International Institute of Forecasters presents:

The 30th International Symposium on Forecasting

San Diego, USA - June 20-23, 2010

Program and Abstracts
The 30th International Symposium on Forecasting (ISF 2010)
June 20-23, 2010 San Diego, California - USA

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Econometrics, and Research Associate of the National Bureau of Economic Research. Prior to joining UCSD, Professor Hamilton has held positions at the University of Virginia. He is associate editor for the Journal of Business and Economic Statistics and the Journal of Money, Credit and Banking. Professor Hamilton is a world-renowned expert on business cycles, energy economics, and econometrics. His approach to modeling changes in regime has been the most influential in the analysis of business cycles. Professor Hamilton's path-breaking article "A new approach to the economic analysis of nonstationary time series and the business cycle" has gathered citations in the thousands, and his highly successful textbook Time Series Analysis is a must-have among graduate students and researchers in the field. Professor Hamilton runs an enjoyable blog on the analysis of current economic conditions and policy http://www.econbrowser.com.

Point of Sale data represents the final real [purchased] demand by consumers and hence is the most effective measure of consumer demand. POS data has become common in the portfolio of data maintained within demand signal repositories (DSRs) by both retail and CPG companies. However, there are significant issues in the effective utilization of POS data. CPG companies need to source POS data from external sources where a great variety of retailers have differing approaches to timing, data cleanliness and other issues which need to be resolved prior to using POS data. In addition, the influence of

The Great Recession witnessed the demolition of decoupling as the global economy experienced an unusually synchronized recession. This paper examines the diffusion, depth and breadth of the recent global recession and analyses the factors that contributed to its severity such as trade and financial linkages. This study also finds that while future international recessions are unlikely to be quite as concerted or intense as the one just experienced, they will probably exhibit greater cyclical "coupling" than the pattern seen for a couple of decades preceding the 2007-09 recession. The paper also examines the highly concerted cyclical upswing that has followed an unusually concerted downturn. The role of a reliable leading index system in helping to time policy actions appropriately is also discussed.

Alan Timmermann has been a member of UC San Diego's department of economics since 1994 and obtained his Ph.D. from the University of Cambridge. He now holds a full-time position at the Rady School and has a joint appointment with the economics department. Dr. Timmermann has worked

JERRY SANDERS
MAYOR

WELCOME TO THE
PARTICIPANTS OF THE

INTERNATIONAL SYMPOSIUM
ON FORECASTING

June 20-23, 2010

On behalf of the City of San Diego, I am pleased to welcome all participants to International Symposium on Forecasting.

Since 1981, the International Institute of Forecasters has been dedicated to developing and furthering the generation, distribution, and use of knowledge on economic forecasting. I commend your work to improve economic forecasting techniques all over the world. The International Symposium on Forecasting is the premier forecasting conference, attracting the world's leading forecasting researchers, practitioners, and students. Success at this conference will help improve forecasting techniques to better suit the nation's economy.

I am pleased that you selected *America's Finest City* as the location for your meeting. San Diego is full of history and diverse cultures, and home to famous venues such as the San Diego Zoo, Balboa Park, Midway Carrier Museum, Sea World, and many museums, parks, beaches and restaurants that I know you will find very enjoyable.

Please accept my best wishes for a successful symposium, and a pleasant stay in San Diego. I hope that you will come back and visit us again soon.

Sincerely,

JERRY SANDERS
Mayor

Welcome from the ISF2010 Chair

On behalf of ISF 2010, the 30th International Symposium on Forecasting, and the International Institute of Forecasters, I am delighted to welcome you to the Symposium and to San Diego. This is the first time we have held a Symposium on the West Coast of the United States. The last time we were in this area was in 1989 in Vancouver. Looking around San Diego I can only wonder, what took us so long?

As you look through the program book you will find some essential logistical details that will help make your stay more enjoyable followed by the program summary and detailed abstracts that indicate what a wide-ranging program is being offered. We expect some 300 participants from over 40 countries and all continents will hear almost 300 presented papers. It is highly appropriate as we convene almost on the doorstep of the University of California at San Diego, that this Symposium marks the first Clive Granger Memorial Keynote Address. Clive Granger moved to UC San Diego in 1974 from his alma mater, the University of Nottingham, and spent the remainder of his career here. One of his former students, Mark Watson, will give the address.

The job of Organizing Chair has become much easier than it once was, thanks to the sterling efforts of our Business Manager, Pam Stroud. On the other hand, the job of Program Chair has not, and I am especially grateful to Gloria González -Rivera who has labored mightily to organize the program sessions. I also thank our sponsors who provide support critical to the success of the Symposium.

I hope you will join me at the Gala Dinner on Tuesday night at the Prado, in nearby Balboa Park. The park, which is a National Historic Landmark, contains several museums and gardens as well as the famous San Diego Zoo and is well worth a visit, if you have the time.
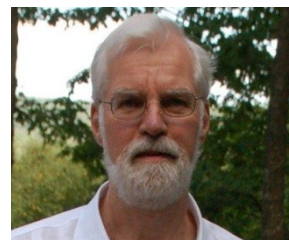
P. Geoffrey Allen
General Chair, ISF 2010

Welcome from the IIF President

With great pleasure, I welcome you, on behalf of the International Institute of Forecasting to the 30th International Symposium on Forecasting in San Diego, U.S., one of the most attractive cities in California. This is the first symposium to be held on the West Coast, and the Organizing Committee and the Directors of the Institute have aimed to involve as many participants as possible from the region. ISFs are becoming truly international with more than 300 delegates from different countries covering all five continents. As usual, my special welcome to the new delegates attending the ISF for the first time. Our aim is to ensure a continuing supply of well-trained forecasting researchers who have a broad perspective of the discipline's important problems. Please consider becoming a member of the IIF, and you will receive the *International Journal of Forecasting,* the premier forecasting journal; *Foresight: The International Journal of Applied Forecasting*; and *The Oracle*, our newsletter. Also consider submitting your presented paper to one of our publications. If interested, do not hesitate to contact Rob Hyndman, editor of the IJF and Len Tashman, editor of Foresight or any of the journals' associated editors at the Symposium.

Thirty years ago, the Institute's goals were set up to unify the disparate strands of forecasting research and practice. As part of its educational agenda, the Institute has taken several other steps towards meeting its goals. (1) The generous support of SAS Corporation has allowed us to offer competitive annual awards in the areas of methodology and applications. (2) We are also contributing to the professional development of practitioners through alternative certification programs; reviewing and approving programs on forecasting offered by qualified individuals and organizations. (3) To encourage larger attendance to ISF we keep offering a limited number of travel grants to young researchers and PhD students. (4) Since 2003, we have been sponsoring small-scale specialized workshops on various themes. The last workshop, Transportation Forecasting, was organised by Benito Flores and Peg Young and took place in Washington DC (September, 22-23, 2009) As with past workshops, experienced the same level of success as in Madrid, Salamanca, Leipzig , Rio de Janeiro and Lisbon. The 7th IIF Workshop, Flash Indicators, will take place in Verbier (Switzerland, January 2011) and will be organised by Miriam Scaglione (miriam.scaglione@hevs.ch) and Esther Ruiz (ortega@est-econ.uc3m.es). At the time of writing this note, plans for an additional workshop on Forecasting the Business Cycle, organised by Laurent Ferrara (Paris, December 2011), have been finalized. You can find more detailed information at http://forecasters.org/conf-wkshops.html.

The Institute depends heavily on volunteers. New directors are elected annually to serve a three-year term whilst the president is elected from among directors. It is my pleasure to welcome two new elected directors, Kesten Green and Haiyan Song and wishing them the best of luck in their duties. One of the outgoing directors, Nada Sanders deserves my sincere gratitude for her contributions to the Institute and her job over the years. We are always looking for volunteers, to assist in meeting the goals of the IIF - to help with activities such as The Oracle, conferences and workshops. Please contact me or one of

the other directors if you wish to be involved, or plan on attending the members meeting which is to be held Monday, 6/21at 5:30pm.

Finally, those of us who have been involved in organizing and running a Symposium know how much energy and dedication is needed; particularly when unexpected events force us to change many organisational details. Therefore, I am especially grateful to Geoff Allen and Gloria **González**-Rivera, and their Organizing and Program Committees. With her usual diligence, our Business Manager, Pam Stroud, has also made every imaginable effort to make ISF 2010 a most memorable event. Thank you all!

Antonio García -Ferrer
President, *International Institute of Forecasters*

Sponsors

The ISF 2010 Organizing Committee would like to thank our Sponsors:

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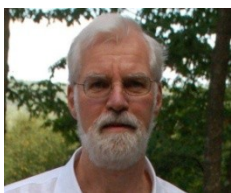
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General Information

<u>Airport and Transportation</u>
San Diego International Airport (Lindbergh Field) – (619) 400-2400

XPRESS Shuttle Transportation: (800) 900-RIDE, www.xpressshuttle.com; Xpress Shuttle offers transportation to and from the airport 24 hours a day at $8.00 per person each way. All major credit cards are accepted.

Taxi cabs are easily accessible outside the baggage claim area of the airport. The approximate cost is $11.00-$15.00 each way.

Busses/Transit: (619) 233-3004 www.sdcommute.com
San Diego Trolley Service: 619-231-8549 or 619-233-3004,
http://www.sdcommute.com/

<u>Banking</u>
- Check cashing privileges are available at the Front Desk for hotel guests only.
- Three Automated Teller Machines are located in the lobby of the Hotel – one at the base of the Seaport Tower, the second outside of Lael's in the Harbor Tower, and the third across from the concierge desk in the Harbor Tower
- Currency Exchange - The Hyatt's Front Desk agents will be happy to assist guests with currency exchange transactions.

<u>Medical Facilities</u>
- Gaslamp Urgent Care (619) 239-9675, 250 Market Street, at 3rd Ave. Open Monday-Friday 8am-6pm, Saturday 8am-1pm, closed Sunday.
- Midway Urgent Care (619) 225-6200, 3434 Midway Drive, 92110
- Open 7 Days a week; 8am-12 Midnight
- Sharp Rees-Stealy Urgent Care (858) 499-2777, 2001 4th Avenue
- Mercy Hospital (619) 294-8111, 4077 5th Ave., at Washington Street
- UCSD Medical Center (619) 543-6222 or (619) 543-6400, 200 West Arbor Drive

<u>Pharmacies</u>
- Allen Pharmacy (619) 232-8101, 1141 6th Ave., Free Delivery; Closed Sundays.
- Ralph's Grocery Store Pharmacy (619) 237-7660, 1st Ave. at G Street. (Closest to Hotel)
- Longs Drugstore (619) 234-5900, 645 Market Street at 6th Ave.

<u>Activities & Attractions</u>
San Diego Convention & Visitors Bureau, 619-236-1212,
www.sandiego.org

o Balboa Park, (619) 239-0512, www.balboapark.org
o Belmont Park, (858) 228-9283, www.belmontpark.com:
Located just minutes from the hotel, this beachfront,
family amusement park features a 1925 roller coaster, the
Plunge (indoor public swimming pool), arcades,
restaurants, shops and more.
o Birch Aquarium at Scripps Institute of Oceanography,
(858) 534-3474(FISH), www.aquarium.ucsd.edu
o Cabrillo National Monument, (619) 557-5450,
www.nps.gov/cabr/
o Gaslamp Quarter, (619) 233-5227, www.gaslamp.org:
historical district of San Diego
o LEGOLAND California, (760) 918-LEGO, www.legoland.com
o Old Town, (619) 220-5373, www.oldtownsandiegoguide.com
o San Diego Wild Animal Park, (760) 747-8702,
www.sandiegozoo.org
o Seaport Village, (619) 235-4014,
www.seaportvillage.com: Seaport Village is located just
steps from the Manchester Grand Hyatt.
o SeaWorld, (619) 226-3901, (800) 25-SHAMU,
www.seaworld.com
o San Diego Zoo, (619) 231-1515, www.sandiegozoo.org

Museums
   o Aerospace Museum (619) 234-8291
   o Centro Cultural de la Raza (619) 235-6135
   o Mingei International Museum (619) 239-0003
   o Museum of Photographic Arts (619) 238-7559
   o San Diego Historical Society (619) 232-6203
   o Reuben H. Fleet Science Center (619) 238-1233
   o San Diego Art Institute (619) 236-0011
   o San Diego Museum of Art (619) 232-7931
   o San Diego Museum of Man (619) 239-2001
   o San Diego Natural History Museum (619) 232-3821
   o Spanish Village Art Center (619) 233-9050
   o Timkin Museum of Man (619) 239-5548
   o Museum of San Diego History (619) 232-6203

Tours & Sightseeing
   o Contactours & Charter services, (619) 477-8687,
     www.contactours.com
   o Old Town Trolley Tours of San Diego, (619) 298-8687,
     www.historictours.com
   o SEAL Tours of San Diego – Sea & Land Adventures, (619)
     298-8687, www.sealtours.com

- o Hornblower Cruises and Events, (619) 686-8700, www.hornblower.com

<u>Water Activities</u>
Power Boat, Sailboat, Kayak, and wave runner rentals are available through Downtown Boat Rentals at Marina A, located behind Sally's Restaurant. Seaforth Boat Rentals can be reached at (619) 239-2628.

Exhibitors

Autobox.com

forecastpro.com

timberlake.co.uk

sas.com

Meetings

Board of Director's Meetings

Saturday, 19 June 2010
10:00am - 4:00pm
Manchester Grand Hyatt, Oxford Meeting Room

Sunday, 20 June 2010
10:00am - 3:00pm
Manchester Grand Hyatt, Oxford Meeting Room

Board of Director's Dinner

Saturday, 19 June 2010
7:00pm - 10:00pm
Sally's Restaurant, Manchester Grand Hyatt

Future ISF Organizers' Meeting

Sunday, 20 June 2010
4:15pm – 4:45pm
Manchester Grand Hyatt, Oxford Meeting Room

IJF Associate Editors Meeting

Sunday, 20 June 2010
4:00pm - 5:00pm
Manchester Grand Hyatt, America's Cup D

IJF Associate Editors Dinner

Monday, 21 June 2010
7:00pm - 10:00pm
Casa Guadalajara, Old Town San Diego

IIF Members Meeting

Monday, 21 June 2010
5:30pm - 6:00pm
Manchester Grand Hyatt, Cunningham A

ISF2010 Registration and Schedule

- Registration will take place on the 4th Level of the Manchester Grand Hyatt

- Tickets for the Gala Event may be purchased at the Registration Desk.

- Delegates are asked to wear their badges at all times during the symposium events.

Registration - Hours
Sunday, June 20   8:00am - 9:00am
                     3:00pm - 6:00pm
Monday, June 21   8:00am - 5:00pm (closed during lunch session)
Tuesday, June 22   8:00am - 3:00pm (closed during lunch session)
Wednesday, June 23   8:00am - 10:00am

SYMPOSIUM SCHEDULE

Sunday, June 20
9:00am-5:00pm Workshop #1: Advances in Forecasting with Neural Networks
9:00am-12:00pm Workshop #2: Abstract Intervention Analysis
9:00am-12:00pm Workshop #3: Order Matters!
1:00pm-5:00pm Workshop #4: Time-Series Data Mining
1:00pm-5:00pm Workshop #5: Demand Driven Forecasting

4:00pm -5:00pm IJF Editor's Meeting
5:00pm -5:30pm ISF Future Organizer's Meeting
6:00pm 8:00pm Welcome Reception, Hyatt Courtyard

Monday, June 21
8:15am-8:30am Welcome Address
8:30am-9:30am Keynote Speaker
9:40am-12:40pm Sessions (with coffee break)
12:40pm-2:00pm Lunch
2:00pm-5:30pm Sessions (with coffee break)
5:30pm-6:00pm IIF Member's Meeting

Tuesday, June 22
8:30am-9:30am Keynote Speaker
9:40am-12:40pm Sessions (with coffee break)
12:40pm-2:00pm Lunch (ISF2011 Presentation)
2:00pm-5:30pm Sessions (with coffee break)
6:00pm-10:00pm Gala Event – The Prado, Dinner, Entertainment

Wednesday, June 23
8:30am-9:30am Keynote Speaker
9:40am-12:30pm Sessions
12:30pm-2:00pm Lunch

Keynote Speakers

Mark Watson

Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs, Princeton University

Dating Business Cycles Using Many Indicators

(Joint with James H. Stock, Harvard University)

Time: Wednesday, June 23 8:30am-9:30am
Venue: Randall Ballroom

Recipient of the honor of the *1st Clive Granger Memorial Keynote Address*

Greg Allenby

Helen C. Kurtz Chair in Marketing, Ohio University

A Probit Model with Structured Covariance for Similarity Effects and Source of Volume Calculations

Time: Tuesday, June 22 8:30am-9:30am
Venue: Randall Ballroom

 Tim Bollerslev

Juanita & Clifton Kreps Professor, Duke University

Modeling and Forecasting Financial Market Volatility: Past Developments and New Directions

Time: Monday, June 21 8:30am-9:30am
Venue: Randall Ballroom

Featured Speakers

William Cotton

Professor, Department of Atmospheric Science, Colorado State University

Is Climate Really Predictable on 10-50 Year Time Scales?

Time: Wednesday, June 22, 9:40am-10:40am
Venue: Cunningham AB

James Hamilton
Professor, Economics, University of California, San Diego
Calling Recessions in Real Time [IJF Invited Lecture]

Time: Monday, June 21, 9:40am-10:40am
Venue: Cunningham AB

David Orrell
Scientist and Author, The Future of Everything, and Economyths
Where's the Puck? 2500 Years of Forecasting

Time: Monday, June 21, 2:00pm-3:00pm
Venue: Cunningham AB

Allan Timmermann
Atkinson/Epstein Endowed Chair, University of California, San Diego

New Tests of Forecast Optimality Across Multiple Horizons

Time: Tuesday, June 22, 9:40am-10:40am
Venue: Cunningham AB

Organized Session Chairs

Carlos Mate	Universidad Pontificia Comillas, Spain
John Guerard	McKinley Capital Management, USA
Herman Stekler	George Washington University, USA
Mohsen Hamoudia	France Telecom Group, France
James Alleman	University of Colorado, USA
Peg Young	US Department of Transportation, USA
Gian Luigi Mazzi	Eurostat, Luxembourg
Steven Vitullo	Marquette University, USA
Gaetana Montana	Eurostat, Luxembourg
Kesten Green	University of South Australia, Australia
Sven Crone	Lancaster University, United Kingdom

Workshops

ISF 2010 offers unique, tailored workshops for symposium registrants. The workshops provide the opportunity to participate in an in-depth look at specific forecasting themes. All workshops will be held on Sunday, June 20, 2010.

Workshop #1
Advances in Forecasting with Neural Networks

Dr. Hans Georg Zimmermann

Senior Principal Research Scientist, Siemens AG

9:00am - 5:00pm

Venue: Cunningham A

The identification of dynamical systems, forecasting and optimal control respectively optimal decision making are standard econometric tasks. Does the mathematics of neural networks add something new to econometrics? Do we get new

methodological insights and even a better understanding of the real world economy? The lecture answers these questions with a definitive yes!

The workshop is of interest for academics as well as practitioners. It gives an overview of 22 years of our method and software development together with econometric applications we have done at Siemens Corporate Technology.

Workshop #2

Abstract Intervention Analysis

Chip Wells

SAS, Cary, NC - USA

9:00am - 12:00pm

Venue: Cunningham B

Intervention analysis is widely used in many areas of time series analysis. Applications include policy analysis of law changes, identifying and estimating demand effects associated with retail promotional activity, and accommodating supply shocks associated with hurricanes in production forecasting models. The rational polynomial transfer function framework provides forecasting practitioners with a flexible and powerful tool for identifying, estimating and extrapolating intervention effects in a time series model.

This workshop discusses intervention analysis in a rational polynomial transfer function framework. The discussion emphasizes building intuition regarding how dynamic intervention effects (lags, shifts, decay, etc.) are accommodated in univariate time series models. Examples of the transfer function approach to intervention analysis are presented using SAS/ETS and SAS Forecast Server software.

Workshop #3

Order Matters! How the sequence in which you introduce variables into your model determines the quality of your analysis

David P. Reilly

Automatic Forecasting Systems, USA

9:00am - 12:00pm

Venue: Cunningham C

Model Identification using a bottom-up approach requires alternative scenarios in order to consider the impact of the sequence of integrating memory of the Y variable along with incorporating causal variables while adjusting for the impact of omitted series both stochastic and deterministic with proxy variables (ie dummy variables).

Spurious Outliers can often be restated as lead/lag effects of user specified series thus enhancing the forecast model. Unspecified Level Shift variables in a series increase the background error variance effectively masking the statistical significance of model coefficients. In univariate models, treating the outlier first leads to a clear formulation of the ARIMA structure while in other cases you should treat introduce the ARIMA structure first before identifying the outlier. This problem gets even more complicated in causal models since the order in which one treats causal, memory and dummies becomes critical in forming a quality model. A number of textbook examples and real-life industrial examples will be explored in the seminar.

Workshop #4

Time Series Data Mining

Michael Leonard

SAS, Cary, NC - USA

1:00pm - 5:00pm

Venue: Cunningham B

Web sites and transactional databases collect large amounts of time-stamped data related to their suppliers and/or customers over time. Mining this time-stamped data can help business leaders make better decisions by listening to their suppliers or customers via their transactions collected over time. A business can have many suppliers and/or customers and may have a set of transactions associated with each one. However, the size of each set of transactions may be quite large making it difficult to perform many traditional data mining tasks. This workshop proposes techniques for large-scale reduction of time-stamped data using time series analysis, seasonal decomposition, and automatic time series model selection. After data reduction, traditional data mining techniques can then be applied to the reduced data along with other profile data. This workshop demonstrates these techniques using SAS/ETS and Enterprise Miner.

Workshop #5

Time Series Data Mining

Charlie Chase

SAS, Cary, NC - USA

1:00pm - 5:00pm

Venue: Cunningham C

Demand-driven forecasting is a three-step process that

allows companies to sense demand signals through the synchronization of internal and external data, shape demand using advanced analytics, and predict demand to create a more accurate unconstrained demand forecast. Using "what if" analysis, forecasters can shape demand based on current sales and marketing activities as well as on external

factors affecting demand such as weather, special events, and economic conditions to optimize volume and revenue while minimizing marketing investment. This structured approach puts more emphasis on upstream activities that directly affect consumer demand, thus creating a more practical view of true unconstrained demand.

List of Sessions by Topic Area

Keynote Speakers

K1   Plenary   **Tim Bollerslev**   Monday, 8:30am-9:30am
            Modeling and Forecasting Financial Market Volatility:
            Past Developments and New Directions

K2   Plenary   **Greg Allenby**   Tuesday, 8:30am-9:30am
            A probit model with structured covariance for
            similarity effects and source of volume calculations

K3   Plenary   **Mark Watson**   Wednesday, 8:30am-9:30am
            Dating business cycles using many indicators

Featured Speakers

FS1 Featured **James Hamilton**   Monday, 9:40am-10:40am

            Calling Recessions in Real Time [IJF Invited Lecture]

FS2 Featured **David Orrell**   Monday, 2:00pm-3:30pm
            Where´s the puck? 2500 years of forecasting

FS3 Featured **Allan Timmermann**   Tuesday, 9:40am-10:40am
            New tests of forecast optimality across multiple horizons

FS4 Featured **William Cotton**   Wednesday, 9:40am-10:40am
            Is climate really predictable on 15-20 year time scales

Business Cycles

BC1   Organized   Business Cycles 1   Monday, 11:10am-12:40pm
BC2   Contributed   Business Cycles
      Monday, 4:00pm-5:30pm
BC3   Contributed   Business Cycles 3
      Tuesday, 9:40am-10:40am
BC4   Contributed   Business Cycles 4
      Tuesday, 11:10am-12:40pm
BC5   Contributed   Business Cycles 5
      Tuesday, 2:00pm-3:30pm
BC6   Contributed   Business Cycles 6
      Tuesday, 4:00pm-5:30pm
BC7   Contributed   Business Cycles 7
      Wednesday, 9:40am-10:40am
BC8   Contributed   Business Cycles 8
      Wednesday, 11:00am-12:30pm

Climate and Environment

C&E1 Contributed   Climate and Environment
      Monday, 11:10am-12:40pm
C&E2 Organized   Climate & Environment 2   Wednesday, 11:00am-12:30pm

Count Data/Intermittent Demand

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CD      Contributed     Count Data/Intermittent Demand, Practitioner Track
        Monday, 2:00pm-3:30pm
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Demography

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DM      Contributed                                    Demography
        Tuesday, 9:40am-10:40am
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Econometrics

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EC1     Contributed                                    Econometrics 1
        Monday, 4:00pm-5:30pm
EC2     Contributed                                    Econometrics 2
        Tuesday, 11:10am-12:40pm
```

Energy

```
EN1     Contributed                                    Energy 1
        Monday, 9:40am-10:40am
EN2     Contributed                                    Energy 2
        Monday, 11:10am-12:40pm
EN3     Contributed                                    Energy 3
        Monday, 4:00pm-5:30pm
EN4     Contributed                                    Energy 4
        Tuesday, 11:10am-12:40pm
EN5     Organized   Energy 5              Wednesday, 9:40am-10:40am
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Exponential Smoothing

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ES      Contributed               Exponential Smoothing
        Monday, 4:00pm-5:30pm
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Forecasting Methods

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FM1     Contributed               Forecasting Methods 1
        Monday, 11:10am-12:40pm
FM2     Contributed               Forecasting Methods 2
        Monday, 2:00pm-3:30pm
FM3     Contributed               Forecasting Methods 3
        Monday, 4:00pm-5:30pm
FM4     Contributed               Forecasting Methods 4
        Tuesday, 11:10am-12:40pm
FM5     Contributed               Forecasting Methods 5
        Tuesday, 2:00pm-3:30pm
FM6     Contributed               Forecasting Methods 6
        Tuesday, 2:00pm-3:30pm
FM7     Contributed               Forecasting Methods 7
        Tuesday, 4:00pm-5:30pm
FM8     Contributed               Forecasting Methods 8
        Tuesday, 4:00pm-5:30pm
FM9     Contributed               Forecasting Methods 9
        Wednesday, 11:00am-12:30pm
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Finance

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FN1   Organized   Finance 1                          Monday, 11:10am-12:40pm
FN2   Contributed                                             Finance 2
      Monday, 2:00pm-3:30pm
FN3   Contributed                                             Finance 3
      Monday, 4:00pm-5:30pm
FN4   Contributed                                             Finance 4
      Tuesday, 9:40am-10:40am
FN5   Contributed                                             Finance 5
      Tuesday, 11:10am-12:40pm
FN6   Contributed                                             Finance 6
      Tuesday, 2:00pm-3:30pm
FN7   Contributed                                             Finance 7
      Tuesday, 4:00pm-5:30pm
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State / Local Government

```
GO    Contributed                               State/Local Government
      Tuesday, 4:00pm-5:30pm
```

Inflation

```
IF    Contributed                                            Inflation
      Monday, 11:10am-12:40pm
```

Industry

```
IN1   Contributed                           Industry 1, Practioner Track
      Monday, 4:00pm-5:30pm
IN2   Contributed                         Industry 2, Practitioner Track
      Wednesday, 11:00am-12:30pm
```

Judgemental Forecasting

```
JF1   Contributed                 Judgemental & Scenario Forecasting 1
      Monday, 2:00pm-3:30pm
JF2   Contributed                         Judgemental Forecasting
      Tuesday, 4:00pm-5:30pm
JF3   Contributed                       Judgemental Forecasting 3
      Wednesday, 9:40am-10:40am
```

Macroeconomics

```
MC    Organized   Macroeconomics                  Tuesday, 4:00pm-5:30pm
```

Marketing

```
MK1   Contributed                         Marketing 1, Practitioner Track
      Monday, 9:40am-10:40am
MK2   Contributed                                        Marketing 2
      Tuesday, 4:00pm-5:30pm
```

Neural Networks

```
NN    Organized   Neural Networks              Tuesday, 11:10am-12:40pm
```

Prediction Markets

PM   Contributed   Prediction Markets
      Tuesday, 2:00pm-3:30pm

Supply Chain

SC   Organized   Supply Chain, Practitioner Track   Tuesday, 9:40am-
10:40am

Symbolic Data

SD   Organized   Symbolic Data   Wednesday, 11:00am-12:30pm

Software

SW   Contributed   Software
      Monday, 2:00pm-3:30pm

Telecommunications

TL1   Organized   Telecommunications 1, Practitioner Track   Tuesday,
11:10am-12:40pm
TL2   Contributed   Telecommunications 2, Practitioner Track
      Tuesday, 2:00pm-3:30pm

Transportation

TP1   Organized   Transportation, Practitioner Track   Monday, 11:10am-
12:40pm

Tourism

TR1   Contributed   Tourism 1
      Monday, 9:40am-10:40am
TR2   Organized   Tourism 2   Tuesday, 9:40am-10:40am

Volatility

VO1   Contributed   Volatility 1
      Monday, 9:40am-10:40am
VO2   Contributed   Volatility 2
      Monday, 11:10am-12:40pm
VO3   Contributed   Volatility 3
      Monday, 4:00pm-5:30pm
VO4   Contributed   Volatility 4
      Tuesday, 11:10am-12:40pm
VO5   Contributed   Volatility 5
      Tuesday, 2:00pm-3:30pm

Timetable / Schedule Overview

Room locations can be found on page 170

Saturday 19 June

10:00am – 5:00pm
IIF Directors Meeting   Oxford Meeting
Room

Sunday 20 June

10:00am – 2:00pm
IIF Directors Meeting   Oxford Meeting
Room

9:00am-5:00pm
Workshop: Advances in Forecasting with Neural Networks   Cunningham A

9:00am-12:00pm
Workshop #2: Abstract Intervention Analysis   Cunningham B

9:00am-12:00pm
Workshop #3: Order Matters!   Cunningham C

1:00pm-5:00pm
Workshop #4: Time-Series Data Mining   Cunningham B

1:00pm-5:00pm
Workshop #5: Demand Driven Forecasting   Cunningham C

4:00pm-5:00pm
IJF Editor's Meeting   America's Cup D

5:00pm-5:30pm
ISF Future Organizer's Meeting   Oxford Meeting
Room

6:00pm-8:00pm
Welcome Reception   Hyatt Seaport
Courtyard

Monday 21 June

8:15am-8:30am
Welcome Address   Randle Ballroom

8:30am-9:30am
Keynote Speaker – Tim Bollerslev   Randle Ballroom

Modeling and Forecasting Financial Market Volatility: Past Developments and New Directions

9:40am-10:40am
Featured Speaker – Jim Hamilton   Cunningham AB
Calling Recessions in Real Time [IJF Invited Lecture]

TR1   Contributed: Tourism 1   America's Cup A
MK1   Contributed: Marketing 1, Practitioner Track   America's Cup B
VO1   Contributed: Volatility 1   America's Cup C
EN1   Contributed: Energy 1   America's Cup D

Break   Randle Foyer

11:10am-12:40pm
C&E1 Contributed: Climate and Environment   America's Cup A
TP1   Organized: Transportation, Practitioner Track   America's Cup B
VO2   Contributed: Volatility 2   America's Cup C
EN2   Contributed: Energy 2   America's Cup D
BC1   Organized: Business Cycles 1   Cunningham A
FM1   Contributed: Forecasting Methods 1   Cunningham B
FN1   Organized: Finance 1   Cunningham C
IF   Contributed: Inflation   Oxford

12:40pm – 2:00pm
Lunch   Randle CDE

2:00pm-3:30pm
Featured Speaker – David Orrell   Cunningham AB
Where´s the puck? 2500 years of forecasting

JF1   Contributed: Judgemental & Scenario Forecasting 1   America's
Cup A
CD   Contributed: Count Data/Intermittent Demand, Practitioner Track
      America's Cup B
FM2   Contributed: Forecasting Methods 2   America's Cup C
FN2   Contributed: Finance 2   America's Cup D
SW   Contributed: Software   Oxford

Break   Randle Foyer

4:00pm-5:30pm
ES   Contributed: Exponential Smoothing   America's Cup A
IN1   Contributed: Industry 1, Practitioner Track   America's Cup B
VO3   Contributed: Volatility 3   America's Cup C
EN3   Contributed: Energy 3   America's Cup D
BC2   Contributed: Business Cycles   Cunningham A
FM3   Contributed: Forecasting Methods 3   Cunningham B
FN3   Contributed: Finance 3   Cunningham C
EC1   Contributed: Econometrics 1   Oxford

5:30pm-6:00pm
IIF Member's Meeting   Cunningham A

Tuesday 22 June

8:30am-9:30am

Keynote Speaker – Greg Allenby   Randle Ballroom
A probit model with structured covariance for similarity effects and source of volume calculations

9:40am-10:40am
Featured Speaker – Allan Timmermann   Cunningham AB
New tests of forecast optimality across multiple horizons

```
TR2    Organized: Tourism 2                      America's Cup A
SC     Organized: Supply Chain, Practitioner Track    America's Cup B
FN4    Contributed: Finance 4                    America's Cup C
DM     Contributed: Demography                   America's Cup D
BC3    Contributed: Business Cycles 3            Oxford
```

Break   Randle Foyer

11:10am-12:40pm
```
NN     Organized: Neural Networks                America's Cup A
TL1    Organized: Telecommunications 1, Practitioner Track  America's
Cup B
VO4    Contributed: Volatility 4                 America's Cup C
EN4    Contributed: Energy 4                     America's Cup D
BC4    Contributed:  Business Cycles 4           Cunningham A
FM4    Contributed: Forecasting Methods 4        Cunningham B
FN5    Contributed:  Finance 5                   Cunningham C
EC2    Contributed: Econometrics 2               Oxford
```

12:40pm – 2:00pm
Lunch   Randle CDE

2:00pm-3:30pm

```
PM     Contributed: Prediction Markets           America's Cup A
TL2    Contributed: Telecommunications 2, Practitioner Track America's
Cup B
VO5    Contributed: Volatility 5                 America's Cup C
FM5    Contributed: Forecasting Methods 5        America's Cup D
BC5    Contributed: Business Cycles 5            Cunningham A
FM6    Contributed: Forecasting Methods 6        Cunningham B
FN6    Contributed: Finance 6                    Cunningham C
```

Break   Randle Foyer

4:00pm-5:30pm
```
JF2    Contributed: Judgemental Forecasting      America's Cup A
MK2    Contributed: Marketing 2                  America's Cup B
FM7    Contributed: Forecasting Methods 7        America's Cup C
GO     Contributed: State/Local Government       America's Cup D
BC6    Contributed: Business Cycles 6            Cunningham A
FM8    Contributed: Forecasting Methods 8        Cunningham B
FN7    Contributed: Finance 7                    Cunningham C
MC     Organized: Macroeconomics                 Oxford
```

7:00pm-10:00pm
Gala Event   The Prado
Buses leave hotel at 6:00pm

Wednesday 23 June

8:30am-9:30am
Keynote Speaker – Mark Watson   Randle Ballroom
Dating business cycles using many indicators

9:40am-10:40am
Featured Speaker – William Cotton   Cunningham AB
Is climate really predictable on 15-20 year time scales?

JF3	Contributed: Judgemental Forecasting 3	America's Cup A
BC7	Contributed: Business Cycles 7	America's Cup C
EN5	Organized: Energy 5	America's Cup B

Break   Randle Foyer

11:00am-12:30pm

C&E2	Organized: Climate & Environment 2	America's Cup A
IN2	Contributed: Industry 2, Practitioner Track	America's Cup B
SD	Organized: Symbolic Data	America's Cup D
BC8	Contributed: Business Cycles 8	Cunningham A
FS9	Contributed: Forecasting Methods 9	Cunningham B

12:30pm – 2:00pm
Lunch Randle CDE

ABSTRACTS

Notes:

- For papers with multiple authors, the presenter is indicated by *

- The IIF will publish electronic proceedings of this symposium (ISSN 1997-4124). Please submit your paper or

presentation as soon as possible. Details of the procedure can be found on page 163.

Keynote Speech [K1]

Plenary Session:

Monday, June 21, 8:30am-9:30am
Room: Randle AB

Chair: Gloria González-Rivera
University of California, Riverside, USA

Modeling and forecasting financial market volatility: past developments and new directions

Tim Bollerslev
Duke University, USA

Following the advent of the (G)ARCH class of models more than two decades ago, a revolution in modeling and forecasting financial market volatility has swept academic research and the financial services industry alike, with the new forecasting procedures finding wide-ranging applications in asset pricing, portfolio allocation, risk management, as well as direct volatility based trading. This lecture surveys some of the important historical developments and most popular statistical forecasting procedures in current use, along with ongoing volatility research based on high-frequency intraday data and so-called realized variation measures.

Tim Bollerslev is the first Juanita and Clifton Kreps Distinguished Professor of Economics at Duke University and Professor of Finance at the Fuqua School of Business at Duke University. He is an elected fellow of the Econometric Society, and a longtime Research Associate at the National Bureau of Economic Research in Cambridge, Massachusetts. Prior to joining Duke, Dr.Bollerslev has held positions as the Sharpe Distinguished Professor of Finance at the Kellogg Graduate School of Management at Northwestern University, and the Commonwealth Professor of Economics at the University of Virginia. Risk and volatility plays a central role in the theory and practice of financial economics. It is only over the past two decades, however, that economists have begun to fully appreciate the importance of accurately, measuring, modeling and forecasting the temporal dependencies in financial market volatility. Dr. Bollerslev's research has been at the forefront of these developments. Many of his ideas for forecasting financial market volatility are now routinely used by economists and finance practitioners throughout the world. The GARCH model invented by Dr. Bollerslev was explicitly cited in the press release accompanying the 2003 Nobel Prize in Economics "for methods

of analyzing economic time series with time-varying volatility (ARCH)" as the "model most often applied today." Much of Dr. Bollerslev's recent research has focused on the analysis of newly available high-frequency intraday or tick-by-tick, financial data and so-called realized volatility measures.

Featured Speech [FS1]

Featured Session:

Monday, June 21, 9:40am-10:40am   Room:
Cunningham AB

Chair: Rob Hyndman
Monash University, Australia

Calling recession in real time (IJF Editor's Invited Paper)

James D. Hamilton

University of California, San Diego, USA

This paper surveys efforts to automate the dating of business cycle turning points. Among the challenges discussed are the conceptual meaning of a change in the phase of the business cycle, differences between real-time data releases and subsequent data revisions, and changes over time in key economic and predictive relationships. These concerns warrant putting a high priority on simplicity and robustness. The real-time track records of several alternative approaches are compared.

James D. Hamilton is Professor of Economics at the University of California, San Diego. He is an elected fellow of the Econometric Society and of the Journal of Econometrics, and Research Associate of the National Bureau of Economic Research. Prior to joining UCSD, Professor Hamilton has held positions at the University of Virginia. He is associate editor for the Journal of Business and Economic Statistics and the Journal of Money, Credit and Banking. Professor Hamilton is a world-renowned expert on business cycles, energy economics, and econometrics. His approach to modeling changes in regime has been the most influential in the analysis of business cycles. Professor Hamilton's path-breaking article "A new approach to the economic analysis of nonstationary time series and the business cycle" has gathered citations in the thousands, and his highly successful textbook Time Series Analysis is a must-have among graduate students and researchers in the field. Professor Hamilton runs an enjoyable blog on the analysis of current economic conditions and policy http://www.econbrowser.com

Tourism 1 [TR1]

Contributed Session:

Chair: Pilar González
University of the Basque Country, Spain

Tourism forecasting: the accuracy of alternative econometric models revisited

Haiyan Song *
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Egon Smeral
Austrian Institute of Economic Research
Gang Li
University of Surrey, United Kingdom
Li Chen
Hong Kong Polytechnic University

This study evaluates the forecasting accuracy of six alternative econometric models in the context of predicting the quarterly international tourism demand in 25 countries/country groupings. Tourism demand is measured in terms of tourist expenditure by inbound international visitors in a destination. Two univariate time series models are included in the forecasting comparison as benchmarks. Forecast accuracy is assessed in terms of error magnitude and directional change. Seasonality is an important feature of forecasting models and requires careful handling. The empirical results show that the time-varying parameter (TVP) model provides the most accurate short-term forecasts, whereas the naïve (no-change) model performs best in longer term forecasting up to two years, in terms of the error magnitude accuracy. This study provides new evidence of the TVP model's superior performance in short-term seasonal tourism demand forecasting.

Forecasting seasonal tourism demand using multivariate a structural time series model

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Chenguang Wu
Hong Kong Polytechnic University
Haiyan Song
Hong Kong Polytechnic University

This study presents a new attempt to explore the forecasting superiority of the multivariate time series forecasting method in a new direction. In this study, a quarterly tourism demand series is separated into four seasonal component series. On the one hand, the evident seasonality suggests that each seasonal component series has its unique features. On the other hand, since they all refer to a particular tourism demand, they are most likely to exhibit a common trend in the long run. In addition, due to habit persistence, cross-correlations are likely to exist among the seasonal component series. Therefore it is appropriate to specify these seasonal component series as a multivariate time series model. Given the superior forecasting performance of the basic structural time series model (BSM) over other time series and econometric models, the seasonal component time series in this study are specified as a multivariate BSM. The potential cross-corrections will be specified accordingly. The forecasting accuracy of this multivariate BSM is compared with its univariate counterparts. The empirical results will be reported in the presentation.

Forecasting turning points in Spanish tourism demand growth rate cycle

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Paz Moral
University of the Basque Country, Spain

Tourism demand suffers recurrent fluctuations undergoing periods of expansion and recession. Both public institutions and tourism industries are interested in having information about the turning-points in tourism demand cycle in order to be able to plan investments in advance. Therefore, it is important to develop an appropriate forecast method for this problem.

The objective of this paper is to forecast tourism demand cycle turning-points applying the diffusion index model (Stock and Watson, 2002). This methodology, which has been applied successfully in forecasting macroeconomic variables, is very useful to summarize the information in a large number of time series. It is based on extracting a relative few common factors, which are weighted averages of the predictors, using a model similar to a dynamic factor model.

The tourism demand cycle considered in this paper is the growth rate cycle defined as the trend annual growth rate (TAG) of the monthly overnight stays. The monthly growth rates of the trend are computed applying the Basic Structural Time Series Model (Harvey, 1989). In order to calculate the trend annual growth rate, the monthly growth rates are summed over the year. This series is, finally, centered. A diffusion index model will be fitted to the Spanish tourism demand TAG. In particular, data from two of the main source markets, UK and Germany, are considered. These two origins represent 60% of the total non-resident overnight stays and their temporal evolution show different patterns.

The forecasting performance of this model, with respect to both the growth cycle and the turning-points, is compared to benchmark forecasts from other models used in the literature, in particular, ARIMA models, econometric models (Witt et al., 2003) and composite leading indicator models (Kulendran and Wong, 2009). The composite leading indicator is constructed adding the standardized TAG of the partial indicators considered.

Marketing 1 [MK1] [Practitioner Track]

Contributed Session:

Monday, June 21, 9:40am-10:40am   Room:
America's Cup B

Chair: Wai Keung Calvin Wong
Hong-Kong Polytechnic University

Intelligent Sales Forecasting Decision Support System for Fashion Retailers

Wai Keung Calvin Wong
Hong-Kong Polytechnic University
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The fashion industry is characterized by short product life cycles, volatile customer demands, tremendous product varieties, and long supply processes. Most fashion items' sales are of strong seasonality. Such distinct characteristics increase the complexity of sales forecasting in the fashion retail supply chain. Thus, fashion retailers are still relying on the subjective assessment and experience with simple statistical analysis on the historical sales data to make forecasting decisions. This type of method is unreliable and cannot be stored when the professionals leave the companies while inexperienced buyers may not be capable or confident to develop a reliable sales forecast.

By integrating the PoS database of the fashion retail companies, an intelligent sales forecasting system is developed to generate accurate and reliable mid-term sales forecasts for assisting fashion retailers to conduct sales forecasting activities. The experimental results indicate that the proposed system outperforms the other advanced techniques for fashion sales forecasting. The key features of the system are as below:
1. Integrated operation platform: The system provides an integrated operation platform based on the B/S structure, in which the user can easily analyze historical sales data and conduct sales forecasting in a user-friendly manner.
2. Relation analysis on external factors and fashion sales: External factors, such as weather changes, economic changes and promotion activities, can largely affect fashion sales. The system can discover the relations between these external factors and fashion sales based on extensive data analysis.
3. Intelligent sales forecasting engine: Due to the high demand uncertainty and strong seasonality of fashion sales data, a nonlinear fashion sales forecasting model based on improved extreme learning machine is included in the forecasting engine to generate reliable fashion sales forecasts for assisting the fashion retailers in their sales forecasting decision making process.

Is forecast accuracy a good KPI for applications in retail forecasting?

Roland Martin
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Forecasts are used in many fields to plan the supply of goods. In the retail business, forecasts are used to order items that may run out of stock if no order is placed. However, the forecast quality (independent of the measure used) does not necessarily tell us about the quality of an order. This is due to the fact that retail KPIs focus on stocks, out-of-stocks and lost sales rather than forecast error. In addition, a forecast is just the basis for an order. Several optimisation steps (like logistical unit rounding, order optimisation etc.) are performed based on the initial forecast quantity that blurs the effect of a good forecast.

In this talk we will focus on retail KPIs and show on several examples that a good forecast is necessary but not sufficient for good retail KPIs. More interesting than a perfect forecast (i.e. a small forecast error) is a robust forecast with good error estimation.

Point of Sale Data in Demand Forecasting

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Hans Levenbach
Delphus Inc., USA
Jennifer Beckett
Velocity, Inc., USA

*Point of Sale data represents the final real [purchased] demand by consumers and hence is the most effective measure of consumer demand. POS data has become common in the portfolio of data maintained within demand signal repositories (DSRs) by both retail and CPG companies.   However, there are significant issues in the effective utilization of POS data. CPG companies need to source POS data from external sources where a great variety of retailers have differing approaches to timing, data cleanliness and other issues which need to be resolved prior to using POS data. In addition, the influence of POS information on order flows from retailers is influenced by differing order/buying patterns and supply chain models among retailers. In this presentation we will describe the data characteristics of POS data and give consideration to the applicability of conventional forecasting models.   In addition, we will show several approaches used by CPG companies and suggest potential areas for researchers interested in working with POS data.*Volatility 1 [VO1]

Contributed Session:

Monday, June 21, 9:40am-10:40am   Room: America's Cup C

Chair: Wei-Chong Choo
Universiti Putra, Malaysia

Forecasting volatility for China and Hong Kong stock markets

Sze-Nie Ung
Universiti Putra, Malaysia

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Hui-Yoong Yan
Universiti Putra, Malaysia

This study evaluates the performance of a GARCH model, and its modification, using the rate of returns from the daily stock market indices including Shang Hai Composite Index, Shen Zhen Component Index and Hong Kong Hang Seng Index. We also investigate the behavior of China and Hong Kong stock market volatility with respect to a few macroeconomic variables, which are gold price, crude oil price and currency exchange rates. The results show that all GARCH models are useful in modelling the China and Hong Kong stock markets' volatility, at least within sample. However, we found that the macroeconomic variables used in this study have no impact on the returns of China and Hong Kong stock markets, and have only a little effect on the volatility of China and Hong Kong stock markets. The post-sample results show that the GJRGARCH model outperformed the GARCH model and a few ad hoc methods in forecasting the China and Hong Kong stock market's volatility.

A multi-agent approach for risk analysis improvement based on FIPA standard

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The FMEA methodology is one of the risk analysis techniques recommended by international standards. It is a systematic process to identify potential failures to fulfill the intended function, to identify possible failure causes so the causes can be eliminated, and to locate the failure impacts so the impacts can be reduced. By applying the FMEA methodology during the various phases of a product's life cycle, the methodology provides a systematic and disciplined strategy for examining all the ways in which a product can fail. The results of FMEA in turn affect the product design, process development, sourcing and suppliers' quality, downstream application (referring to downstream of a process or user of the product), and field service. Using Failure Mode and Effects Analysis can potentially be disadvantageous, for this purpose a multi agent system (MAS) is proposed and by relying on its benefits, FMEA disadvantages would fade away. This multi-agent system is adapted to the safety engineering aspect of industrial process lines to accomplish each and every obstacle that could appear in industrial processes and their safety issues.

Forecasting of financial markets: A modeling approach

Rouhia Noomene *
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Forecasts of financial market volatility play a crucial role in financial decision making and the need for accurate forecasts is apparent in a number of areas, such as option pricing, hedging strategies, portfolio allocation and Value-at-Risk calculations. Unfortunately, it is notoriously difficult to accurately predict volatility and the problem is exacerbated by the fact that realized volatility has to be approximated as it is inherently unobservable. Due to its critical role the topic of volatility forecasting has however received much attention and the resulting literature is considerable.

Energy 1 [EN1]

Contributed Session:

Monday, June 21, 9:40am-10:40am   Room:
America's Cup D

Chair: Reinaldo Souza
PUC-Rio, Brazil
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An Integrated Load Forecasting System for a Distributing Utility with Load Data Observed at a very Tiny Interval (15min) to a Long Range Interval (1 year)

Reinaldo Souza
PUC-Rio, Brazil

This paper describes the development of an integrated load forecasting system, where the forecasts are produced simultaneously for all possible horizons, i.e., very short term (up to 30 days ahead, based on 15 min load observations); short term (14 months ahead, based on monthly load data); medium term (60 months ahead, based on monthly load data) and long term (10 years ahead, based on yearly load data). These horizons constitute a compulsory requirement of the Brazilian regulator (ANEEL) and apply to all distributing utilities in operation within the country. The developed system, called SPCI, includes a number of forecasting techniques (Holt-Winters with multiple seasonalities, Neural nets, Dynamic Regression, among others) and was developed in a WEB environment. It uses not only load data from the utility, but also exogenous related series from other sources (meteorological, economic, demographic etc). It displays the forecasts for both active and reactive loads.

Detrending Daily Natural Gas Demand Data Using Domain Knowledge

Ronald Brown *
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Bo Pang
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Steven R. Vitullo
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George F. Corliss
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To economically and safely run their operations, natural gas distribution companies need to know the demand of their customers over the next few days. Often many years of historical daily data is available for building models for forecasting daily use. However, the customer base demand characteristic is not stationary due to customers changing equipment and customer count growth. Let us consider an example to illustrate this. Suppose a model is built using data from the most recent five years from an operating area with substantial growth. If all days in the training data set are equally weighted, the model best predicts the load for the average customer base in the training data set. The residual errors of the model will be smallest for the middle year. The errors will be positive (larger predictions than actual demand) over the first two years of the training data, and will be negative (smaller predictions than actual demand) over the last two years of the training data. Our goal is to build a model to predict demand for the coming heating season. This model will best predict the heating season three years prior. This paper develops a method to detrend historical data using domain knowledge of natural gas consumption first principles. Tests have shown that with no detrending, models trained on short historical data sets are better than models trained on long historical data sets. The contribution of this work is demonstrated by tests that have shown models trained on the detrended data sets out-perform all of the models trained on non-detrended data, and longer historical data sets are superior to shorter data sets, especially on unusual days.

Integrated energy load forecasting and analysis

Michal Kurcewicz *
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Magdalena Rempuszewska
SAS Institute, USA
Ewa Owczarz
RWE, Poland

We present a fully integrated system for energy load forecasting and analysis. The system supports both operational forecasts (day-ahead) of the hourly load curve and medium-term forecasts of energy consumption that are used mainly for portfolio management purposes. Medium-term forecasts are created within a collaborative forecasting process during which experts use their business knowledge to update automatically generated statistical forecasts. Updated forecasts are then reconciled, to create consistent energy consumption forecasts for key customers and portfolio segments. Additionally, the system allows for advanced load profile analysis, supports the offering process and stores cleansed metering data. The system has been implemented at RWE Poland using SAS software.

Climate and Environment 1 [C&E1]

Contributed Session:

Monday, June 21, 11:10am-12:40pm   Room:
America's Cup A

Chair: Kevin Albertson
Manchester Metropolitan University, United Kingdom

Determination of the set of feasible investment rates to achieve pre-specified goals of forecasted carbon emissions

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Takashi Yoneyama
ITA, Brazil

Douglas Francisco Marcolino Gherardi
INPE, Brazil

The main idea in this work is to use the constraint satisfaction approach to determine the set of feasible investment rates in reforestation and clean technology, so as to achieve pre-specified goals in terms of carbon emission, as forecasted by a mathematical model. An efficient allocation of resources to reduce the greenhouse effect depends on constraints related to technical and political decisions. In a previous article, the authors proposed to use optimal control theory to provide estimates of the investments needed in land reforestation and in the adoption of clean technologies for an optimum emission and abatement of CO_2. However, the concept of optimality relies on assigning a number to each investment policy via a cost function, which may be difficult to be specified. Here, a different viewpoint is adopted, namely the determination of the set of investment rates that permits goals, represented by inequalities that must be satisfied. More specifically, the goals reflect target values for CO_2 and the times required to attain them. A case study is carried out using published data for the European Union from 1960 up to 1996. The goals are proposed to conform to the Kyoto Protocol for European Countries. The investment rates are proportional to the GDP (gross domestic product) and CO_2 concentration and affect the reforestation efforts and the adoption of clean technology. Several scenarios were simulated in order to provide insight in terms of the adopted decisions and effects of the uncertainty in the model parameters.

Efficient climate forecasting

Ole Humlum
Oslo University, Norway

Jan-Erik Solheim
University of Oslo, Norway
Kjell Stordahl *

Telenor Norway
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The Intergovernmental Panel of Climate Change (IPCC) describes climate forecasts in The Physical Science Basis (2007). Based on high emission scenario their main forecasts suggest 3.6°C global temperature increase until 2100. Evaluation of the forecasts, however, shows that temperature has not increased since 2001, even though CO_2-emissions now are higher than the highest emission alternative. The IPCC report also describes uncertainties related to climate modelling, but the 2009 global temperature plots below the lowermost uncertainty level indicated, given no increase in emissions. Hence, it becomes important to develop alternative temperature forecasting models. Most meteorological time series show significant multi-year periodic behaviour, which so far has not been included in standard climate models.
By decomposing meteorological time series into time/frequency space by wavelet analysis, it becomes possible to extract information on both the amplitude and variation over time of any periodic signal within the series, assuming that the signal can be decomposed into sinusoidal components. The resulting wavelet diagram then provides information on periodic behaviour in the data series. Several dominant cyclic patterns identified can be related to known physical phenomena, such as oceanographic or solar and moon orbital variations. We demonstrate how an alternative climate model based on such observed cyclic behaviour is able successfully to reproduce/hindcast meteorological data series. We further suggest that this represents an efficient method to forecast future climate, even without introducing additional temperature effects from CO2 in recent times. In contrast to standard climate models, it is possible to expose our model to scientific falsification within few years. Experiments on forecast robustness carried out by truncating existing data series back in time, suggest our modelling approach to yield useful results at least 20-30 years into the future, given a meteorological record of about 100 years length. Longer data series will enable even longer forecasts.

Time series analysis of global warming data

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We build ARIMA transfer function models of the two data sets on earth's temperature and CO2 history provided by the BBC. One has temperature and CO2 levels every thousand years for the last eight hundred thousand years. The other is yearly since 1850. Models are built using Autobox. We conclude that the relationship between CO2 and temperature has changed radically and as a result, there is no statistical basis for saying that global warming will continue.

Validating forecasts of future weather and climate

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Concern over anthropogenic climate change has led to attempts to simulate future weather patterns implied by different climate change scenarios. One approach has been use of Markov processes to generate weather patterns likely to characterise future climate. Comparison between actual and simulated weather patterns is a complex issue given seasonal variations, the underlying distribution of variables such as rainfall and temperature, the stochastic nature of weather and the inherent difficulty of predicting key variables such a wind force and direction. This paper relates to the Peak District of England, where climate change projections suggest weather conditions will get milder, with warmer, wetter winters and hotter, drier summers up to the year 2100. The paper is part of a research project to establish how the number of wildfires in the Peak District uplands of northern England is likely be altered by climate change. Simulated daily weather data for Buxton is derived from a weather generator developed for the Built EnvironmenT Weather scenarios for investigation of Impacts and eXTremes (BETWIXT) project. Weather simulations for Buxton are generated by Markov Chain process using the BETWIXT model. These simulations are validated against actual base weather data using six criteria: mean, variance, skewness and kurtosis; autocorrelation patterns and their ability to replicate past fire patterns. Conclusions are drawn on the validity of using simulated weather data for forecasting.

Transportation [TP] [Practitioner Track]

Organized Session:

Monday, June 21, 11:10am-12:40 pm   Room:
America's Cup B

Chair: Peg Young
US Department of Transportation, USA

Short term forecasts of vehicle miles traveled

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Vehicle-miles traveled by cars, trucks and buses on public roads are used as a key measure of roadway use. This measure of mobility is used as the primary measure of travel activity on the highway system. Vehicle-miles travelled (VMT) exhibited a long-term upward trend until 2007. But the last two years have not only slowed the growth of VMT, but forced a decline by the end of 2007. In 2009, VMT appears to resume its upward growth. For this presentation, we create a series of forecast models to determine which techniques perform the best on the monthly VMT data.

Long term forecasts of vehicle miles traveled

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Vehicle-miles traveled (VMT) is the principal measure of traffic flow and mobility on the nation's highways. Long-term forecasts of VMT are used to help determine both the expected future travel demand and needed investments in the highway infrastructure to meet that demand. This presentation will present a model to forecast long-term VMT per licensed driver as a function of per-capita personal income, average fuel costs, and average length of trip. Changes in the long-term trend of VMT growth in recent years will also be discussed, and the implications for future investment planning.

Analysis on the maritime traffic flows in Korea: A comparison of forecasting performance of models

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Hyoung-Geun Kim
Korea Maritime Institute

This study investigates the maritime traffic flows in Korea using some models such as traditional regression, time series model, and neural network model. The objective of this study is to compare the forecasting performance of models. We consider import and export traffic flows of 33 items during the periods 1994-2009 and compare the forecasting performance of models. Traffic flow patterns and the model with the best forecasting performance vary by each item. Item groups are categorized according to the change patterns of the flows. Finally, we choose the forecasting model based on item's characteristics and structural change. Results of the study can provide useful insight for the investment of port development in Korea.

Forecasting metro rail transit 3 ridership using Box-Jenkins methodology

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This paper, through the Univariate Box-Jenkins (ARIMA) technique, described the variation in and forecasted the ridership of the Metro Rail Transit 3 (MRT3). Using the historical plot, this study revealed that there was an increasing trend and a seasonal component. Based on the quartic root and natural logarithmic transformed series with first regular – first seasonal differencing, a best fitted model to describe the ridership was generated. The integration of seasonal and nonseasonal moving average models was able to obtain the forecast values for 2009. The model identified was adequate for the actual value of ridership was found between the confidence interval of the forecasted values. Implication includes the application of time series analysis in general and Univariate Box-Jenkins technique in particular, on railway transportation management in the Philippines.

Volatiltiy 2 [VO2]

Contributed Session:

Monday, June 21, 11:10am-12:40 pm   Room: America's Cup C

Chair: Alejandro Bernales
University of Manchester, United Kingdom

Forecasting realized volatility via wavelets and nonlinear time series analysis

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Being able to trade and forecast realized volatility (the volatility an investor actually experiences over a particular time horizon) has been a much sought after goal in the financial community for a number of years. This paper will show that via the use of multi resolution analysis via wavelets and such nonlinear time series measures as embedding dimension and time delay, forecasts for realized volatility across a variety of horizons can be achieved. Though this paper will focus on showing how to forecast 1 month volatility 1 month out, it will be demonstrated that the same general methodology can be used to forecast other volatility horizons such as 1 week or 6 to 8 months volatility anywhere from several weeks to several months into the future. It will also be shown that this forecasting technique can be used to good effect on both individual stocks and stock indices on a global basis and that it returns superior forecast results versus existing implied volatility techniques.

Can we forecast the implied volatility surface dynamics for CBOE equity options?

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We investigate whether the dynamics in the volatility surface implicit in the prices of individual equity options traded on the CBOE contains any exploitable predictable patterns. In particular, we examine the possibility that the dynamics in the volatility surface implicit in S&P 500 index options may be associated and forecast subsequent movements in the implied volatility surface characterizing individual equity options. We find a strong relationship between equity and S&P 500 index option implied volatility surfaces. In addition, we discover a

remarkable amount of predictability in the movements over time of both equity and stock index implied volatilities. We show that the predictability for equity options is increased by the incorporation in the model of recent dynamics in S&P 500 implied volatilities. Similarly, when we examine the economic value of these predictability patterns (by proposing and simulating trading strategies that exploit our 1-day ahead forecast of implied volatilities), we report that delta-hedged and straddle portfolios that take trade on the entire implied volatility surface and across all contracts examined produce high risk-adjusted profits which are maximum for the model that takes into account the feedback from past market implied volatility changes to subsequent dynamics in individual equity options implicit volatilities.

Structural change and the implied-realized volatility relation

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One of the many puzzles in international finance is the frequent finding that, across a variety of asset markets, implied volatility is a biased predictor of realized volatility. In particular, it is typically found that the least squares slope coefficient in a bivariate regression is less than unity. However, given asset price volatility is often characterized as possessing long memory, recent literature have shown that allowing for fractionally integrated behaviour, for example by using narrow band least squares (NBLS), removes this bias. Of course, the appearance of long memory could generate by the presence of structural breaks. Therefore this paper discusses the effect of structural breaks on the implied-realized volatility relation. Firstly, using data from several foreign exchange options markets, results show that both implied and realized volatility contain structural breaks in the level. The breaks in the implied series never occur before those of the realized series, suggesting the market has no ability to forecast structural change. Secondly, when breaks are accounted for in the bi-variate framework (i) the order of integration of implied and realized volatility reduces from approximately I (0.5) to I(0) and (ii) the point estimate of the slope parameter falls and the null of unbiasedness can be rejected. Allowing for structural breaks reinstates the implied-realized volatility puzzle. Given that fractionally integrated behaviour and structural breaks are observational equivalent in finite samples, what are we to conclude about the status of the implied-volatility puzzle? Simple simulations subsequently reveal that NBLS can spuriously find unbiasedness by removing the part of the spectrum relevant to volatility. In contrast to the extant literature, it is shown to be unlikely that fractionally integrated volatility is the cause of the puzzle!

Outlier detection in the lognormal logarithmic conditional autoregressive range model

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In this study, we propose an outlier detection procedure in the lognormal logarithmic Conditional Autoregressive Range (Log-CARR) model. The detection procedure is based on the ARMA form of the lognormal Log-CARR model and modified by the method used by Chen and Liu (1993). The test statistic used in the detection process can be shown to have an exact sampling distribution. The detection procedures are demonstrated to be well sized and to have good power using Monte Carlo simulations. Three other error distributions are also assumed in the Log-CARR model when performing power simulations to demonstrate the robustness of the detection procedure. The evidence of an empirical investigation shows that this method can effectively detect price range outliers and improve forecasting accuracy

Energy 2 [EN2]

Contributed Session:

Monday, June 21, 11:10am-12:40pm   Room:
America's Cup D

Chair: Robert Wendling
MISI, VA, USA

Unintended Consequences: Forecasting the Impacts of Dedicated Renewable Energy Transmission

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Significant growth in renewable electricity generation will require major expansion of electricity transmission grids. In the U.S., this could require the building of an additional 20,000 miles of transmission over the next decade – double what is currently planned. To facilitate this, government policy-makers are planning to build "green" transmission lines that would be restricted to electricity generated by renewable sources, primarily wind and solar. However, state and local jurisdictions are resisting siting of such transmission unless it serves local constituents and existing power plants. This presentation summarizes the results of a recent forecast of the potential impacts of this expanded transmission and their implications. One of the major findings is that, if such transmission is built and local access is allowed, then the major beneficiaries of the added transmission may be existing power generation facilities, especially coal-fired plants. Many of these facilities have very low electricity generating costs and their capacity factors are transmission-constrained. We forecast that their access to added transmission lines could enable them to sell electric power at rates against which wind and solar electricity-generated power cannot compete. Thus, a vast expansion of transmission lines designed to facilitate renewables could result in a large expansion in the generation of inexpensive electricity. However, this expansion may not be from renewable energy sources. Rather, the expanded, low cost electricity generation would result from the increased capacity utilization of the existing coal fleet enabled by the building of this new transmission – and perhaps by new coal plants facilitated by the additional transmission. These plants will be able to generate electricity at prices that are significantly cheaper than those of the renewable technologies. These forecasts represent a classic case of "unintended consequences," and the implications for energy and environmental policies are discussed.

Fuels Demand by Light Vehicles and Motorcycles in Brazil

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Sara Gomez Mata and José Antelo Suarez, Rio de Janeiro, Brazil

The purpose of this paper is to analyze the consumption of gasoline, alcohol and natural gas vehicle (NGV) by light vehicles and motorcycles in Brazil. Through the estimation of fleets per consumption class, in an environment influenced by a new engine technology (flex-fuel), this exercise estimates the fleet-elasticity of cars (and motorcycles) powered by gasoline, hydrated alcohol, natural gas vehicle (NGV) and flex-fuel, in addition to the income elasticity within the period from January, 2000 to December, 2008. This paper uses an alternative variable as income proxy and estimates the five different fleets through the combination of vehicles sales and scrapping curves. This paper's conclusion is that given specific issues of the Brazilian fuel market, in special prices and technological innovations, the fleets' equations for the consumption of the three fuels represent in a more significant manner the relationships expected between supply and demand variables than the commonly used functions of prices and income.

Oil price volatility and traders' behavior

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This paper is concerned with the evolution of volatility in WTI, gasoline and heating oil prices in the New York Mercantile Exchange (NYMEX). During the last decade the oil market experienced a huge volatility of its prices in a context of general rise in commodities markets and a sharp downward trend following the global economic recession in 2008. The influence of so-called fundamental factors-the balance between supply and demand and the storage capacity, the exogeneous macroeconomic variables and the behaviour of the players in the raw material price formation can be considered as keys factors of explanation. In this paper we focus on crude oil market and two of the most important derivatives markets - gasoline and heating oil -, which represent more than two-thirds of the oil product demand in the US in 2008. We carry out a comparative analysis of the 3 markets through statistical and econometric tests, which point out that fundamentals could not explain all the prices and volume patterns on these markets. Finally we test the influence of the trader's behaviour on these markets. The statistical analysis is carried out in the context of a Vector Autoregressive model (VAR) allowing for regime change in terms of a Markov process. The question we address is whether the net position in the futures markers or the volume of transactions can have

some predictive power for spot and futures markets returns. We concentrate on the WTI crude oil (spot and futures prices), as well as gasoline and heating oil. We adopt a multivariate Markov switching model MS-VECM that allows for regime switching mean equation parameters and variance-covariance matrix. The data consists of weekly observations from January 1993 to December 2009 of 'price' and 'volume' quotations for WTI, unleaded gasoline and heating oil as reported in NYMEX.

Estimating asymmetric price response to cost changes using a Bayesian threshold model

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Asymmetric price response to cost changes is a common phenomenon in many markets. As a typical example, retail gasoline prices respond faster to crude oil price increases than to crude oil price decreases. Various studies have reported this nonlinearity between input price and output price by implicitly assuming constant relationship. But no one has yet examined that the speed of response changes over time. This paper studies the existence of this phenomenon using the weekly gas station prices of different cities in the US by a Bayesian threshold model incorporating time-varying parameters.

Business Cycles 1 [BC1]

Organized Session:

Monday, June 21, 11:10am-12:40pm   Room:
Cunningham A

Chair: Gian Luigi Mazzi
Eurostat, Luxembourg

Exploring the Predictive Content of Realized and Implied Volatility Measures for Macroeconomic Fluctuations

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This paper investigates the predictive power of various realized and implied volatility measures for turning points of U.S. business cycles and time-varying density of output growth. We construct monthly stock market, industry level and bond market realized volatility measures from daily returns. We also consider option implied volatility measures such as VIX. In terms of methodology, we use linear and Markov-switching models both in univariate and multivariate settings. We find that these volatility measures are countercyclical and contain valuable information about the future path of economic activity. Volatility measures are also found to be useful for forecasting the density of output growth. The industry level realized volatility is the most informative one in terms of predicting the business cycle turning points. We also find that when different realized volatility series are used as augmenting variables in predictive models for industrial production, they help to explain a significant percentage of the variability of output growth. The results uncover a strong relation between the volatility dynamics and economic fluctuations. We further explore this key relationship via a joint nonlinear dynamic factor model. We find that the common volatility factor extracted from various realized volatility measures is very valuable in predicting business cycle turning points, especially in a horizon of two months. Our results hold in-sample and out-of-sample, using revised or real time data.

Monitoring the Economy: an Application of Multivariate Real-Time Signal Extraction

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During last year's Joint Statistical Meeting in Washington I presented a new monthly economic indicator for the US -USRI: http://www.idp.zhaw.ch/usri-. On that occasion, the indicator timed the end of the recession in June 2009. Although the NBER did not yet (at the time of writing this abstract) commit to an 'official' dating of the end of the recession, several other well-known indicators confirmed the previous early dating as new information and data became available in the course of 2009. In my talk I'll briefly prolongate last year's true real-time exercise by reviewing the path of various indicators during this recession. Furthermore, I'll attempt to motivate the observed real-time performance in terms of reliability and timeliness of the aforementioned USRI by relying on formal statistical arguments (customized optimization criteria).

Evaluating non parametric univariate and multivariate approaches to turning point detection and forecasting

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This paper evaluates non- parametric procedures for detecting and forecasting turning points in univariate and multivariate series. This focus is chosen because non-parametric procedures for turning point detection are the only methods that can be made independent of the perspective of the researcher. Examples will be provided to show how parametric turning point detection depends on the parameters of the underlying model. The procedures will be evaluated against two criteria. The first of these is their capacity to match the NBER classical cycle turning points. The second criterion is the simplicity/parsimony of the procedures.

The univariate non parametric methods evaluated will be the Bry Boschan (BB) and Bry Boschan Quarterly (BBQ) algorithm and the multivariate approximation to the NBER reference cycle algorithm published by myself and Adrian Pagan in the Journal of Econometrics 2006. Issues explored in the evaluation include: methods to choose the series used in the univariate and multivariate procedures for the detection of turning points; how the method of turning point construction influences the procedures used to forecast turning points; the extent to which turning points are forecastable; and the variables that are of most use in forecasting the turning points in the USA classical cycle as determined by these algorithms.

Alternative specification of Euro area turning points detection models

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Since 2006 Eurostat is compiling two coincident turning points indicators for the euro area, respectively for the growth cycle and the business cycle. They are based on univariate Markov Switching models fitted to each component and the final result is obtained by combining the signals returned by each model. The experience made over more than three years shows that although the two indicators do not deliver any false signals, they have lagging behaviour, more evident for the business cycle one.

This paper investigates alternative model specifications of the two indicators based on a univariate Markov Switching model as well as multivariate ones, providing a simultaneous modelling for all the component series. Furthermore, univariate SETAR specifications are also investigated. A comparative analysis of the behaviour of the models is carried out over the whole estimation period with particular attention to the presence of false signals and the lags in detecting turning points. This analysis is complemented by a real time simulation over the period 2006-2009 by using the Eurostat real-time database. The results are compared by using the Concordance Index, the QPS as well as more sophisticated concordance measures.
The most significant results are that (for SETAR models) the number of false signals returned is always higher than those returned by Markov Switching models, even when a censoring rule is applied. SETAR models deliver in some cases more timely signals than MS models. Concerning the MS models, some specifications return more timely signals than the ones currently used at Eurostat, especially during the last recession, but it is quite difficult to identify a single specification for each indicator, which experiences the best performance over different cycles. Finally, multivariate specifications of both indicators do not appear, at this stage of the analysis, to improve significantly the timeliness of detection with respect to univariate ones.

Forecasting Methods 1 [FM 1]

Contributed Session:

Monday, June 21, 11:10am-12:40pm   Room: Cunningham B

Chair: Ulrich, Gunter
University of Vienna, Austria

Combining forecasts based on multiple encompassing tests in a macroeconomic DSGE system

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We use data generated by a closed-economy dynamic stochastic general equilibrium (DSGE) model comprising ten macroeconomic variables to study the relative benefits of forecast combinations based on a multiple forecast-encompassing test relative to simple uniformly weighted forecast averages across rival models. Our variable of interest in this respect is gross domestic product (GDP). Assumed rival models are four linear uni- and multivariate autoregressive specifications, one of them a more sophisticated factor-augmented vector autoregression (FAVAR). The forecaster is assumed not to know the true data-generating DSGE model. We obtain that the FAVAR specification outperforms the simpler specifications as the sample size increases. Hence, with increasing sample size, the FAVAR model also receives a stronger weight in the test-based weighting procedure. Our results, however, see only small advantages for the implied combination forecast, thus confirming the traded wisdom in the forecasting literature that uniform weighting is difficult to beat in typical forecasting situations characterized by small sample sizes if improved forecasting precision is the ultimate objective. Only for larger sample sizes around 200 observations do we see some advantages for test-based combinations.

Unit Interval Forecasting Using Exponential Smoothing

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There are many situations in which the values of a time series must fall within the unit interval. Examples include all percentages in decimal form, such as the percentage of home loans that have an adjustable rate, the percentage of nonagricultural jobs that are in manufacturing, and the percentage of land receiving a specified treatment. When exponential smoothing methods of forecasting are applied to time series of this type, several problems can arise. While the point forecasts from simple exponential smoothing will remain within the unit interval, the prediction interval may include values outside of it. If there is a trend in the time series, clearly point forecasts may be outside of the interval. We propose using the logistic transformation on these types of time series and then applying the exponential smoothing models to the transformed data. This approach has the advantage that the forecasts and the prediction intervals will remain within the unit interval. We then consider extensions to multiple categories where the sum is 100%. The models and procedures will be presented and illustrated with several examples.

Forecasting with Large Data Sets- A Comparison of Boosting with Forecast Combination and Factor Models

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Traditionally, business cycle forecasts are based on a relatively small number of predictors. Recent research, however, has explored methods that allow for the inclusion of more information in order to improve forecast accuracy. In the past decade, factor models and forecast combination have been discussed intensively as approaches to condense information. This paper presents boosting as an alternative statistical method to handle large information sets, which is new in the field of forecasting. Boosting is a computationally efficient algorithm that selects those variables from a large number of potential predictors that have the highest predictive power. While usually, all lags that have been suggested by an information criterion enter the model, boosting can account for the fact that some of those lags are irrelevant for the forecast. Thus, a more parsimonious model can be set up. We are the first to include boosting into a horserace between forecast combination and factor models. Following the methods for forecast comparison of Stock & Watson (2006), we use a data set containing 91 monthly U.S. economic time series from 1968:1 to 2009:11 with industrial production as the target variable. As a result, it turns out that forecasts based on boosting tend to perform better in the short horizon, i.e. one to two months. In the longer run, i.e. for three, six and twelve months, factor models and forecast combination tend to deliver more accurate forecasts.

A GA Based Forecasting Model Focused on Contextual Factors

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Decomposition regression incorporating contextual factors seems to be a natural choice to exploit both reliability of statistical forecasting and flexibility of judgmental forecasting using contextual information. However, such a regression model suffers from collinearity, due to sporadic variables or dummy variables with few variations in related observation data, leading to poor variable selection and biased parameter estimation with conventional least square estimators. In the presence of collinearity, ordinary least square may not remain optimal, genetic algorithm can be a better alternative. In this study, we employ a log-linear regression model, incorporating promotional factors, estimated by ordinary least square and genetic algorithm as well, in which, MAPE, instead of MSE, is employed in the objective function to minimize the influence of outliers, besides, parameters to be estimated are set with practical constraints to more realistically reflect the real world. Empirical results show that in such cases, in variable selection, parameter estimation, and out of sample forecasting, genetic algorithm may outperform ordinary least square and ARIMA also in

forecasting performance, consistently and significantly, in weekly unit sales forecasting of a consumer packaged product company in Taiwan.

Finance 1 [FN1]

Organized Session:

Monday, June 21, 11:10am-12:40pm   Room: Cunningham C

Chair: John Guerard
McKinley Capital Management, Inc., USA

Testing an Eight-Variable Stock Return Forecasting Model for Portfolio-Level & Performance

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We implement and test an eight-variable stock return forecast model for Japan (PCAP data base) and the USA (Compustat-CRSP) for 1980-2005. In each month from 1980-2005, month-to-month stock return forecasts are used to group stocks into 30 rank-based return portfolios   Using the optimal variable-isolation methods for isolating the contribution of a component-focused parsimonious stock return forecast from the return impact associated with systematic risk, tax, and other variable distortions, we use a mathematical assignment program to optimally transform the rank-ordered cross-sections into an associated cross section matched on risk, tax, growth and other control variables.

For each set of control variables, we measure risk-controlled realized portfolio returns and associated standard deviations for each of the 30 portfolios for the overall 1980-2005 period, each 5-year subperiod, and other pertinent subperiods. We test whether the performance is risk (realized standard deviation) or alpha performance (excess return). Tests for risk versus alpha performance show predominantly alpha performance. Using realized risk-controlled portfolio performance as the criterion for evaluating stock return forecast value, we find that a robust, adaptively reparameterized return forecasting model can provide significant portfolio-level alpha-based rank ordering with an annualized alpha potential in excess of 10% above sample average (p-value less than .0001) in both the USA and Japan.

We compare model performance in the USA and Japan. Given substantial periods in which both the stock and the economies are moving in opposite directions, we have a natural experiment in comparative model performance in up and down markets and economies. Overall, the set of ten controls removes most but not all of the performance sensitivity to both state of market and economy.

Earnings Forecasting Efficiency: Global Evidence

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We investigate the relative importance creating expected returns and building models of applied Markowitz portfolio construction techniques. We focus our study on four regions: USA, Developed Europe, Emerging Markets, and All Country World. We also study the relative importance of earnings forecasting factors or large-cap and small-cap stocks, and compare U.S. earnings forecasting models versus Non-U.S. earnings forecasting models.

Global Cross-Sectional Volatility Analysis

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We investigate the relative importance of countries, industries, and styles in explaining the global cross section of equity returns. We focus our study on three regions: Developed Europe, Emerging Markets, and All Country World. We also study the relative importance of these factors for large-cap and small-cap stocks. We find that the relative importance of the factors depends strongly on the region and market-cap segment, as well as the time period under consideration.

System for Intelligent Investment Portfolio Making

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The paper describes a system for building intelligent investment portfolio based on a profile of a trader using these rules. The fact that 60% of successful trading is a psychological part is very important. The main idea is based on the fact that successful trader has to know about his features as a tolerance of risk, level of patience and other personal features. The system works with three basic profiles of trader, in which is assigned trader after answering a few questions. If the profile of trader is known, the next step is to search an optimal investment portfolio by combining fuzzy logic and data mining methods to find rules for decision making. The main concept in searching for a statistical advantage is based on the fact that markets have every day in a specific time tendency to do big move in one direction and it does not matter which side it is (up-move or down-move). Important is that there is usually a move to one direction. Data mining methods will find time periods with big probability for a price move to one side. We achieve this by comparing current price to reference price (Open, High, Low, Close of n-previous price bars). Founded edge should be wedged by some fundaments like market opening, market closing etc. That is another view for entry point other than

looking for combination in technical indicators. Diversification is realized through two or more non-correlated markets. More important rule than entry point is exit point and that is the thing, where is difference between trader profiles, which are set up in the beginning of the process using fuzzy logic. Decision making rules are set from January 2007 to December 2008 and successfully used from January 2009 to January 2010, so we can see robustness of these rules through the financial crisis.

Inflation [IF]

Contributed Session:

Monday, June 21, 11:10am-12:40pm   Room: Oxford

Chair: Heather L.R. Tierney
College of Charleston, USA

Short-Term Inflation Projections: a Bayesian Vector Autoregressive approach

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We construct a large Bayesian Vector Autoregressive model (BVAR) for the Euro Area that captures the complex dynamic inter-relationships between the main components of the Harmonized Index of Consumer Price (HICP) and their determinants. The model is estimated using Bayesian shrinkage. We evaluate the model in real time and find that it produces accurate forecasts. We use the model to study the pass-through of an oil shock and to study the evolution of inflation during the global financial crisis.

Real-Time Data Revisions and the PCE Measure of Inflation

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This paper tracks real-time data revisions in the Personal Consumption Expenditure (PCE) in the exclusions-from-core model of inflation persistence of Lafléche and Armour (2006) and Tierney (2009), which are based upon Cogley (2002) in five in-sample forecast horizons in 48 vintages. This amounts to examining 240 hypothesis tests for coincidence in a parametric and two nonparametric frameworks. The purpose is to see if the data revisions, which are generally small in magnitude, have an impact on the parameters of the exclusions-from-core inflation persistence model by producing statistically different parameters, which might be of use in policy analysis. By keeping the number of observations the same, the regression parameters of earlier vintages of real-time data, beginning with vintage 1996:Q1, are tested for coincidence against the regression parameters of the last vintage of real-time data used in this paper, which is vintage 2008:Q2.

Regarding the parametric model, the effect of data revisions are only detected in 16 out of the 240 hypothesis tests of the slope coefficients and in none of the intercepts. The first nonparametric methodology involves using the average of all the local conditional nonparametric estimators, which is referred to as the global nonparametric model and is offered as an alternative measure of central tendency to the parametric model. With respect to the global nonparametric model, the regressions of the comparison vintages do not have coincidence as evidenced by having both statistically different intercepts and slopes in 85 out of the 240 hypothesis tests. The second nonparametric methodology involves using the local results of the nonparametric regression produced conditional on just the very last observation, i.e. the Tth observation of each comparison vintage. Concerning the results of the Tth local conditional nonparametric model, the comparisons find for statistically different intercepts and slopes in 209 out of the 240 regressions.

Monetary Policy Rules and Inflation Forecasts

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Francesco Carli
Washington University in St. Louis, USA

We evaluate the appropriateness of output gap as an indicator for the conduct of monetary policy by exploring its predictive ability on the rate of inflation. We question whether there exist better indicators to implement this task. We derive alternative measures and their relative performance with respect to the output gap. We use a New Keynesian model with alternative money supply rules to derive alternative inflation forecasting models. We use out-of-sample test statistic for forecast accuracy to choose which money supply rule (the models differ only in the money supply rule) delivers the best out-of-sample inflation forecast.

Does forecast combination improve Norges Bank inflation forecasts?

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Karsten Gerdrup
Norges Bank, Norway
Anne Sofie Jore
Norges Bank, Norway
Christie Smith
Reserve Bank of New Zealand, New Zealand
Leif Anders Thorsrud
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We develop a system that provides model-based forecasts for inflation in Norway. Forecasts are recursively evaluated in real time from 1999

to 2009. The performance of the models over this period is then used to derive real time weights that are used to combine the forecasts. Our results indicate that model combination improves upon the point forecasts from individual models. Furthermore, when comparing the whole forecasting period in real time; model combination outperforms Norges Banks own point forecast for
inflation at the forecast horizon up to a year. By using a suite of models we allow for a greater range
of modelling techniques and data to be used in the forecasting process.

Featured Speech [FS2]

Featured Session:

Monday, June 21, 2:00pm-3:00pm
Room: Cunningham AB

Chair: Len Tashman
Professor Emeritus, University of Vermont, USA

Where´s the puck? 2500 years of forecasting

David Orrell
Scientist and Author

The Canadian hockey player Wayne Gretzky once said that "A good player plays where the puck is. A great player plays where the puck is going to be." Businesses and societies try to perform a similar trick, through forecasting. We seem to have a genetic urge to look into the future, to see around the corner, to guess where the puck is going. Traditionally the domain of religions, astrologers, or mystics, we now rely on sophisticated mathematical models to predict the weather, the spread of diseases, the economy, and much else. But while forecasting has been called the world's second oldest profession, it sometimes seems that we're not getting much better at it – as our recent difficulties with climate change, the swine flu pandemic, or the credit crunch have shown. This talk takes a provocative look at the history and the challenges of prediction, from the oracle at Delphi, to the

latest methods from complexity research, and argues that we need to adopt a systems-based approach to forecasting.

David Orrell

David John Orrell (born 1962 in Edmonton) is a Canadian mathematician and author who is living in Oxford, England. He received his doctorate in mathematics from the University of Oxford. His work in the prediction of complex systems such as the weather and climate has been featured in New Scientist, London's Financial Times, BBC Radio, and CBC TV. His theory that errors in weather forecasts are due not to chaos (the "butterfly effect") but to model error stirred up a storm of debate in meteorological circles. He now conducts research in the area of systems biology. He is the son of theatre historian and English professor John Orrell. His book Apollo's Arrow: The Science of Prediction and the Future of Everything was a national bestseller and finalist for the 2007 Canadian Science Writers' Award.

Judgemental & Scenario Forecasting 1 [JF1]

Contributed Session:

Monday, June 21, 2:00pm-3:30pm   Room: America's Cup A

Chair: Paul Goodwin
University of Bath, United Kingdom

The development of profitable forecasts of outcomes using data in a speculative financial market

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This paper examines the degree to which prices, formed by the judgments of individual bettors, discount historic prices in a horserace betting market. Conditional logit analysis is employed to predict winning probabilities, based on market prices. These are used, together with various wagering strategies to yield substantial abnormal returns. Consequently, in contrast to the existing literature, the results suggest that the bettors' judgments do not fully account for historic price information. The disparity with previous efficiency studies highlights the importance of considering market ecology and of adopting an appropriate modeling procedure and investment strategy to fully exploit information contained in market prices.

An exploration of the forecasting ability of traders in a financial market

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This paper reports the results of a field study examining the ability of decision-makers to effectively account for evolving and sporadically changing information in their subjective probability judgments of future events. The research is conducted in a naturalistic setting where it is possible to measure the extent to which dynamic information is employed in probability judgments: the horserace betting market. The study explores the subjective probabilities of bettors concerning

16,344 horses running in 1,671 races. The results suggest that bettors are skilled in discounting evolving and sporadically changing information in their probability judgments. They appear to achieve this by adopting effective heuristics to simplify their dynamic information environment and by learning to improve their judgments using outcome feedback. A number of task, individual and environment related factors which help bettors' effectively handle sporadically changing information, and which could be of value to decision-makers in other areas of human endeavor, are discussed.

Does the desirability of events influence information use in forecasting?

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Recent research in supply chain companies found a bias towards optimistic forecasts of demand. One possible explanation for this is that when a particular outcome is regarded as desirable, information that favours this event (positive information) receives more attention when a forecast is being made than equally reliable negative information. This has been referred to as valence priming. An experiment was carried out to examine whether valence priming is likely to be a factor leading to bias in product demand forecasting. Participants were asked to estimate whether the sales uplift from a promotion campaign would exceed or fall below 80%. One group of participants was rewarded if the 80% uplift was exceeded and the other was not. The participants were also supplied with information that both supported a greater than 80% uplift or suggested that it would not occur and were asked to indicate which of these reasons formed the basis of their forecast. We hypothesized that those who were rewarded if the greater than 80% uplift occurred would pay more attention to the positive information than those who were not rewarded. We report the results of our experiment and its implications for the design of forecasting systems.

Decision Making for Closing of Bank Branch: A Simulation Model

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The article deals with the method of simulation as a support for decision making. The two dimensional partial differential equations and fuzzy logic theory are used. At first the theory is mentioned, than the way of building up of a model and finally the case study deals with simulations leading to closing of a branch of the bank to reduce the costs. Banks must use their financial resources carefully. Tasks for decision makers are to decrease the costs nowadays. The banks are surrounded not only by competitive banks, but they have branches and the competition in this case is undesirable. The decision makers must solve the problem which activities of branches will be reduced, changed (focus on corporations, persons; loans, mortgages etc.) or which one will be closed. They can be supported by designed program to optimize their decision. The designed methodology implemented in a computer program enables to do the simulation. The program is very flexible for the set up of conditions, restrictions and obstacles. The two and three dimensional graphs together with polar graph and fuzzy outputs results in graphical ways are presented. The designed methodology can improve the quality of decision making processes not only for banks, but also firms, markets, hospitals etc.

Count Data/Intermittent Demand [CD] [Practitioner Track]

Contributed Session:

Monday, June 21, 2:00pm-3:30pm   Room:
America's Cup B

Chair: Ralph Snyder
Monash University, Australia

Forecasting Intermittent Demand for Supply Management

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We consider the problem of forecasting demand for supply management in the common context of SKUs with intermittent demand and small sample sizes. We focus on various demand models with dynamics similar to exponential smoothing but which involve Poisson measurements, or suitable adaptations of Poisson measurements, to accommodate the common feature of over-dispersion. The main objective, in the quest to overcome statistical problems associated with small sample sizes, is to explore the use of a single smoothing parameter, and where appropriate, a single damping factor, across an entire range of SKUs. An emphasis is placed on the generation of lead time demand distributions suitable for safety stock determination. Our study is conducted with real demand data for a range of car parts and includes comparisons with the preponderate Croston method of forecasting.

A Forecasting Support System for Intermittent Demand

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Intermittent demand patterns are characterized by infrequent demand arrivals coupled with variable demand sizes, when demand occurs. Such patterns prevail in many industrial applications, rendering the need of a specialized Forecasting Support System (FSS) requisite. Intermittent Demand Forecasting System (IDFS) incorporates established forecasting techniques used widely in intermittent demand patterns, offering an

efficient expert forecasting engine based on competitions among implemented techniques. The system allows statistical forecasts derived from implemented techniques to be combined with judgments made by the user. These judgments can be the choice of the appropriate methods' parameters or methods combined as well as the adjustments made upon the statistical forecasts based on user's knowledge (soft data) and expertise. Numerical and graphical interpretations of statistical and forecasting analysis with appropriate accuracy metrics grant the effectiveness of the forecasting procedure provided by the IDFS. Finally, IDFS supplies detailed reporting information on all aspects of the analysis and forecasting while also showing information about the accuracy of different extrapolation techniques.

On predictive modelling of demand occurrences

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It has been argued that intermittent/sporadic demand forecasting for inventory control as a research area should not be considered in isolation from such relevant and established fields as modelling time series of counts and statistical model discrimination. This study, concerned with predictive modelling of demand occurrences, as represented by binary time series, seeks to answer the question of how often a (homogeneous) Bernoulli process, the simplest possible model, can adequately approximate (unknowingly complex) real data sources. While the Bernoulli process is an essential part of a number of recently proposed forecasting models and theories, no published research has been found to determine how often real data support this simplifying assumption. Consequently, three alternative methodologies (based on statistical testing and more recent ideas of Akaike) have been applied to three previously published datasets to confirm that the adequacy of the Bernoulli process approximation was strongly supported by the vast majority of items in each dataset. Only a small fraction of items (less than 3%, 5% and 20%) exhibited demand occurrence patterns with appreciable trends, dependencies and other deviations from pure randomness, thereby questioning the appropriateness of the simplest model. It is thus argued that estimation by method of simple exponential smoothing, which assumes non-stationarity of the demand process, as originally proposed by John Croston, can often be simplified by using estimators that are natural under the assumption of strict stationarity, which in this study data favoured so frequently. This work is a necessary step towards development of the ``let data speak" approach to forecasting demand counts for inventory control.

A neural network methodology for forecasting constant and dynamic demand rate for intermittent demand

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Intermittent demand appears when there are several periods in a time series with no demand occurrence and when it occurs it does not have a constant size. Furthermore, intermittent demand time series have typically few observations. These factors make intermittent demand forecasting challenging and forecast errors can be costly in terms of unmet demand or obsolescent stock. Intermittent demand forecasting problems have been addressed using established forecasting methods, like simple moving averages, exponential smoothing and Croston's method with its variants. This study proposes a neural network (NN) methodology to forecast intermittent time series. NNs are used to provide both constant demand rate forecasts, as the Croston\'s method that is the norm for intermittent demand problems, and dynamic demand rate forecasts, which do not assume that the demand rate stays constant in the future. A key NN limitation that is addressed in this study is the small time series sample size, which can hinder NNs' training. The methods are compared on a dataset of 3000 real time series from the automotive industry, using the mean absolute scaled error that has been found appropriate for intermittent demand forecasting evaluations. The out-of-sample comparisons indicate that NNs forecasting constant demand rate have superior performance in comparison to established competing methodologies, while dynamic demand NN forecasts also rank high, indicating that the implications of this alternative should be considered. In order to explore this further, an inventory simulation is performed. The methods are evaluated directly on service level and not using forecast error measures. The findings from both evaluations are contrasted providing insights on the performance of the methods and discussing whether forecast errors are a good proxy for service levels.

Forecasting Methods 2 [FM2]

Contributed Session:

Monday, June 21, 2:00pm-3:30pm
Room: America's Cup C

Chair: Matthew Schneider
Cornell University, USA

Evidence Based Forecasting (and the M4 Competition)

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The field of forecasting has progressed significantly during the last half a century. The relevant advancements have been mainly facilitated by the development of new methods and by the widespread usage of powerful computers. However, the latest financial crisis raised many questions with regards to the true underlying value of forecasting as a field. It could be argued that the biggest challenge facing currently the field of forecasting is not in the introduction of additional methods or more experiments in further studying judgmental biases. Instead, we must objectively evaluate available empirical evidence in the field of forecasting and cognitive psychology in order to provide decision and policy makers with evidence- based information. The purpose of the M4-Competition is to further study the validity and utility of various forecasting methods. The experimental structure of the M4-Competition has been extended and enriched, in comparison with the previous competitions, in some very significant ways. In particular: 1. We have increased the number of time series utilized to 10,111 and grouped them into various categories. 2. The Internet is being introduced as a separate category. The same is true for intermittent/count series that prevail in many industrial applications. 3. There is a considerable emphasis being placed on uncertainty; this is to be facilitated through the construction of confidence intervals for all series and methods enabling the evaluation of forecast uncertainty. 4. The empirical utility of the forecasts will be separately analyzed and contrasted to forecast accuracy. Sales/demand forecasts, for example, are to be analyzed also with regards to their stock control as well as financial trading implications. 5. An evaluation of published judgmental forecasts will be made to study

their accuracy and uncertainty. It is our expectation that the M4-Competition will add significant value to make Evidence Based Forecasting (EBF) more useful and relevant.

Reanalysis of M-Competition Data for Exceptions Management Using ROC Measures

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Matthew Schneider *
Cornell University, USA

M-Competitions have used central tendency forecast error measures, such as the MSE and MAPE, leading to the conclusion that simple forecast methods are best. What can be said, though, about large-change forecast accuracy for application of exceptions management? Reanalysis of monthly, micro time series data from M-competitions and one-step-ahead forecasts finds that complex measures are best for both ordinary and exceptional forecasts. We employ receiver operating characteristic (ROC) analysis to study exceptional, large change forecasts.

Update on the Development of X-13ARIMA-SEATS

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This paper provides an update to Monsell (2007) to give details of new features found in the current prototype of X-13ARIMA-SEATS, a seasonal adjustment program that allows the user to produce either an X-11 or SEATS seasonal adjustment. These features include expanded options for generating spectral diagnostics, improved model-based seasonal adjustment diagnostics, an AICC based test for length of month regressors, a new regressor for end-of-month stock Easter based on Findley (2009), a technique for specifying groupings for user defined holiday regressors, and a new regression testing procedure based on the chi-square statistic for determining if regression groups should included in the regARIMA model.

Analyzing Seasonal Time Series with Periodic Low Volumes

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Businesses often require accurate forecasts of time series data that are highly seasonal with low periodic volumes. The sales of highly seasonal retail items frequently show this pattern. During times of high activity, sales are high; during the off-season, sales might be deterministically zero or on the level of white noise with respect to the period of high activity. In addition, the periods of high activity might have irregularities. The number of active periods might not be consistent from year to year, or the active period might not begin and end in the same period each year. Also, these series often have regression components that are related to the calendar, so the timestamp of each observational period is important.
Time segmentation analysis can be used in conjunction with custom intervals to perform accurate statistical seasonal adjustment and forecasting of these series. Some additional uses of time segmentation analysis, such as data mining and automatic identification of knot placement in splines, are also demonstrated.

Finance 2 [FN2]

Contributed Session:

Monday, June 21, 2:00pm-3:30pm
Room: America's Cup D

Chair: Trino-Manuel Niguez
University of Westminster, United Kingdom

An Economic Evaluation of Stock-Bond Return Comovements with Copula-based GARCH Models

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Owing to their importance in asset allocation strategies, the comovements between the stock and bond markets have become an increasingly popular issue in financial economics. Moreover, the copula theory can be utilized to construct a flexible joint distribution, which allows for skewness in the distribution of asset returns as well as asymmetry in the dependence structure between asset returns. Therefore, this paper proposes three classes of copula-based GARCH models to describe the time-varying dependence structure of stock-bond returns, and then examines the economic value of copula-based GARCH models in a mean-variance framework. We compare their out-of-sample performance with other models, including the passive, the constant conditional correlation (CCC) GARCH, and the dynamic conditional correlation (DCC) GARCH models. From the empirical results, we find that a dynamic strategy based on the GJR-GARCH model with Frank copula yields larger economic gains than passive and other dynamic strategies. Moreover, a risk-averse investor will pay high performance fee to

switch from a passive strategy to a dynamic strategy based on GARCH-based copula models.

Forecasting the Unconditional and Conditional Kurtosis of the Asset Returns Distribution

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This paper analyzes the out-of-sample ability of different parametric and semi-parametric GARCH-type models to forecast the conditional variance and the conditional and unconditional kurtosis of three types of financial assets (stock index, exchange rate and Treasury Note). For this purpose, we consider the Gaussian and Student-t GARCH models by Bollerslev (1986, 1987), and two different time-varying conditional kurtosis GARCH models based on the Student-t and a transformed Gram-Charlier density.

A hybrid approach for stock return prediction

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Since Sorensen, Miller and Ooi advocated using the classification and regression trees (CART) for stock picking (Sorensen, Miller and Ooi, 2001), CART has been gaining popularity in the investment industry, with some of the top fund management firms incorporating CART into their quantitative models for investment decisions. Besides of the well-loved interpretability in final models, the other important advantage of CART lies in determining the non-linear hierarchy of determinants that leads to homogeneous subgroups (terminal nodes). However, CART models data in a very naive way within each terminal node by either taking average in regression trees or majority voting in classification trees. This naiveness at node level partly leads to instability of CART, and various other issues, such as limited variation in final predictions. A hybrid approach is proposed in this study which is the combination of CART for handling non-linearity and interactions at top level and a parametric model based on linear combinations of input at node level. The proposed method is used on US stock data for return predictions. Economically meaningful improvement over simply using CART or a parametric model alone is observed.

Forecasting intraday movements in the stock market

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Methods to anticipate movements in the stock market are essential to determine the best moment to buy and sell stocks, options and indexes. Forecasting significant abrupt movements can be of paramount value to investors in order to avoid financial crisis. Since the famous event of 1929, several mathematical models have been proposed to try to forecast the occurrence of these movements. The main idea in this work is to adapt a method developed earlier by the authors using wavelet transform to anticipate intraday changes in the stock market using acquisition data to each 15 minutes. Because it is not an easy task to infer imminent price movements by simply examining the relative values of the coefficients resulting from the wavelet transform, an indicator is proposed in the form a real number between 0 and 1. The parameters of the algorithm to compute the proposed index was tuned using pre-down and post-down data windows along a large record of Brazilian Stock Market Index (Ibovespa) and some options of Brazilian firms. Some statistical data are presented to show the efficiency of the proposed indicator.

Software [SW]

Contributed Session:
Monday, June 21, 2:00pm-3:30pm
Room: Oxford

Chair: Samik Raychaudhuri
Oracle Inc., USA

Introducing Oracle Crystal Ball Predictor: a new approach to forecasting in Excel

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In this presentation we will have an overview of the functionality provided by Oracle Crystal Ball's (CB) Predictor engine. In brief, CB Predictor has an intuitive interface for selecting, managing and cleaning data, running multiple forecasting algorithms (including seasonal and nonseasonal models) and regression on large datasets, and a coherent way of presenting and extracting results or generating reports. Some of the innovative features include outlier detection and filling in missing values. We will also have a sneak preview of forthcoming features.

Methodology for Autobox

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Autobox follows a Box-Jenkins based approach which attempts to identify the pattern within the data through the use of a tournament style approach to model building. Box-Jenkins laid out an approach , but there were many missing holes in this approach which we have attempted to rectify using the following:
The tournament approach evolves evaluating alternative sequences in forming a composite model which may include: 1)Autoregressive 2)Differencing 3)Moving Average 4)Level shifts 5)Local Time Trends 6)Pulses 7)Seasonal Pulses 8)Fixed Effects a)Month of the year, Week of the year, Day of the week, Hour of the day, Interactions between the fixed effects 9)Days of the month 10)Lead/Contemporaneous/Lags to user specified causals 11)End of the month effects 12)Friday before a holiday and Monday after a holiday

In addition, Autobox examines the constancy of parameters over time, constancy of variance over time and the linkage between the residuals and the expected value of the series (i.e., power transformations). The residuals from the model must be NIID.

An Introduction to Singular Spectrum Analysis with SAS/ETS(r) Software Singular spectrum analysis

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An Introduction to Singular Spectrum Analysis with SAS/ETS(r) Software Singular spectrum analysis (SSA) is a relatively new approach to modeling time series data. Now supported in SAS/ETS(r) software, the SSA method of time series analysis applies nonparametric techniques to decompose time series into principal components. SSA is particularly valuable for long time series, for which patterns (such as trends and cycles) are difficult to visualize and analyze.

This paper provides an introduction to singular spectrum analysis and demonstrates how to use SAS/ETS software to perform SSA. As an illustration, monthly data on U.S. temperatures over the last century are analyzed to discover significant patterns.

Exponential Smoothing [ES]

Contributed Session:

Monday, June 21, 4:00pm-5:30pm   Room:
America's Cup A

Chair: David Giles
University of Victoria, Canada

Why the damped trend works

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The damped trend method of exponential smoothing is a benchmark that
has been difficult to beat in empirical studies of forecast accuracy.
One explanation for this success is the flexibility of the method,
which contains a variety of special cases that are automatically
selected during the fitting process. That is, when the method is
fitted, the optimal parameters usually define a special case rather
than the method itself. For example, in the M3-competition time
series, the parameters defined the damped trend method only about 43%
of the time using local initial values for the method components. In
the remaining series, a special case was selected, ranging from a
random walk to a deterministic trend. The most common special case was
a new method, simple exponential smoothing with a damped drift term.

Analytic Bias Reduction for Some Exponential Smoothing Models

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Although maximum likelihood estimation of exponential smoothing models
yields parameter estimates that have desirable asymptotic properties,
these estimators are biased in finite samples. This, in turn, has
implications for the quality of the associated forecasts. In this paper
we approach several standard exponential smoothing models from a
likelihood perspective, assuming Gaussian innovations. We present
analytic expressions for the biases, to $O(1/n)$, of the MLEs of the
parameters in these models. Our results facilitate the construction of
bias-adjusted estimators of the models' parameters, and these modified
estimators are unbiased to $O(1/n^2)$. We investigate the effects that
these bias corrections have on fore-casting performance, and
specifically the extent to which the forecast bias-variance tradeoff is
affected by modifying the MLEs of the parameters. Finally, the merits
of this analytic bias adjustment are compared, in a simulation
experiment, with alternative bias corrections based on bootstrap and
jackknife methods.

Exponential smoothing models for demand forecasting with censored data

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Demand forecasts play decisive roles in organizational planning, management, budgeting and performance monitoring. Exponential smoothing methods, given their relative simplicity and robustness, are especially useful in organizations forecasting thousands of products each month. However, special constraints have to be incorporated into the forecasting scheme when forecasting non-negative time-series data with a proportion of zero values and a high variability among the nonzero values so as not to obtain negative predictions. In this communication we develop a Bayesian forecasting approach based on exponential smoothing models for addressing the problem of forecasting positive demand time-series data with the before-mentioned features. We consider the zero demand values as censored data, which may result from inventory shortages. The Bayesian solution to this problem can be obtained by considering the 'missing data' as parameters of the model. Their posterior distribution is then calculated together with that of the model parameters. This joint posterior distribution is not analytically tractable but can be approached using MCMC simulation techniques. Finally, the predictive distribution for the future values of the time series, with support of the positive half-line instead of the unrestricted one, is estimated using Monte Carlo integration.

Double seasonal exponential smoothing, a Bayesian approach

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We introduce an extension of exponential smoothing to deal with double seasonality that could easily be adapted to more than two seasonal cycles. In our approach, we explicitly consider the interaction effects between the two seasonal cycles. We assume additive effects and a stochastic component given by independent, homoscedastic, normal errors. Under those conditions the joint distribution of the data vector is multivariate normal, with a covariance matrix which is a function of the unknown smoothing parameters only, while the mean vector depends only on the unknown initial conditions. Following the Bayesian paradigm, we obtain the joint posterior distribution of all the unknowns. Only the marginal posterior of the smoothing parameters is analytically intractable and has to be approached using simulation techniques. The conditional distribution of initial conditions giving

the smoothing parameters is well known and can be integrated out exactly in order to compute the predictive distribution. Finally, we propose to integrate out the smoothing parameters using Monte-Carlo techniques, obtaining an estimate of the predictive distribution as well as their main characteristics: point forecasts and prediction intervals.

An extension to exponential smoothing modelling methods for forecasting

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There are exponential smoothing models described in Hyndman et al. (2002, 2005) that have equivalent standard ARIMA models. These models may suit to model time series data with no economic cycle. We aim to extend the applicability of these models to the time series data, which not only have a level or trend or both but an economic cycle as well, such as GDP or its relative growth data. In addition, a non-seasonal economic time-series data with no trend has generally no unit root, such as growth rate of the seasonally adjusted quarterly GDP, whereas, the additive non-seasonal exponential smoothing model with no trend has one unit root. Likewise, a non-seasonal economic data with a trend has generally one unit root, such as the annual GDP data, whereas, the additive non-seasonal exponential smoothing models with a trend has two unit roots. In this sense, the exponential smoothing models are over-differenced when applied to the economic data. To overcome these problems, we propose a new form to the additive exponential smoothing model and show that it provides a better approach to modelling economic data.

Industry 1 [IN1] [Practitioner Track]

Contributed Session:

Monday, June 21, 4:00pm-5:30pm   Room:
America's Cup B

Chair: Hans Levenbach
Delphus, Inc., USA

Predictive Analytics for Hospital Management

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Paul Savage
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Whatever the latest meaning of predictive analytics, planners working for healthcare providers are keenly interested in forecasting population demand for services and the expected outcomes of diagnostic and treatment regimes for patients in their facilities. Moreover, there are also the environmental and regulatory issues of hospital closures, consolidations, physician recruitment, and patient migration patterns that impact the future of hospitals and healthcare networks and organizations. Especially for those hospital facilities in suburban New York, closest to state borders (Connecticut and New Jersey) literally tens of thousands of patients are crossing into an adjoining State for access to medical care services. These patterns of migration, into and out of the State, are not new and have often been a significant source of activity for Tertiary Care facilities and frequently invisible to regulatory agencies.

There are large volumes of data being collected and organized by these institutions, but generally not widely used for analytical purposes. State databases contain a wealth of information regarding inpatient episodes of care and are applicable to the health planning needs of the State and local communities. Because of the large volumes of data (at least 50 million records for four years of data residing on our servers), we will describe a four-step analytical methodology involving database management, data mining, statistical and OR modeling and dashboard development to help clients better embrace the opportunities for making future-oriented decisions regarding healthcare issues of quality, productivity, competition and profitability facing their institution.

Forecasting Corporate Management Team Performance

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Assembling the right corporate management team is a challenging and complex process in today's global economy. The recent worldwide financial meltdown has simply underscored the importance of a farsighted and balanced management team. The strength and composition of the management team along with effective corporate governance policies plays an important role in addressing these challenges. Interestingly enough professional sports franchises have paid much more attention to team based outcomes compared to the corporate world. The purpose of this paper is to illustrate how analytical modeling can be used in helping shape corporate organizational teams. A panel data analysis of S&P 1500 firms for the period 2004 to 2007 was performed. The results from the analysis show that as the degree of diversity in the management team increases so does corporate performance as measured by Tobin's Q.

Analyzing student predictions on forecasting exam results

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Student interest is always a critical factor for learning transfer and exam success. Running practical exercises / experiments that are relevant to the domain of the lesson keeps students' focus and helps achieve higher knowledge transfer to them. Such an experiment was included in the lesson "Forecasting Techniques" and current work ranked judgmental forecasting ability of students for the prediction of exam results. The methodology used did not affect student belief regarding the influence of their submitted forecast on the actual result. The analysis of the gathered information clearly showed that students liked the experiment; students who received very good grades were pessimistic while students who received a pass grade were a bit optimistic. Students who passed the exam liked the teaching methods while the rest of them did not, which is an obvious conclusion that also validated the current work. Measuring these and similar metrics for a course can provide very useful feedback to improve learning processes and provide more targeted learning that lead both learners and students to on-going success.

Is there Evidence of Shift-Contagion in International House Markets?

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The paper attempts to provide evidence of shift-contagion across international housing markets, with a particular focus on UK and Spain. We use a Markov Switching FAVAR framework and regime-dependent impulse response functions. The Crisis regime which we identify endogenously is shown to also
correspond to an exogenously determined index of financial crises which peaked in the early 1990s and in the more recent Subprime crisis. Furthermore, we find that the response of domestic house price to a shock to a common (global) house price factor during a Crisis regime is relatively more amplified than in a ormal (more tranquil) regime. Less compelling evidence is found for France.

Volatility 3 [VO3]

Contributed Session:

Monday, June 21, 4:00pm-5:30pm
Room: America's Cup C

Chair: Todd Prono
Commodity Futures Trading Commission, USA

Simple GMM Estimation of the Semi-Strong GARCH (1,1) Model

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Efficient GMM estimation of the GARCH(1,1) model requires consideration of both the conditional third and fourth moments. This paper proposes simple GMM estimation based upon the unconditional skewness of residuals and the autocovariances of squared residuals. An advantage of this simple estimator relative to efficient GMM is that neither the third nor the fourth conditional moment needs to be estimated. A second advantage is that linear estimators apply to all of the model's parameters. Sequential estimation involves TSLS followed by either two-step (linear) GMM or CUE. Simultaneous estimation involves either two-step GMM or CUE. The sequential estimators are applicable to a multivariate GARCH model with time-varying correlations that enjoys all of the computational simplicity of the Constant Correlation model. A Monte Carlo study of the proposed estimators is included, in which CUE is shown to dominate QML in certain circumstances. The proposed multivariate GARCH model is benchmarked against the Constant Correlation and Dynamic Conditional Correlation models in an empirical application involving a portfolio of foreign currency futures measured at a very high frequency. One-step-ahead Value at Risk estimates of this portfolio form a basis for comparison.

Generating Portfolio Volatility Forecasts from Smooth Transition Exponential Smoothing

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One of the primary inputs in portfolio selection process is expected risk. Accurate forecast of this input is thus crucial in obtaining minimum variance portfolio. A completely different portfolio may form due to an error in forecasted portfolio risk. This in turn will affect the quality of a portfolio. Recently, smooth transition exponential smoothing (STES) proved to perform better than *ad hoc* models and GARCH models in forecasting risk of an asset or index. However, the ability

of STES to provide the best forecasted portfolio risk is still doubtful. Hence, this study specifically examines the forecast performance of STES with different smoothing parameters as compared to *ad hoc* and GARCH models in forecasting portfolio risk. Using eight major international stock indices, we estimate the variance-covariance matrix on a rolling window basis. Several loss functions are then employed to analyze the forecasting performance of each model and the STES result is encouraging.

Forecasting Volatility with Smooth Transition Exponential Smoothing in Commodity Market

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New Adaptive Smooth Transition Exponential Smoothing (STES) method allows smoothing parameters to vary as a logistic function of user-specified variables. The sign and size of past shocks were used as transition variables which are analogous to the conditional variance dynamics of the smooth transition GARCH models. STES allow smoothing parameters to change over time, in order to adapt to the latest characteristics of the time series. Parameters are estimated by minimizing the sum of squared deviations between estimate and forecast variance. STES method was tested in stock markets with encouraging results. But it has NOT been tested in primary commodity market yet. Commodity markets have radically different characteristics from equity markets in term of nature of trading, quantity and tenure of transactions, return and risk involved etc. These factors may result in a radically different magnitude of volatility. Hence, the empirical results of STES in equity markets cannot be transferred over to commodity markets as it is. A further study of new adaptive STES model in commodity market is deemed necessary to prove its forecasting capacity. This paper presents the application of STES in commodity markets by forecasting the volatility of gold and crude oil. We investigate the behaviour of gold volatility with respect to crude oil return and vice versa. We would like to study if crude oil return has a significant impact on gold volatility and vice versa. Besides using STES, modified GARCH models were used for comparison with STES. The parameters of modified GARCH models and variance processes are estimated jointly using the maximum likelihood method .STES methods have shown impressive results if compared with variants of GARCH models.

Forecasting volatility: Optimal forecast error criterion for utility-based loss functions

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The paper proposes an optimal forecast error criterion for utility maximization under an option trading rule. Analyzing the quadratic and exponential utility functions, which give the "utility" or "loss" of the accumulated profits from the repeated daily S&P 500 index option trade, we find that both utility cases are asymmetric and peak when the forecast conditional variance equals the actual conditional variance. In the sense that the expected utility is a declining function of forecast error, we find that the coefficients in our regression depend on the parameters in the economic problem an investor faces, including the risk aversion parameter and the level of conditional variance. We repeat the procedure for different levels of risk aversion and study how the regression coefficients change when the risk aversion parameter changes. The empirical results show that for a more highly risk-averse investor the optimal forecast error criterion is a weighted average of MAE and MSE but which weights MSE less heavily. The optimality forecast error criterion based on functions of forecast errors for utility maximization under asymmetric loss provides a simple rule for making economic and financial decisions under uncertainty.

Energy 3 [EN3]

Contributed Session:

Chair: Steven Vitullo
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Disaggregating Time Series Energy Consumption Data

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Often, we need to disaggregate time series data to obtain a higher frequency time series for the purpose of forecasting and modeling, for example, disaggregating natural gas consumption data when we only have access to month billing period consumption. Another application is home heating oil customers. We disaggregate heating oil deliveries to daily consumption to improve forecasting accuracy. Heating oil companies want to improve their forecasting accuracy to know when to send a truck to fill a customer's oil tank. Increased forecasting accuracy of customer's consumption reduces the number of customers who run out of heating oil and can reduce the number of trucks and drivers the company needs to have in active service. Disaggregation uses historical consumption and variables correlated to the consumption such as weather information to estimate how much fuel was consumed each day. By doing this, we can get an estimate of daily consumption from each customer's historical usage. We disaggregate historical consumption (intervals) for both natural gas and heating oil customers using the Time Series Reconstruction (TSR) algorithm. The TSR algorithm uses least squares and correlated variables to reconstruct both the magnitude and variability in the underlying (daily) natural gas and heating oil consumption series.

Using Conditional Kernel Density Estimation for Wind Power Density Forecasting

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Of the various renewable energy resources, wind power is widely recognized as one of the most promising. The management of wind farms and electricity systems can benefit greatly from the availability of estimates of the probability distribution of power generated from each wind farm. However, most research has focused on point forecasting of wind power. In this paper, we develop an approach to producing wind power density and quantile forecasts. We model wind power in terms of wind speed and wind direction. In this framework, there are two key uncertainties. First, there are the inherent uncertainties in wind speed and direction, and we model these using a bivariate VARMA-GARCH model, with a Student t distribution, in the Cartesian space of wind speed and direction. Second, there is the stochastic nature of the relationship of wind power to wind speed and direction. We model this using conditional kernel density (CKD) estimation, which enables a nonparametric modeling of both the conditional mean and density of wind power. Using Monte Carlo simulation of the VARMA-GARCH model, density forecasts of wind speed and direction are converted to wind power using CKD estimation. Our work is novel in several respects: the CKD method is conditional on a density, rather than a single value; previous studies have not modeled a stochastic power curve; and to accommodate time evolution in the power curve, we incorporate a time decay factor within the CKD method. The new approach is evaluated with 1 to 72 hours-ahead forecasts using data sets from Greek wind farms.

Electric Load Forecasting Using Neural Networks and Rare Category Detection

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This paper presents a neural network-based model for short term electric load forecasting. To improve the forecasting accuracy from neural networks, the rare category detection is introduced to pre-process the historical data. This proposed model is capable of incorporating seasonal effects and extreme weather conditions. Experiments and evaluations have been conducted for the proposed model using historical load data of New York control area. Simulation results show that the model is capable of providing load forecasting with improved accuracy.

Forecasting of daily total atmospheric ozone in Isfahan using artificial neural networks (ANNs)

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In this work, in order to forecast the total column ozone over Isfahan, we have examined several neural networks algorithms with different meteorological predictors based on the ozone-meteorological relationships with previous day's ozone value. The meteorological predictors consist of temperatures (dry and dew point) and geopotential heights at standard levels of 100, 50, 30, 20 and 10 hPa with their wind speed and direction. These data together with previous day total ozone forms the input matrix of the neural model that is based on the back propagation algorithm (BPA) structure. The output matrix is the daily total atmospheric ozone The model was build based on daily data from 1997 to 2004 obtained from Isfahan ozonometric station data. After modeling these data we used 3 year (from 2001 to 2003) of daily total ozone for testing the accuracy of model. In this experiment, with the final neural network, the total ozone is fairly well predicted, with an Agreement Index 90%.

Business Cycles 2 [BC2]

Contributed Session:

Monday, June 21, 4:00pm-5:30pm
Room: Cunningham A

Chair: Klaus Wohlrabe
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Predictive Ability of Business Cycle Indicators under Test: A Case Study for the Euro Area Industria

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In this paper we assess the information content of seven widely cited early indicators for the euro area with respect to forecasting area-wide industrial production. To this end, we use various tests that are designed to compare competing forecast models. In addition to the standard Diebold-Mariano test, we employ tests that account for specific problems typically encountered in forecast exercises. Specifically, we pay attention to nested model structures, we alleviate the problem of data snooping arising from multiple pairwise testing, and we analyze the structural stability in the relative forecast performance of one indicator compared to a benchmark model. Moreover, we consider loss functions that overweight forecast errors in booms and recessions to check whether a specific indicator that appears to be a good choice on average is also preferable in times of economic stress. We find that on average three indicators have superior forecast ability, namely the EuroCoin indicator, the OECD composite leading indicator, and the FAZ-Euro indicator published by the Frankfurter Allgemeine Zeitung. If one is interested in one-month forecasts only, the business climate indicator of the European Commission yields the smallest errors. However, the results are not completely invariant against the choice of the loss function. Moreover, rolling local tests reveal that the indicators are particularly useful in times of unusual changes in industrial production while the simple autoregressive benchmark is difficult to beat during time of average production growth.

Real Time Forecasting with the Composite Leading Index

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We examine the performance of composite leading index (CLI) to predict future movement in aggregate economic activity. We focus on two points to estimate the ability of CLI. First, CLI is first announced in a preliminary form, and then CLI is revised repeatedly. We find that there are significant differences between real-time forecast and final (revised) forecast. Second, CLI components are often added and eliminated to improve the CLI's performance. When we use real time CLI, we find that CLI is composed of in-sample and out-of-sample. At the revision of CLI, CLI is constructed in corresponding with the previous reference date of turning points on business condition using real-time data. After the revision, we use new CLI components to predict the future. It is widely known that significant in-sample evidence of does not guarantee significant out-of-sample predictability. We compare the forecast performance between in-sample and out-of-sample using Diebold–Mariano test. We find that the performance of real-time forecasts is significantly better than forecast that uses the final revised data. We conclude that results of in-sample tests of predictability will typically be more credible than results of out-of-sample tests. It is natural that in-sample forecast is better in a word. This is because the revision of CLI is re-constructed in corresponding with the previous turning points on business condition. But we find that the ability of CLI is reduced with repeated revision. This shows that it is difficult to correspond to every turning point when we re-construct new version CLI.

The use of multivariate macroeconomic forecasts to forecast GDP: Evidence from the G7 countries

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This paper uses the dataset of monthly multivariate macroeconomic forecasts provided by Consensus Economics Inc. to examine whether non-GDP macroeconomic forecasts can help predict future GDP forecast revisions in the G7 countries and ten Asian economies. The dataset ranges from 1992 to 2009. The forecasted variables are GDP, inflation, corporate earnings, interest rates, wages and unemployment. There are more than 800 different forecasters, primarily commercial and investment banks. A large literature has shown that, because of the autocorrelation of forecast revisions, future GDP forecast revisions are predictable. We investigate whether, controlling for the forecast revisions of GDP, other macroeconomic forecasts such as inflation, unemployment and interest rates can help us predict future GDP forecast revisions with greater accuracy. We first use a dynamic panel data approach to analyse the predictability of future GDP forecast revisions. Unsurprisingly, we find that forecast smoothing makes it possible to predict future forecast revisions. The main empirical result of the paper is that several macroeconomic variables, in particular the forecast revisions of unemployment and wages, help us

predict future GDP forecast revisions with 10-20% greater accuracy depending on the countries. The second contribution is to provide a theoretical explanation to our novel result. We develop two different models of strategic forecasting. In the first model the intensity of forecast smoothing varies across variables. The second model assumes instead that the intensity of forecast smoothing is constant, but the accuracy of private signals changes across variables. We find that the linkages between the forecast revisions of the different variables strongly support the first model rather than the second one.

Contagious Contractions and the Death of Decoupling

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*The Great Recession witnessed the demolition of decoupling as the global economy experienced an unusually synchronized recession. This paper examines the diffusion, depth and breadth of the recent global recession and analyses the factors that contributed to its severity such as trade and financial linkages. This study also finds that while future international recessions are unlikely to be quite as concerted or intense as the one just experienced, they will probably exhibit greater cyclical "coupling" than the pattern seen for a couple of decades preceding the 2007-09 recession. The paper also examines the highly concerted cyclical upswing that has followed an unusually concerted downturn. The role of a reliable leading index system in helping to time policy actions appropriately is also discussed.**Forecasting Methods 3 [FM3]*

Contributed Session:

Monday, June 21, 4:00pm-5:30pm
Room: Cunningham B

Chair: Gianluca Cubadda
University of Rome, Italy

A Medium-N Approach to Macroeconomic Forecasting

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This paper considers methods for forecasting macroeconomic time series in a framework where the number of predictors, N, is too large to apply traditional regression models but not sufficiently large to resort to statistical inference based on double asymptotics. This is achieved by examining the conditions under which partial least squares (PLS) and principal component regression (PCR) provide consistent estimates of a stable autoregressive distributed lag model as only the number of observations, T, diverges.

We show both by simulations and empirical applications that the proposed methods compare well to models that are widely used in macroeconomic forecasting. In particular, since to date little is known on the statistical properties of PLS in finite samples, a Monte Carlo study is carried out to evaluate the forecasting performances of this method in a medium-N environment. To our knowledge, our simulation analysis is unique in that we simulate time series generated by stationary 20-dimensional VAR(2) processes that satisfy the conditions under which both PLS and PCR are consistent. Indeed, several studies were devoted to compare PCR and PLS with other methods but always in a static framework. Our results suggest that ADL models estimated by PCR and, especially, PLS forecast well when compared to both OLS and ridge regression.

In the empirical application, we forecast four US macro time series by a rich variety of methods using various lags of twenty variables as

predictors. The empirical findings indicate that forecasting methods based on PLS outperform the competitors.

Finding Independent Factors in Large Macroeconomic Datasets

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Principal Components and Factor Analysis are some of the most popular techniques used to analyze large data sets with many variables. Their focus is on the second moments of the data: redundancies present in the unprocessed data are measured with correlations. However, by ignoring higher order statistics, such techniques may be missing important parts of the picture. This paper considers statistical approaches based both on estimation theory and on information theory, whereby factors are extracted using the stronger criteria of factor independence and nongaussianity. It proposes a simple algorithm tailored to macroeconomic data sets that use Principal Components as a pre-processing step, and it illustrates its performance using both Monte Carlo simulations and real data.

Some Results on Time-series Forecasting under Model Uncertainty

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I extend the framework of forecasting in weakly stationary processes by incorporating the concept of model uncertainty. A critical assumption is that the forecaster does not know the Data Generating Process, but is aware of a set of potentially correct models with some probability distribution. Two issues are analytically investigated, namely (i) the impact of changes in model dimensionality; and (ii) the role of exogenous variables in dynamic models. First, I introduce a risk-neutral decision making process based on the expected loss minimisation problem. By particularly looking at a Vector Autoregressive (VAR) model, the analyses on model dimensionality that follow yield powerful implications. I show that there is always non-trivial expected gain from an increase in dimensionality, and hence a univariate predictor is never optimal – in a mean square sense. Nevertheless, the supposedly fully-specified VAR predictor might not be optimal either when estimation risk is taken into account. On the role of exogenous variables, I compare Autoregressive Distributed Lag (ARDL) and Threshold Autoregressive (TAR) models with a pure Autoregressive (AR) model. I show that there is expected gain from introducing an additional exogenous variable into the predictor. However, such gain may be relatively small under certain circumstances, for example, when the exogenous variable is highly persistent.

Discerning Between Models Through Multi-Step Ahead Forecasting Errors

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We develop and show applications of two new test statistics for deciding if one ARIMA model provides significantly better h-step-ahead forecasts than another, as measured by the difference of approximations to their asymptotic mean square forecast errors. The two statistics differ in the variance estimates used for normalization. Both variance estimates are consistent even when the models considered are incorrect. Our main variance estimate is further distinguished by accounting for parameter estimation, while the simpler variance estimate treats parameters as fixed. Their broad consistency properties offer improvements to what are known as tests of Diebold and Mariano (1995) type, which are tests that treat parameters as fixed and use variance estimates that are generally not consistent in our context. We show how these statistics can be calculated for any pair of ARIMA models with the same differencing operator.

Finance 3 [FN3]

Contributed Session:

Monday, June 21, 4:00pm-5:30pm
Room: Cunningham C

Chair: Alain Kabundi
University of Johannesburg, South Africa

Applying a Genetic Algorithm to International Diversification of Equity Portfolios

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John Muteba Mwamba
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This paper uses a genetic algorithm (GA) portfolio optimization method, which includes out of sample forecasts of expected future returns and fluctuations from foreign currency markets in the optimization process. The method provides a hedged portfolio capable of offsetting exchange rate risk that negatively affects international diversification. The paper develops a genetic algorithm (GA) capable of dealing with inequality and interval financial constraints while taking care of investors' level of risk aversion. The paper compares the results obtained using the GA to those of two traditional approaches, namely the Quadratic Mean-Variance (QMV) and the Quadratic Variance Minimization (QVM). The results show that although the overall portfolio returns are similar for all three of the methods discussed, the GA provides investors not only with higher Sharpe ratio and return portfolios but also – and mostly – with portfolios with minimal risk across all levels of risk aversion.

Exploring the interior of the efficient frontier - using density forecasting to find consistent portfolio

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In quantitative portfolio selection, the Markowitz efficient frontier identifies a set of portfolios in risk – return space from which a rational investor may choose according to his degree of risk aversion. Underlying this framework is the assumption that the returns on the underlying assets follow a time invariant multivariate normal density, fully described by a vector of expected returns and a covariance

matrix. There are several flaws in this assumption, for example: in practice, these parameters are estimated from available data; the data generating process is not time invariant; the density function may have fat tails. Here we use density forecasting to identify the circumstances under which the position of a portfolio on the efficient frontier accurately reflects its subsequent investment behaviour. We generate 'dominated' portfolios within the efficient frontier to investigate how much, if any, extra risk needs to be taken to achieve the return implied by the efficient frontier. We call a portfolio consistent when the Berkowitz statistic indicates that the out-of-sample return density is consistent with the in-sample parameters. We use the members of the Dow Jones Industrial index as our data set.

Currency Carry Trading with MGARCH-based Carry-to-Risk Portfolio Optimization

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Currency carry trading is an investment strategy which borrows in a low-yield currency and/or invests in a high-yield currency, with the hope of profiting from the interest rate differential (the carry) between two money markets, as well as from currency movements. Technically, profit (or loss) will be generated by a difference between the exchange rate written in a forward contract and the spot exchange rate on the day when the contract expires. The risk in this strategy stems from unforeseeable currency movements. Which currencies, and with which weights, should be included in a portfolio? One possible approach is to use carry-to-risk maximization. We extend the usual static approach by substituting an MGARCH-based conditional covariance matrix capable of forecasting portfolio risk for the next period. By comparing examples of time series of realized profits, our paper shows the benefit of forecasting the conditional covariance structure of currency movements and other assets when constructing a carry-trading portfolio.

Hedging Greeks for a Portfolio of Options using Linear and Quadratic Programming

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The aim of this paper is to develop a hedging methodology for making a portfolio of options delta, vega and gamma neutral by taking positions in other available options, and simultaneously minimizing the net premium to be paid for the hedging. A quadratic programming solution for the problem is formulated, and then it is approximated to a linear programming solution. A prototype for the linear programming solution has been developed in MS Excel using VBA.

Econometrics 1 [EC1]

Contributed Session:

Monday, June 21, 4:00pm-5:30pm
Room: Oxford

Chair: David Harvey
University of Nottingham, United Kingdom

Testing for Unit Roots in the Presence of a Possible Break in Trend and Non-Stationary Volatility

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In this paper we analyse the impact of non-stationary volatility on a recently developed unit root test which allows for a possible break in trend occurring at an unknown point in the sample. Under an assumption of homoskedastic shocks, the test is asymptotically correctly sized and efficient regardless of whether or not a break in trend occurs. However, we show that under non-stationary volatility, although the break fraction estimator retains the same attractive large sample properties as for homoskedastic shocks, the limiting null distribution of the unit root statistic based around this estimator is no longer free of nuisance parameters. A solution to this inference problem is then provided by considering a wild bootstrap-based implementation of the unit root test, using the trend break estimator from the original sample data. The proposed bootstrap method does not require the practitioner to specify a parametric model for volatility, and is shown to perform very well in practice.

Measuring Aggregate Uncertainty in a Panel of Forecasts and a New Test for Forecast Heterogeneity

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Using a multi-period signal extraction model with heterogeneous agents, we show that aggregate uncertainty can be expressed as forecast disagreement plus the perceived variability of future aggregate shocks.

Under the joint limits with both T and N approaching infinity simultaneously, a simple test statistic has been developed to check whether idiosyncratic errors are homoskedastic. With a factor decomposition of the panel of forecast errors, we propose an improved measure of historical forecast uncertainty as a benchmark against which policy-makers can assess their current uncertainty. Based on density inflation forecasts, our results support the use of GARCH-type models, rather than the ex post squared errors in consensus forecasts, to estimate the ex ante variability of aggregate shocks as a component of aggregate uncertainty.

Estimation of asymptotic covariance matrices by using Vallée-Poussin kernels and spectral density

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In the context of time series analysis, some of the modern non-parametric estimators of covariance matrices make use of spectral density. For example, the popular Newey-West estimator does so. Convolution with Fejer kernel is often applied to these matrices in order to reach desired properties. However, the typical problem with using Fejer kernel is slow convergence. This paper explores the properties of an alternative covariance matrix estimator based on a kernel with faster convergence properties – the Vallee-Poussin kernel. Theoretical and numerical results are presented.

Unit Root Tests: Give it a Break!

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Unit root tests are used to identify the stationarity property of a time series data. One of the applications of unit root tests is to test the random walk hypothesis of stock prices data. The most widely used unit root test is the Augmented Dickey Fuller test. A few price series data exhibit a structural change from their usual trend due to various reasons involving major policy changes or economic downturns. The ADF test is biased towards null of random walk in presence of such a structural break in a series. An important implication of not accounting for structural break is that all the random shocks are assumed to have a permanent effect on the system. If we would need to test whether these shocks are just transitory around a stable trend path, we use a different class of unit root tests. We review these tests which take structural breaks into account. As an empirical example, we test the random walk hypothesis for daily cotton spot

prices in the National Commodity Derivatives Exchange (NCDEX), India. We use the ADF test, Zivot-Andrews test and the Lumsdaine-Papell test to examine the random walk hypothesis and summarize our results.

Keynote Speech [K2]

Plenary Session:

Tuesday, June 22, 8:30am-9:30am   Room: Randle AB

Chair: Roy Batchelor
Cass Business School, United Kingdom

A probit model with structured covariance for similarity effects and source of volume calculations

Greg Allenby

Ohio State University, USA

Source of volume calculations are used in a variety of marketing and economic calculations to measure the origin of demand due to changes in marketing mix variables. A manufacturer considering the introduction of a new product offering, for example, is interested in the extent to which demand is sourced from existing brands in their product line versus competitive brands. Demand sourced from existing brands is detrimental to the profitability of the new entrant, and is often referred to as "cannibalization." An important aspect of source of volume calculations is the ability to accurately predict patterns of substitution among existing offerings. Doing, so, however, is potentially costly in terms of the parameterization of a system of demand.

For J offerings, there exist J2-J possible cross effects for any product attribute or price that can change the demand for an offering. Economic models are therefore used to reduce the number of parameters needed to characterize demand patterns, with the logit model being the most parsimonious. A logit model can represent demand for J offerings with as few as J parameters – i.e., J-1 intercepts for the offerings and one price coefficient. However, as might be expected, this parsimonious representation of a demand system comes at a potential cost of mis-representing patterns of substitution.

Our model allows for higher rates of substitution among similar offerings through a structured error covariance matrix that relates the magnitude of off-diagonal elements to pair-wise measures of product similarity. The structured covariance matrix is parameterized as a function of observables about the alternatives, much as the deterministic utility component is a function of the alternative attributes. We propose and test alternative measures of product similarity, and show that our model provides a better fit to the data and more reasonable estimates of substitution. An advantage of a structured covariance matrix is that it readily accommodates the introduction of new product offerings in a counter-factual analysis, and allows analysis of demand for choice sets of varying size. These features are important for calculating cannibalization rates due to new product entry. Our model does not require additional data beyond that already used for estimating choice models, and requires just one additional parameter.

Greg Allenby's research focuses on the development and application of Bayesian statistical methods in marketing. His research deals with quantifying aspects of consumer behavior using data routinely collected by most organizations, and, more recently, its relationship to behavior prior to the purchase, outside the marketplace. These insights are used to develop new approaches to market definition and market segmentation, and to improve product development, pricing, promotion and targeting activities. He is a Fellow of the American Statistical Association, and is co-author of *Bayesian Statistics and Marketing*, published by John Wiley & Sons (2005). Greg is an Associate Editor for Marketing Science, the Journal of Marketing Research, the Journal of Business and Economic Statistics, and Quantitative Marketing and Economics.

Featured Speech [FS3]

Featured Session:

Chair: Gloria González -Rivera,
University of California, Riverside, USA

New tests of forecast optimality across multiple horizons

Allan Timmermann
University of California, San Diego, USA

We propose new tests of forecast optimality that exploit information contained in multi-horizon forecasts. In addition to implying zero forecast bias and zero autocorrelation in forecast errors, we show that forecast optimality under squared error loss also implies testable restrictions on second moments corresponding to long and short forecast horizons. In particular, the variance of the forecast error should be increasing in the horizon; the variance of the forecast itself should be decreasing in the horizon; and the variance of forecast revisions should be bounded by twice the covariance of revisions with the target variable. These bounds on second moments can be restated as inequality constraints in a regression framework and tested using the approach by Wolak (1989). Moreover, the tests can be conducted without the need for data on the target variable, which is particularly useful when this is subject to large measurement error. We also propose a new univariate test of forecast rationality that constrains the coefficients in a regression of the target variable on the long-horizon forecast and the sequence of interim forecast revisions. Size and power of the new tests are compared with those of conventional orthogonality tests through Monte Carlo simulations. An empirical application to the Federal Reserve's greenbook forecasts is used to illustrate the tests.

Alan Timmermann has been a member of UC San Diego's department of economics since 1994 and obtained his Ph.D. from the University of Cambridge. He now holds a full-time position at the Rady School and has a joint appointment with the economics department. Dr. Timmermann has worked extensively with the Rady School. He served on the faculty recruiting committee and led the visioning, planning and execution of the Rady Economic Forecasting Conference. Prior to this, he was a member of the steering committee and dean search committee for the UCSD Management School. Dr. Timmermann is a very productive and visible scholar in finance and applied econometrics. He serves as an associate editor on leading journals in finance, economics and forecasting. He uses a mix of theory, data and sophisticated econometric techniques to understand the behavior of financial markets. His objective is to understand what determines the movement of stock prices and to use this in managing risk and forecasting future price movements. He has also studied mutual fund performance and the extent to which mutual fund 'star' managers exist. Allan also is an effective and popular teacher. His students praise the relevance and rigor of his classes, his fairness and his sense of humor. Dr. Timmermann teaches finance courses in the Rady School MBA programs.

Tourism 2 [TR2]

Organized Session:

Tuesday, June 22, 9:40am-10:40 am   Room:
America's Cup A

Chair: Shuang Cang
Bournemouth University, United Kingdom

Analysis of Impact Factors on Loyalty Using Radial Basis Function Neural Networks Approaches

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Correctly measuring the impact factors on loyalty plays a very important role in policy and decision making for all tourism relevant business. It is easy to eliminate the variables that are irrelevant with the dependent loyalty variables. However, the simple correction methods do not work if the variables are not independent or the combination of the variables makes the contribution to the dependent loyalty variables than any individual variable. The national trust data is a rich data set collected via a self completion survey distributed from 160 national trust properties across the UK. One of important loyalty variables is the recommendation of national trust visit to other peoples. This paper employs the radial basis function neural networks (RBFNN) to determinate national trust visitors' loyalty comparing with other techniques such as the standard artificial neural network (multi-layer perceptron neural networks), decision tree (C5) and logistic regression models. RBFNN is capable of dealing with complex and nonlinear relationship between input variables and dependent variables, the importance scores of weights and weight clamping of neural networks methods are used as measurement of impact factors on the dependent variables. Empirical studies of these methods indicate that the prediction rates of RBFNN outperform other methods and this leads to the more accuracy measurements of impact factors on the dependent loyalty variables. Accurately finding and measuring the impact factors out of the larger variables are a significant contribution for the managements of national trust and attracting more people to visit national trust, it is the most efficient advertisement way on national trust visits.

Flash indicators and forecasts in tourism destinations: A systematic analysis of nowcasting & forecasting

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Since 2006, the Barometer of Tourism of the Canton of Valais has produced flash tourism estimates for the most recent summer and winter seasons. Research that focused on the relationship between several characteristics of the destinations and the accuracy of estimation (both forecasts and flash estimations) was presented at ISF 2009. That work found that the most relevant destination characteristics were intensity of tourism (the ratio of inhabitants to number of overnight guests) and the share of overnights (relative to the total number of overnights in all of Valais).

A Spatial State Space Model: with Applications in forecasting Australian Domestic Tourism Demand

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In univariate time series analysis, the development of the state space framework, which encompassed all exponential smoothing models (Ord et al., 1997; Hyndman et al., 2002), was a significant milestone. The vector innovations structural time series (VISTS) models of de Silva et al. (2009) extend the state space framework to a multivariate setting, and are shown to have equivalent forms in VARIMA models. In this paper we develop a new class of spatial state space (SSS) models. We show that, via spatial structural restrictions on the so-called persistence matrix, the SSS models are special cases of the VISTS models, and will be the first in formulating spatial exponential smoothing. Furthermore, when compared to the existing space-time ARIMA (STARIMA) models of Martin and Oeppen (1975) and Pfeifer and Deutsch (1980), the SSS model class encompasses nonlinear models for which there are no STARIMA equivalent forms. While empirical applications of STARIMA models rely heavily on subjective selection criteria based on ACFs and PACFs, the new SSS models are relatively easy to select through model selection procedures. Moreover, STARIMA models restrict both autoregressive and moving average coefficients for the same temporal lag to be equal across spatially correlated time series, which is necessary for the purpose of model selection, but highly restrictive in cases where some time series may exhibit more persistence than others. In contrast, the SSS models do not impose these restrictions and are therefore more flexible. Finally, the forecasting performance of the new SSS models is compared to STARIMA models and univariate pure time series models, using Australian domestic tourism demand data.

Supply Chain [SC] [Practitioner Track]

Contributed Session:

Chair: John Boylan
Buckinghamshire New University, United Kingdom

The relationship between forecast accuracy and inventory cost depends on the demand process

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Previous research (Gardner, 1990; Mahmoud and Pegels, 1989; Syntetos and Boylan, 2008) has shown that the efficiency of a stock control system does not relate directly to forecasting performance as calculated by standard forecast accuracy measures. These papers argue that improvement in forecast accuracy must be distinguished from improvements in inventory performance. It has been argued that a more accurate forecast does not necessarily imply reduced inventory cost, which is more important in the real world. In this paper we explore the relationship between forecast accuracy and inventory costs and the factors upon which this relationship depends. The literature is abundant in discussions on the benefits of sharing information in supply chains. Different performance metrics such as forecast accuracy and inventory cost have been employed to measure the benefits of information sharing. However, the results using these performance metrics are often discussed in isolation and the associations between them have not been explored. In this paper, we consider the relationship between the improvement in forecast accuracy and its effect on inventory holdings and cost. We assume that demand follows an ARIMA process. We show that this translation of benefits from improvements in the accuracy of forecasts to inventory savings depends on the nature of the demand process. Two approaches are considered in this paper. The first approach, No Information Sharing (NIS), is where the retailer does not share any information with the manufacturer. In this approach, the manufacturer forecasts on the basis of orders received from the retailer. In the second approach, Forecast Information Sharing (FIS), the retailer shares its forecasting information with the manufacturer. The orders placed by the manufacturer to its supplier are then based on this shared forecast. Both approaches are then compared by calculating the forecast accuracy, inventory holdings and inventory cost. Using an AR (1) demand process, we first mathematically analyse the association between Mean Squared Error (MSE) and inventory holdings. Owing to the mathematical complexity of establishing equations for the inventory cost, we then

employ simulations. This helps us establish the association between MSE and inventory cost. Using simulation, we also explore the effects of the autoregressive parameter and cost ratio on this association. We then move on to consider the relationship in other ARIMA processes. The simulations performed show that the relationship between MSE and inventory cost shows a demand process dependent behaviour.

Impact of Information Exchange on a supplier forecasting performance

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Forecasts of demand are crucial to drive supply chains and enterprise resource planning systems. Usually, well-known univariate methods that work automatically such as the exponential smoothing are employed to accomplish such forecasts. In fact, a particular type of a Decision Support System, known as a Forecasting Support System (FSS) integrates managerial judgment with quantitative forecasts. Traditional Supply Chain relies on a decentralised system where each member feeds its own FSS with incoming orders from direct customers. Nevertheless, other collaboration schemes are also possible, for instance, the Information Exchange framework allows demand information to be shared between the supplier and the retailer. Current theoretical models have shown the limited circumstances where retailer information is valuable to the supplier. However, there has been very little empirical work carried out. This work assesses the role of sharing the market sales information obtained by the retailer on the supplier forecasting accuracy. Data has been collected from a manufacturer of domestic cleaning products and a major UK grocery retailer to show the circumstances where information sharing leads to improved accuracy.

On the relationship between forecast errors and inventory performance

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Previous research has shown that forecast accuracy is to be distinguished from the performance of the forecasts when utility measures are employed. This is particularly true in an inventory management context where the interactions between forecasting and stock control are not yet fully understood. We explore the relationship between forecasting performance and inventory implications under an ARIMA representation of the demand process. Two distinct scenarios are incorporated in our analysis: Forecast Information Sharing (FIS) and No Information Sharing (NIS) in a two-stage supply chain. We approach the problem analytically and by means of simulation. The validity of the theoretical results is assessed on a real sales dataset from a major European superstore. The results indicate that the gain in accuracy by Forecast Information Sharing depends on the demand process. The translation to inventory savings then depends on the magnitude of the forecast accuracy improvement, regardless of the demand process. Insights are also offered into pertinent managerial issues and our paper concludes with an agenda for further research in this area.

Finance 4 [FN4]

Contributed Session:

Chair: Lars-Erik Öller
Stockholm University, Sweden

Density forecasting of the Dow-Jones share index

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The distribution of differences in logarithms of the Dow-Jones Share
Index is compared to normal (N) and a weighted sum of Normal and an
Asymmetric Laplace distribution (NAL). It is found that the NAL fits
best. We came to this result by studying samples with high, medium and
low volatility, thus circumventing strong heteroscedasticity in the
entire series. The NAL distribution also fitted economic growth, thus
revealing a new analogy between financial data and real growth.

A q-Gaussian Maximum Likelihood Estimator for Financial Series Forecasting

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Relatively recent developments in physics--specifically, non-extensive
statistical mechanics-- have introduced the q-Gaussian distribution as
one approach to reproduce the fat tails observed in real life
applications in a multitude of fields. This distribution fits some data
well, provides one explanation for the mechanisms that give rise to the
observed behavior, exhibits properties that make them more feasible
than alternative solutions (like Lévy process and others that become
Gaussian for large time-scales or do not evidence volatility
clustering), and quantifies in an intuitive way the departure from the
Gaussian distribution. However, to determine the parameters of the
distribution, many researchers still rely on visual or least-square
fittings, known to produce biased estimates. In order to provide a more
powerful and robust method we introduce a maximum likelihood (ML)
procedure to estimate the parameters of the q-Gaussian distribution and
its confidence ellipsoid, thus obtaining consistent, efficient and
unbiased parameters along with their confidence intervals and

multivariable correlations. We apply the ML method and determine the distribution of the returns of two time-series that are usually analyzed in terms of their volatility: USD swap rates (2000-2010) and the S&P500 index (1950-2010). Recently, a relationship has been shown to exist between the ARCH(1)/GARCH(1,1) constants and the parameters of the q-Gaussian distribution. Consequently, by applying the ML method, when we obtain the time behavior of the whole distribution we are also finding the ARCH(1)/GARCH(1,1) constants and their confidence intervals, thus linking, in a robust way, the shape of the distribution with the short-term volatility forecasting, respectively. Moreover, the relationship works both ways: from the ARCH (1)/GARCH(1,1) constants we can also reconstruct the parameters of the q-Gaussian distribution and determine the degree of departure from normality. By establishing this bridge, it is therefore equivalent to speak of autoregressive behavior or departure of normality.

The Information Content of High-Frequency Data for Estimating Equity Return Models and Forecasting Risk

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We demonstrate that the parameters controlling skewness and kurtosis in popular equity return models estimated at daily frequency can be obtained almost as precisely as if volatility is observable by simply incorporating the strong information content of realized volatility measures extracted from high-frequency data. For this purpose, we introduce asymptotically exact volatility measurement equations in state space form and propose a Bayesian estimation approach. Our highly efficient estimates lead in turn to substantial gains for forecasting various risk measures at horizons ranging from a few days to a few months ahead when taking also into account parameter uncertainty. As a practical rule of thumb, we find that two years of high frequency data often suffice to obtain the same level of precision as twenty years of daily data, thereby making our approach particularly useful in finance applications where only short data samples are available or economically meaningful to use. Moreover, we find that compared to model inference without high-frequency data, our approach largely eliminates underestimation of risk during bad times or overestimation of risk during good times. We assess the attainable improvements in VaR forecast accuracy on simulated data and provide an empirical illustration on stock returns during the financial crisis of 2007-2008.

Demography [DM]

Contributed Session:

Tuesday, June 22, 9:40am-10:40 am   Room:
America's Cup D

Chair: David Swanson
University of California Riverside, United States

MAPE-R: A Refined Measure of Accuracy for Ex Post Evaluation of Estimates and Forecasts

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Jeff Tayman
University of California San Diego, USA
Tom Bryan
McKibben Demographics, USA

Accurately measuring a population at a current and point in time is of fundamental interest to demographers. Therefore, it is not surprising that attempting to accurately measure the future also has been a subject of interest for demographers. Within these discussions, demographers have often been criticized for their inaccurate forecasts. Discussions of methods and data are usually at the center of these criticisms, along with suggestions for providing an idea of forecast uncertainty. However, the measures used to evaluate the accuracy of forecasts also have received attention and while accuracy is not the only criterion advocated for evaluating demographic forecasts, it is generally acknowledged to be the most important. In this paper, we continue the discussion of measures of forecast accuracy by concentrating on a refined version of the measure that is arguably the one used most often, Mean Absolute Percent Error (MAPE). The refined version, MAPE-R, has not had the benefit of a major empirical test, which is the central focus of this paper. We do this by comparing US county population forecasts for 2000 to county census counts. We find that the refined MAPE-R not only overcomes earlier shortcomings, but offers a significantly more meaningful representation of average error than MAPE, even when extreme errors are not present.

A comparison of forecasting methods for mortality rates and life expectancy

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Although there are many methods for forecasting mortality rates and life expectancy, there has been very little comparative research on the accuracy of the forecasting methods. By using age- and sex-specific populations of 14 developed countries, we compare the short- to medium-term accuracy of ten methods for forecasting mortality rates and life expectancy. These ten methods include the Lee-Carter method and many of its variants and extensions. The result of the weighted Hyndman-Ullah method is shown to provide the most accurate point forecasts of mortality rates. However, the accuracy of this method for forecasting mortality rates does not necessarily translate into good forecast accuracy for life expectancy. The Lee-Miller method gives the best point forecast accuracy of life expectancy. Furthermore, we evaluate and compare the empirical coverage probabilities for both mortality rates and life expectancy. These comparisons show that the weighted Hyndman-Ullah method provides the most accurate interval forecasts of mortality rates, and the robust Hyndman-Ullah method gives the best interval forecast accuracy of life expectancy. The methods discussed in this paper are all implemented in an R package, which is freely available from the authors.

Coherent functional forecasts of mortality rates and life expectancy

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Forecasts of age-specific mortality rates and life expectancy for males and females can diverge using most standard models. There have been some recent attempts to develop modified models to produce "coherent" forecasts that do not diverge, but these can be complicated or unreliable. In this paper, we propose a new approach to producing coherent forecasts of age-specific mortality rates and life expectancy for males and females that is easy to apply and produces forecasts at least as accurate as any competitor method. Our method is based on functional time series models and is flexible in allowing different types of dynamics. Forecasts from our model are compared with the forecasts obtained from alternative models when applied to data from many countries. Our model can be generalized to allow forecasting of

functional time series from any number of related groups. Some of the
generalizations will be described.

Business Cycles 3 [BC3]

Contributed Session:

Chair: Karsten R. Gerdrup
Norges Bank, Norway

Forecasting Norwegian GDP in Real Time: A Density Forecast Combination Approach

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In this paper we use real time data when forecasting Norwegian GDP and explore the role and properties of density forecast combinations. Forecast combination using an appropriate weighting scheme has become a tool in the forecasting literature and in central banks as it alleviates the risk of selecting poor models. While the literature on forecast combination using real time data often evaluates point forecasts, this paper also evaluates density forecasts. The model suite includes a wide set of models often considered useful by central banks, ranging from vector auto regressions and factor models to a dynamic stochastic general equilibrium model.   Forecasts are recursively evaluated on real time data from 2000 to 2009. First, we investigate the robustness of density forecasts when the weight attached to each model is based on past forecast performance. We explore to what extent density forecast combinations and the precision of these forecasts are sensitive to data revisions, from the first release of GDP to the most recent vintage. We consider different types of weighting schemes. Second, we compare forecasts from our forecast density combination approach with a selection strategy where we try to pick the ``best'' model in real time. Finally, we compare our real time point forecasts with Norges Bank's own point forecasts, the first releases of GDP from Statistics Norway as well as forecasts from some simple benchmark models. Our results are promising and indicate that our density combination approach produces rather accurate point forecasts and well-calibrated densities in real time.

Composite Leading Indicators of Inflation in China

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The goal of this paper is to construct composite leading indicators that anticipate inflation cycle turning points in China. The composite leading indicators are designed to serve as practical tools to assist real-time monitoring of inflationary pressure. The data sets started from 1995 to 2005, and are monthly. CPI is taken as the indicator of inflation cycle; the leading indicators are selected according to the time difference correlation indices with CPI, K-L information, etc. Four indicators are selected as the leading indicators, including Industry Product Index, M1, Raw Material Price Indices, and Investment in Fixed Assets. The leading indicators are found to be an informative tool for signaling future phases of the inflation cycle out-of-sample. The leading indicators are composed by the method of the Department of Commerce, USA, and based on the growth rate cycle. The composite leading indicators lead CPI about 6 months at the turning points. We also found that the forecasting ability of the composite leading indicators is good, though any one of the four indicators is not very suitable to take as an indicator to forecast the inflation cycle.

Modeling Macroeconomic Performance in China – Official Data Problems and Implications

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It is difficult to exaggerate the importance of China's macroeconomic performance to the world economy and the danger of misreading China. There have been increasing needs for reliable measures of Chinese macroeconomic performance for business planning and macroeconomic policy-making. However, most of the exercises of modeling Chinese macroeconomic performance do not seriously consider the problems underlying the published official indicators. In this study, based on The Conference Board (TCB)'s recent exercise in constructing the (experimental) leading and coincident economic indicators (or LEI and CEI) for China, we first investigate major data problems in Chinese official indicators and their potential biases, and then explore the best way to minimize the impact of these problems when interpreting these indices. Lastly, we assess how well the LEI and CEI have tracked China's domestic cyclical dynamics throughout the global economic recession in 2008-2009 as well as past domestic and global downturns.

Neural Networks [NN]

Organized Session:

Chair: Sven F. Crone
Lancaster University Management School, United Kingdom

Boot.EXPOS in NNGC competition

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Boot.EXPOS is a procedure developed by the authors that combines the resampling technique bootstrap with the exponential smoothing methods. The main objective of this research is to contribute for a better understanding of using bootstrap in helping to deal with different time series analysis and obtain forecast. A times series is a combination of pattern and error term. As a first phase is necessary to identify and separate the observable components from the random part. For a time series, the "best" EXPOS model is selected using the AIC criterion. The goal is to find the appropriate EXPOS model and to separate the pattern (trend or/and seasonality) from the error term. Time series patterns and the optimal estimated values for the exponential parameters are found and kept for later use. For the remaining part, the stationarity is investigated using the Dickey-Fuller test. The Boot.EXPOS is inspired on the sieve bootstrap: an AR(p) is used to filter the random series, and then the centered residuals are bootstrapped. Now the algorithm works backward: using the bootstrap residuals series, an AR(p) is obtained recursively. Adding the patterns from the first phase, the result is a replica of the initial time series. This time series replica is forecasted for i=1,...,h steps ahead, using the EXPOS type and the estimates of the smoothing parameters found in the first phase. Repeating B times, the column mean of a matrix with B rows and h columns is taken. The interest in participating in the NNGC competition is to test the relative performance of Boot.EXPOS in this experimental setting. Monthly and daily datasets with forecasting horizon h=12 (e.g. 1 year) and h=14 (e.g. 2 weeks), were already forecasted.

Non-linear time series forecasting using A Fuzzy Cerebellar Associative Memory Model for NNGC Competition

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Many real-world systems and processes exhibit complex dynamic and non-linear characteristics that cannot be modeled by typical statistical and machine learning models. Facilitation of efficient and accurate prediction and identification of such dynamic and non-linear systems is therefore an important task for many real-world applications. The human cerebellum is a vital part of the brain system that possesses the capability to accurately model highly non-linear physical dynamics, as displayed in the precise and rapid execution of dexterous movements and fluid motor reflexes in our everyday life. We can therefore exploit our increasing knowledge of the human cerebellum to construct an intelligent computational model to effectively handle the complexity of non-linear dynamic systems in the real world. This paper presents the use of a novel brain-inspired computational model of the human cerebellum named the kernel density-based CMAC with Takagi-Sugeno-Kang fuzzy inference model (KCMAC-TSK) for fast and accurate non-linear time series modeling and forecasting. The structure of the KCMAC-TSK model is inspired by the neuro-physiological aspects of the cerebellar learning and development process. By incorporating the first-order TSK fuzzy inference scheme in the KCMAC-TSK model, we enhance the modeling capability and accuracy of the resultant computational model, while at the same time providing the computing transparency that is enabled by the structure of the linguistic rules. We applied the KCMAC-TSK model in the modeling and forecasting of the Neural Forecasting Grand Competition (NNCG) datasets. The NNGC forecasting competition seeks to evaluate the accuracy and modeling sensitivity of various computational intelligence methods in time series forecasting of dataset of multiple frequencies. The data consists of 6 datasets; each containing 11 time series with different frequencies, including yearly, quarterly, monthly, weekly, daily and hourly transportation data.

Forecast Combination With Neural Network Weighing Methods

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This article presents the proposal of a neural network based framework for combining time series forecasts. It uses multilayer perceptron regression models to estimate, at a given point in time, the linear weights (relevancies) of the available experts (forecasters) at that time; with those weights, the experts can be linearly combined to produce a single, potentially more accurate, forecast. The presented weight generation framework delivers regression models that estimate weight vectors solely based on previous individual forecasts, taken at some fixed time window; those models can be especially effective for multi-step-ahead forecasting, as no performance measure is applied as exogenous (input) variable and no knowledge of the series future realization is required. Additionally, the proposed framework allows for the neural networks to learn both from traditional exact weighing methods (e.g constrained least squares) and high performance heuristics (e.g normalized inverse of the mean squared error), which provide diversity and flexibility to the process. A large set of experiments were carried out over benchmarking public data, with relevant statistical comparisons between traditional (non-neural network) and

neural network ensemble methods. Preliminary results indicate significant performance gain in the usage of the latter.

Naive Support Vector Regression and Multilayer Perceptron Benchmarks for the 2010 Neural Network

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In recent forecasting competitions, algorithms of Support Vector Regression (SVR) and Neural Networks (NN) have brought forth some of the most accurate but also inaccurate contenders, some even failing to outperform simple statistical benchmarks. As both SVR and NN offer substantial degrees of freedom in model building (e.g. selecting input variables, kernel or activation functions, number of hidden nodes or support vectors etc.), a myriad of heuristics and ad-hoc rules have emerged which lead to different models with varying performance. This heterogeneity impairs comparisons across classes of algorithm and fails to develop an understanding of their presumed nonlinear and non-parametric capabilities. In order to determine a generalized estimate of performance for both SVR and NN in the absence of an accepted methodology, this paper seeks to compute benchmark results employing a naïve methodology which attempts to mimic many of the common mistakes in model building. The naive methodologies serve primarily to compute predictions for each of the 66 time series in the NNGC competition and to provide a lower error bound representative of a within class benchmark for both algorithms. In addition, their discussion aims to draw attention to the most common, mistakes that regularly lead to model misspecification of MLP and SVR in time series forecasting.

Telecommunications 1 [TL1] [Practitioner Track]

Organized Session:

Chair: Mohsen Hamoudia
Orange - France Telecom Group, France

Bass-Rogers adoption of Internet and Leapfrogging phenomenon of Web 2.0 Implementation

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This paper investigates the leapfrog phenomenon, particularly late adopters of the Internet bypassing early Internet adopters in the implementation of Web 2.0 in tourism. Even though the Diffusion of Innovation theory covers many aspects of innovation adoption and implementation, implementation stage research remains sparse and perhaps no research has investigated the leapfrog phenomenon across different adopter categories. Thus, this study used a software robot to generate reports on Web 2.0 and User Active Features (UAF) by Swiss tourism websites. Moreover, this study used the Wayback Machine to classify website adopter categories and then investigate the leapfrogging phenomenon across adopter categories. The results suggest a link between adopter categories and the odds of implementation of at least one UAF or Web 2.0 feature. However, the findings only showed a slight leapfrogging phenomenon between Laggards and the Late Majority in the UAF model. This research helps fill the gap on implementation stage research by the analysis of Web 2.0 features implemented in the tourism sector.

Telecom Forecasting Issues for the 2010s

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The last 25 years provided us a rich environment for ITC/Telecom forecasting with seismic transitions in broadband, cellular telephony, wireless data, packet switching, fiber optics, HDTV, the Internet and so on. Now that the culmination of these transitions is in sight, is

there anything new and exciting left to forecast besides the details? Plenty, I think. My short list includes wireline broadband beyond 100 Mb/s, the role of wireless broadband beyond 4G, getting broadband to hard-to-reach areas, the future of Internet video and social media, 3D-TV, device-to-device and people-to-device communications, and ITC/Telecom applications to problems in energy, transportation, health care, etc. Previous telecommunications forecasting experience can help us forecast these developments. Examples: Our past experience in forecasting HDTV can help forecast 3D-TV adoption. Our past experience forecasting broadband speeds can apply to speeds beyond 100 Mb/s. Our wireline vs. wireless forecasting experience may tell us something about their respective roles at higher speeds. In this presentation, I will present examples, ideas and preliminary results for some of these topics and draw some general lessons and conclusions.

Mobile Commerce from the Consumer's Perspective: Evidence from the United States

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Mobile commerce (or m-commerce) is the conduct of financial and commercial transactions using wireless means (most often, specially equipped mobile phones or equivalent wireless devices). Usually, for such activities, it is necessary to install special software (sometimes called "mobile wallet") on compatible mobile phones. To support these activities, mobile payment networks have emerged in the US. The advent of m-commerce in the US follows by about a decade the launch of electronic commerce (or e-commerce), which relied on internet access for the conduct of similar transactions. Except for the physical access devices involved, the two forms of commerce are similar in many ways, e.g., they both (1) are "contactless" and replace conventional credit and debit cards or cash, (2) raise concerns about privacy and security, and (3) most importantly, rely on broadband connectivity.

A behavioural model of the adoption and use of new telecommunications media: the effects of communication

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Recent years have seen the dramatic growth of new modes of communication. Besides using landline and mobile phone for voice communication, people spend increasing amounts of time receiving and sending messages through social networks (e.g. Myspace or Facebook) and real-time communication software (e.g. Skype or MSN). The purpose of this research is to develop a behavioural model to analyse the weighting of specific media attributes that drive people to adopt or use these new communication channels. Seven telecommunications media available in 2010 have been categorised included landline, mobile phone, short message service, E-mail, Internet telephony, instant messaging and social networking. Various media product/service attributes such as synchronicity, multi-tasking, price, quality, mobility, privacy and video which might affect consumers' media choice were first identified. Importantly, this research has designed six types of communication scenarios in the online survey with 894 valid responses to clarify the effects of different communication aims. Various existing methods for modelling media choice were considered including choice models based on intentions data, conjoint analysis and

simple multi-attribute rating techniques exploiting ranks (SMARTER). The weight of each attribute in each communication has been estimated leading to forecasts of individual media choice. By calculating the forecasting error between the probability of the estimated media choice and the actual using behaviour, we found that using conjoint analysis to forecast the consumer's media choice is better than using SMARTER; using employment status for clustering respondents is better than using self-explicated utility. In addition, through aggregating the probability of the individual's media choice and the data on the proportion of communication spending in each scenario, each medium's market share has been estimated. Media substitution effects between scenarios will also be addressed leading to forecasts of end usage patterns, a critical element in the investment decisions made by telecommunications and internet providers.

Volatility 4 [VO4]

Contributed Session:

Chair: Esther Ruiz
Universidad Carlos III de Madrid, Spain

Predictive ability of GARCH vs. Realized Volatility Models vis a vis Forecast Horizon

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We compare out-of sample forecasting performance of GARCH vs. various Realized volatility models using symmetric, asymmetric, linear and quadratic loss functions for 3-major exchange rates (U.S Dollar vs. Canadian Dollar, Japanese yen and German Mark and major indices (S&P 500, DJones, Nasdaq100, Nikkei225, FTSE100,DJJTOXXE50, DAX). We find that the out of sample performance depends on the forecast horizon, the loss function and the degree of asymmetry of the loss function being used.

How to choose a multivariate GARCH model? A model confidence set approach

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Most financial applications are multivariate problems with volatility forecasts as one of the inputs. Forecasting multivariate volatility is relatively easily done using a multivariate GARCH model, i.e. the conditional variance matrix is modelled as a function of past returns. A large number of multivariate GARCH models have been proposed in the literature, but no large scale forecast comparison is available. This paper addresses the selection of multivariate GARCH models in terms of forecasting accuracy with a focus on large scale problems. A priori, it is difficult, if not impossible, to identify which model has the best out-of-sample forecasting performance. Therefore, we suggest to proceed in two steps. The first step is to estimate a variety of models and produce out-of-sample forecasts. This can be easily done by using standard econometric software packages which are today readily available to the forecaster. The second step is to identify a set of models that show superior forecasting performance. These models can then be used either to produce combined forecasts or to select a particular preferred model. One could also consider comparing ex-ante combined forecasts against the individual models to assess the

inclusion of weak models. To measure out-of-sample forecasting performances, model based forecasts are usually contrasted to ex-post realizations when they become available. Hence, the forecaster needs also to select a loss function to measure deviations between realizations and forecasts. This paper considers 20 stock time series from the NYSE and the NASDAQ indices. The sample period is 21 years, from January 2, 1988 to December 31, 2008 (5230 observations). The universe of competing models consists of more than 100 model based forecasts each representing a combination of a model specification and an estimation method.

Is one model enough? Forecasting volatility using Bayesian Model Averaging

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Volatility estimation represents an important objective when modeling high frequency financial time series. Stochastic volatility (SV) models have been considered as the most efficient way in modeling volatility. However, model uncertainty in the context of the data generating process has never been considered so far. Bayesian Model Averaging is a natural way to treat model uncertainty and estimate volatility in the context of SV models. In this paper we introduce the Bayesian Model Averaging for parametric and volatility estimation in the presence of alternative SV models. Its performance in volatility forecasting is measured using the conditional predictive ability test and new forecastability estimators. The results show that there is much to gain from the introduction of uncertainty when forecasting volatility.

Estimating GARCH volatility in the presence of outliers: A comparison of robust procedures

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The main goal when fitting GARCH models to conditionally heteroscedastic time series is to estimate the underlying volatilities. Volatility estimates depend on two different factors: the filter used to obtain them and the parameter estimates employed in the filter. It

is well known that outliers affect the estimation of the GARCH parameters. However, little is known about their effects on the filters used to estimate the volatilities. In this paper, we show that when estimating the volatility by using the standard GARCH filter with Maximum Likelihood (ML) estimates of the parameters, the biases incurred can be very large even if the estimated parameters have small biases. This is due to the fact that the estimated volatilities depend on the unconditional variance of the series, which is a non linear function of the GARCH parameters. Using simulated data, we also analyze the performance of two robust filters implemented with three robust estimators of the parameters. Our results show that the biases of the robust estimators are reduced when compared to those of the standard filter with ML estimates of the parameters. All the results are illustrated using daily S&P500 and IBEX35 returns.

Energy 4 [EN4]

Contributed Session:

Chair: Ada Lau
University of Oxford, United Kingdom

Spatiotemporal Kriging and Correlation Modeling of Wind Power Generation

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Wind power spatiotemporal forecasts are important since power grids are integrating an increasing number of wind farms in their portfolio, and spatiotemporal covariance structures should be exploited to generate more reliable probabilistic forecasts. We consider a spatiotemporal kriging approach, which assumes a Gaussian process and optimal predictions are obtained as linear combinations of neighborhood observations in space-time. However, wind power generation at an individual site is well known to have a highly non-Gaussian distribution. There is a discrete probability mass at zero due to their abundance, and some may also have a probability mass at the maximum capacity. Moreover, the continuous distribution is significantly right-skewed. We tackle the problems by considering a modified logistic transformation which could normalize the continuous part into an approximately Gaussian distribution. We then consider a logit model to describe the dynamics of the probability mass at zero and maximum capacity. To apply spatiotemporal kriging, a correlation structure is needed. We construct a non-separable, anisotropic correlation model to describe the correlation structure of wind power generated from 65 farms in Ireland. Our model successfully explains the dynamics due to the movement of a weather front. Applying our correlation model to the kriging predictor, together with the discrete probability models at zero and one, we generate spatiotemporal probabilistic and point forecasts at 1-3 hours ahead, which is an important horizon for planning power dispatch strategies. We sum up individual forecasts and obtain aggregated point forecasts of wind power generation. Forecast performances are evaluated by proper scores and results demonstrate that our correlation model is superior to all other classes of models studied in previous literatures. Our correlation model outperforms the aggregated point forecasts obtained by considering the univariate aggregated time series directly. Our approach is also computationally efficient and so online updating of forecasts can be easily obtained.

A range of methods for electrical consumption forecasting

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For Electricité de France the forecast of electricity consumption is a fundamental problem which has been studied for the last twenty years. It is necessary to be able to provide customers and at the same time optimize the production at different horizons of time. Results of operating models that use non linear regression or ARMAX methods are satisfying with a current accuracy of 1.5% for the forecast of the following day. But, they have to be continually fitted to be adapted to some very difficult periods of time and to the change of the consumption. Since a few years, due to the new competitive environment, the electrical load curve has become less regular. Its shape and level which depended essentially of climatic exogenous variables has become more affected by economical and ecological variables. The data is not always available and the time series used are often short. So we have tried to apply the following alternative methods to answer to problems like adaptivity, nonstationarity, parsimony, lack of data. Among parametric models, the adaptive Kalman filter with exogenous variables seems to be a good solution for adaptivity. Non parametric models, like Generalized Additive Model, are more parsimonious and need less expertise than for parametric. The use of functional data (a part of the load curve) and the search of similarity between those functions by its factorization in wavelets base is an interesting idea. The Bayesian Methods may be very interesting when we have to introduce in the models a priori knowledge (data, law of parameters). Finally, the best solution might be to combine forecasts from different models by using on line combining algorithms. In this presentation we will display the operating models and those different classes of models which we applied to electrical consumption forecast. For each model we will present the method used, we will show some practical results and we will discuss the benefits and drawbacks of it.

Wind Power Forecasting Using Non-Linear ARMAX Models and Neural Networks

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The wind power industry is rapidly expanding and accurate power forecasting is essential for operating wind farms. Wind power forecasts are, among other things, used as input for power trading and service planning for wind farms. Since power output from a turbine is determined by weather conditions and operating characteristics of the installed turbine, forecasting power needs input from one or more numerical weather prediction models together with a model of how the power output relates to wind speed (a power curve). The power curve is modeled as a five parameter logistic model. The power curve is also influenced by topographical parameters introducing speedup effects via different inflow angles and wind shear. A computation of the fluid dynamics around the turbines is performed to characterize each turbine location according to those parameters. Together with meteorological conditions such as the density of the air and turbulence intensity the topographical parameters are used to estimate different power curves for different categories of these variables using historical data measured at each turbine. Weather forecast systems (mesoscale models) able to forecast the weather on a small spatial scale with input from global weather database are used to predict wind speed, wind direction, etc. The data from the weather models can diverge somewhat from what is actually measured on the wind turbines, so a neural network is trained to align the weather forecast to turbine measurements using past values from the turbine. The neural network is basically defining a non-linear autoregressive moving average process with exogenous variables. Periodically training of network and power curves makes the forecast system adaptive to dynamic changes in the surroundings of the farm. This work demonstrates how the different parts of the power forecasting system are implemented and how it performs in comparison with more simple models.

Short-term electricity load forecasting with Adaptive Generalized Additive Models

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Modeling and forecasting the electricity load at short-term and middle-term horizons is a key activity for electrical companies. The need to maintain the equilibrium between the electricity supply and demand at any time is essential to avoid power systems injuries and blackouts that generate financial penalties or more important drawbacks. The French electrical load company Electricité De France (EDF) has always attached the utmost importance to that issue which stands for a central point in power system scheduling.
The advent of the wholesale electricity market in Europe and in France has brought renewed focus on load forecasting methods as the EDF demand which has been equal to the France is now submitted to customers' departures or arrivals. In addition, the emergence of new consumption habits mainly due to new technologies (computers, heat pumps, flat panel displays…) entails slow modifications of the load curves.

Historical EDF models are based on parametric non-linear regression and classical time series modeling (ARIMA models) that needs a large amount of a-priori information from experts. We present a new model based on GAM methods, implemented in R thanks to the mgcv package developed by Simon Wood. This nonparametric model allows us to take into account exogenous predictors like temperature and cloud cover, as well as calendar effects (thanks to cyclic spline projection) or the lag effects of the load itself. We apply it on a part of the EDF portfolio (big customers) and show that this model can deal with various situations and needed less a-priori information than a parametric model. To deal with the problem of non-stationarity we propose an online update of this model, based on online recalculation of the coefficients of the projection on the spline basis. We obtain significant improvement of the forecasts, especially when parametric modeling fails.

Business Cycles 4 [BC4]

Contributed Session:

Tuesday, June 22, 11:10am-12:40pm   Room:
Cunningham A

Chair: Norbert Schanne
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Forecasting Regional Labour Markets with GVAR Models and Indicators

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The development of employment and unemployment in regional labour markets is known to spatially interdependent. Global Vector-Autoregressive (GVAR) models generate a link between the local and the surrounding labour markets and thus might be useful when analysing and forecasting employment and unemployment even if they are non-stationary or co-trending. Furthermore, GVARs have the advantage to allow for both strong cross-sectional dependence on ``leader regions" and weak cross-sectional, spatial dependence. For the recent and further development of labour markets, the economic situation (described e.g. by business-cycle indicators), politics and environmental impacts (e.g. climate) may be relevant. Information on these impacts can be integrated in addition to the joint development of employment and unemployment and the spatial link in a way that allows on the one hand to carry out economic plausibility checks easily and on the other hand to directly receive measures regarding the statistical properties and the precision of the forecasts. Then, the forecasting accuracy is demonstrated for German regional labour-market data in simulated forecasts at different horizons and for several periods. Business-cycle indicators seem to have no information regarding labour-market prediction, climate indicators little. In contrast, including information about labour-market policies and vacancies, and accounting for the lagged and contemporaneous spatial dependence can improve the forecasts relative to a simple bivariate model.

Forecasting Turning Points of the US Business Cycle by Time Varying Markov Regime Switching Models

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Markov regime switching model incorporating time varying transition probabilities is applied to the US leading and coincident indices to forecast turning points of the business cycle. Both leading and coincident indices have their own cyclical dynamics, which are reflected in the transition probabilities and the regime structures of the model. Specifically, the transition probabilities are driven by the transitory component (latent information) of the leading and coincident indices, and the regime structures are developed to consider the temporal comovement of the leading and coincident indices. This framework allows us to discover the lead-lag relationship between the leading and coincident indices and to check the signals of the business cycle turning points by obtaining the state probabilities.

Does consumer sentiment help predicting consumption expenditures?

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The 2008-09 financial crisis has led to the most severe global economic recession since the Great Depression. Most academics and policy makers agree to say that it is an erosion of confidence that has ensured the depth and the longevity of the crisis, especially as regards its impacts on the real economy. This paper proposes to assess empirically the link between consumer sentiment and consumption expenditures for the United States and the euro area. It shows under which circumstances confidence indicators can be a good predictor of household consumption even after controlling for information in economic fundamentals. Overall, the results show that, while for the euro area the consumer confidence index is a good predictor of consumption, the results are less clear cut for the United States. Moreover, there is some evidence of a "confidence channel" in the international transmission of shock, as U.S. confidence indices seem to have some influences on consumer sentiment in the euro area. Finally, the relationship between sentiment and consumption is shown to be non-linear: the contribution of confidence in explaining consumption expenditures increases during periods of uncertainty. In particular, the results show that confidence has significantly contributed to the latest global economic recession as an amplifier of developments in economic fundamentals.

Agent Sentiment and Stock Market Predictability

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Using only market return data we create an original index via a dynamic factor model for stock market sentiment. Conditioning on this index we develop one-step-ahead out-of-sample forecasts for market value-weighted returns. These forecasts outperform a random walk plus drift model under a rolling window and recursive estimation. This result contradicts the efficient market hypothesis and is new to the literature. Using our sentiment index we find support for sentiment driven bubbles in stock returns. Lastly, we use our index to quantitatively chronicle sentiment cycles.**Forecasting Methods 4 [FM4]**

Contributed Session:

Tuesday, June 22, 11:10am-12:40pm   Room: Cunningham B

Chair: Miguel Angel Bermejo
University Carlos III of Madrid, Spain

Hessian Regression for Moving Averages

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Using the Solver in Excel, it is an easy matter to compute 2-period and 3-period moving averages that give far better performance than "smoothing" moving averages (equal weights). I originally set this up as a constrained optimization problem, minimizing RMSE or MAD or MAPE by varying the weights between 0 to 100 percent with the constraint that all the weights (2 or 3) must add up to 100%. After several years, in a flash of the obvious, I saw that indeed this was an unconstrained optimization problem with one less variable, which had no individual bounds that led to the insights below. 1.3-period weighted moving averages simulate consecutive straight line regressions to find the best overall short-term fit that minimizes RMSE, MAD or MAPE. Of course this method cannot predict upturns or down turns, and is absolutely worthless for data that hovers around the average. 2.2-period weighted moving averages can be reduced to Next = Last + Percentage* difference in the last two known data points, and the percentage is an unconstrained weighting, so basically it is an adjustment of the best naïve model, Next equal Last. 3.3-period moving averages simulate consecutive quadratic regressions of the last 3 points to find the best overall short-term quadratic fit that minimizes RMSE, MAD or MAPE. 4.3-period moving averages can be reduced to Next = Last + percentage adjustments for the last 3 and adjustments are unconstrained weightings. This is also a modification of Next equal Last. Because this is a quadratic fit, this allows the model to predict upturns and downturns. Several examples are given to show the efficacy of this method and explain the derivation from a constrained optimization problem to an unconstrained problem.

Identification of TAR Models using Recursive Estimation

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This paper proposes an automatic procedure to identify threshold autoregressive (TAR) models and specify the values of thresholds. The proposed procedure is based on recursive estimation of arranged autoregression. The main advantage of the proposed procedure over its competitors is that the values of thresholds are automatically detected. The performance of the proposed procedure is evaluated using Monte Carlo experiments and real data.

Introducing a Recursive method for Multi-Step ahead Prediction of Time-varying Dynamics via Adaptive Neurofuzzy Models

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Several approaches have been introduced for modeling and prediction of time-varying nonlinear dynamics. Among these methods, locally or partially linear models are one of the most popular approaches, especially Locally Linear Model Tree (LoLiMoT), which is an incremental learning algorithm. Moreover, Singular Spectrum Analysis (SSA) is an important and well-studied approach in signal processing, which depicts powerful performance in multi-step ahead prediction of chaotic time series when it combines with neurofuzzy models. Unfortunately, both of these methods are good for offline applications. However, many applications demand online identification due to different reasons such as time-varying behavior of the process. This paper, first introduces a recursive method for estimation of main pattern of the time-varying dynamics, followed by the adaptive neurofuzzy models with a recursive training algorithm for multi-step ahead prediction of time-varying dynamics for online applications. In addition, in this paper a recursive version of Mutual Information (MI) is used for input selection of the adaptive neurofuzzy models. Prediction of Darvin Sea Level Pressure (DSLP) time series and Disturbance storm time (Dst.) as time-varying natural dynamics are considered in this paper to examine

the performance of the proposed recursive method. Obtained results
depict the power of the proposed method in multi-step ahead prediction
of nonlinear time-varying dynamics.

Optimal Probabilistic Forecasts for Counts

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Optimal probabilistic forecasts of integer-valued random variables are
derived. The optimality is achieved by estimating the forecast
distribution nonparametrically over a given broad model class and
proving asymptotic efficiency in that setting. The ideas are
demonstrated within the context of the integer autoregressive class of
models, which is a suitable class for any count data that can be
interpreted as a queue, stock, birth and death process or branching
process. The theoretical proofs of asymptotic optimality are
supplemented by simulation results which demonstrate the overall
superiority of the nonparametric method relative to a misspecified
parametric maximum likelihood estimator, in large but finite samples.
The method is applied to counts of wage claim benefits, stock market
iceberg orders and civilian deaths in Iraq, with bootstrap methods used
to quantify sampling variation in the estimated forecast distributions.
Illustration of the method using the stock market order data will be
emphasized in the presentation.

Finance 5 [FN5]

Contributed Session:

Chair: Tanya Molodtsova
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Taylor Rules and Exchange Rate Predictability in Emerging Economies

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This study links exchange rate determination and endogenous monetary policy represented by Taylor rules. We fill a gap in the literature by focusing on a group of fifteen emerging economies that adopted free-floating exchange rate and inflation targeting beginning in the mid-1990s. Due to the limited time-series span, a common obstacle to studying emerging economies, we employ panel data regressions to produce more efficient estimates. Following the recent literature, we use a robust set of out-of-sample statistics using bootstrapped and asymptotic distributions for the Diebold-Mariano, Clark and West and Theil's U ratio. By evaluating different specifications for the Taylor rule exchange rate model based on their out-of-sample performance, we find that the forward-looking specification shows strong evidence of exchange rate predictability.

On Predictability of Multiple FOREX Rates based on Multivariate Intelligent Modeling

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In this study, predictability of several multiple FOREX rates has been investigated. In order to take account of the main exogenous variables of each rate, we considered multivariate models for eight different exchange rates. Whereas FOREX rates tend to co-move, a multiple FOREX rate contains more information for prediction tasks, therefore we used a panel of multiple FOREX rates vis-à-vis the USD, as well. An intelligent modeling approach has been exploited for each process. In this study, the underlying intelligent models are based on fuzzification of multi-variable inputs. The final results show the predictability of multiple FOREX rates outperforms to that of previously developed study based on univariate modeling. The comparison amongst different predictions of multiple FOREX rates, in current approach, shows that near all predictabilities have meaningful differences within a unified framework. Also, it has been studied that the social-economic variables have direct influence on exchange rates, during years, in which make a specific FOREX rate more predictable even though it has a small fluctuations.

Real-Time Exchange Rate Predictability with Taylor Rule Fundamentals

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This paper revisits the long-standing Meese and Rogoff puzzle by examining exchange rate predictability with Taylor rule fundamentals and real-time data. Most of the existent literature on exchange rate predictability uses historical data which, because it was not available to the public at the time the forecasts were made, cannot be used to evaluate out-of-sample predictability. Furthermore, most studies of out-of-sample exchange rate forecasting still use 1970's vintage monetary models. In this paper, I evaluate short-horizon exchange rate predictability using real-time data and Taylor rule fundamentals for 9 OECD currencies, plus the Euro, vis-à-vis the U.S. dollar during the last decade and find strong evidence of exchange rate predictability at the 1-month horizon for 8 out of 10 exchange rates and weak evidence of predictability for the remaining 2 exchange rates. In order to understand how market participants form their exchange rate forecasts, I examine the implications of using different types of real-time data. The evidence of exchange rate predictability is stronger with current-vintage real-time data, which consist of all information available at any given month, than with first-release real-time data, which contain only new information about macroeconomic fundamentals. It is stronger with symmetric Taylor rule models, where the real exchange rate does not appear in the foreign country's Taylor rule, than with asymmetric models that contain an element of real exchange rate targeting

USD&EUR Cross Rate Self Similarity Divergence Analysis Using Hurst Parameter Estimation via Wavelet
CANCELLED

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In this study, approximately 11 years long USD&EUR cross rate is analysed. The goal is to determine the intervals which diverge from the self similar characteristics of the whole dataset. Analyses are based on the Hurst Parameter estimation and comparison which is a self similarity detection parameter without the need to any other computation or a parameter. Wavelet based Hurst Parameter estimation method is used on this study in the first phase of the analysis, in order to determine the minimum length meaningful detail coefficient (MLMC), wavelet decomposition is applied to whole dataset. MLMC is obtained, which is valuable information for the rest of the study. In the next step, the dataset is divided into 10 equal length -1 year long- periods and Wavelet decomposition is applied for each period, with respect to the MLMC value. This analysis is performed for 3 different Wavelet basis and 3 different Hurst Parameter confidence intervals are determined for the detection of the divergence from self similarity. Finally, the dataset is divided into 1-year-long periods with 25% footstep which yields 37 periods. Wavelet decomposition is applied to the periods and the Hurst Parameters are detected which exclude from the self similar characteristics of the whole dataset. This last step is also performed for 3 different Wavelet bases and the intersection set is marked as a deviation from the self similar characteristics of the whole dataset, in order to improve the determination of the divergence.

Econometrics 2 [EC2]

Contributed Session:

Chair: Kevin Sheppard
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~~Automatic shrinkage-based pooling of local information~~
CANCELLED

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This paper develops an asymptotic theory which leads to minimum asymptotic mean square error shrinkage when estimating a large number of similar models. While shrinkage methods are commonly employed to improve finite sample performance, their use is not typically justified asymptotically, except in special cases where pooled estimators are appropriate or when combing two inefficient, yet consistent estimators. The fundamental difficulty in asymptotic shrinkage is that bias asymptotically dominates variance reductions and so only consistent estimators are feasible. The asymptotic theory in this paper leads to shrinkage since the number of parameters estimated is a function of the sample size, and, as a result, many of the true parameters are "close" in an asymptotic sense. This leads to an automatic pooling of models with similar parameters and is related to, but distinct from, Qrinkage (Criteria based shrinkage). We explore the estimator in a Monte Carlo and find that the gains can be large when the time series length is small or the cross-sectional size is large. We apply the theory to a panel of volatility models and find that it compares favorably to dynamic factor models.

Forecasting and Deductive Systems

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Let S(t) be the state of some system S at time t. Furthermore, let S(t') be the possible state of the system S at time t'>t. Such states are often characterized by some time-dependent numeric variable (or vector). The task of prognosis can then be described as follows: when observing the time-dependent numerical variable we try to find the

probability p that at time t'>t the variable has a specific value (Gneiting).
Now characterize the described states with a list of conditions C(t) and C(t'), that are met by system S at time t and may meet at time t'>t. According to the principle of developments and deduction (Lorents): it is probable that the system S moves from state S(t) to state S(t'), if the description C(t') of the possible state S(t') follows (logically) from the description C(t). In such cases we can base the prognosis of states on the logical derivability of the descriptions of corresponding states. Example: if we are interested the decision that a certain individuals will follow at some time, then we can search for the answer by collecting the available texts (discussion transcripts, interviews, etc.) that represent the reasoning of the individuals (by using Matsak's system DST) and find the basic arguments, rules that are used to infer new arguments, description of the possible state of interest can be inferred from the basic arguments. Similar approaches are supported by the theory of deductive systems. Examples: It is possible to predict how biological species (as holders of a genetic code) evolve in the future: In evolution, every species will disappear with a probability of 1, to describe the correlation between dominant reasoning mechanisms in the society and architectural styles (Maslov). With methods that are suitable for describing certain discrete structures, it is possible to simulate the reasoning mechanism of Bismarck (Lukov, Sergejev).

Limit Theory for Comparing Overfit Models Out-of-Sample

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This paper uses dimension asymptotics to study then rationale for comparing overfit forecasts out-of-sample instead of in-sample. The two models to be compared are linear regressions, and the number of predictions used by the larger model increases with the number of observations so that their ratio remains uniformly positive. Under this limit theory, tests that are designed to reject if the larger model is true, such as the usual in-sample Wald and LM tests and also Clark and McCracken's (2001) and Clark and West's (2006, 2007) out-of-sample statistics, will choose the larger model too often when the smaller model is more accurate. I show that out-of-sample Gaussian confidence intervals and tests performs as desired, even if the models are nested; these confidence intervals contain the difference between the models' expected performance in the future with the correct probability, as long as the out-of-sample period is very small relative to the total sample size.

Approximating the distributions of test statistics for deterministic components in linear time series

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We derive closed-form expressions for the mean and variance of several test statistics proposed to detect the presence of deterministic components in linear time series models. These two moments can be used to approximate the corresponding unknown distributions. We find that the Inverse Gaussian distribution provides a very good fit and can be easily implemented in a computer program to calculate critical values and p-values. Some examples are given.

Prediction Markets [PM]

Contributed Session:

Chair: Leighton Vaughan Williams
Nottingham Trent University, United Kingdom

The value of prediction markets for business forecasting: A perspective

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The application and value of prediction markets for forecasting the outcome of major national and international events, such as the US Presidential election, is an area which has attracted a good deal of attention in some of the recent academic literature. Somewhat less attention has been paid to the role of prediction markets in business forecasting. In this paper, the published evidence on the uses and value of prediction markets in a corporate setting is explored and evaluated, as well as the benefits and challenges of using these markets as a substitute for, or complement to, traditional forecasting methodologies.

Predictability of 'Unpredictable' Cultural Markets

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Individuals are often influenced by the behavior of others, for instance because they wish to obtain the benefits of coordinated actions or infer otherwise inaccessible information. In these situations, this social influence can decrease the ex ante predictability of the ensuing social dynamics. We claim that, interestingly, these same social forces can increase the extent to which the outcome of a social process can be predicted in its very early stages. This paper explores this claim through a theoretical and empirical analysis of cultural markets such as the experimental music market devised and analyzed by Salganik, Dodds, and Watts. We begin by introducing a new reachability-based method for assessing the predictability of stochastic processes. This method is then applied to

a simple model for online markets, enabling evaluation of the predictability of market outcomes. Insights derived through this analysis are used to develop algorithms for predicting market share winners, and their ultimate market shares, in the early phases of a cultural market's evolution. The utility of these algorithms is illustrated through analysis of publicly available experimental music market data sets.

Predictive Analysis for Social Diffusion: The Role of Network Communities

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The diffusion of information and behaviors over social networks is of considerable interest in research fields ranging from sociology to computer science and application domains such as marketing, finance, human health, and national security. Of particular interest is the possibility to develop predictive capabilities for social diffusion, for instance enabling early identification of diffusion processes which are likely to become "viral" and propagate to a significant fraction of the population. Recently we have shown, using theoretical analysis, that the dynamics of social diffusion may depend crucially upon the interactions of social network communities, that is, densely connected groupings of individuals which have only relatively few links between groups. This paper presents an empirical investigation of two hypotheses which follow from this finding: 1.) the presence of even a few inter-community links can make diffusion activity in one community a significant predictor of activity in otherwise disparate communities and 2.) very early dispersion of a diffusion process across network communities is a reliable early indicator that the diffusion will be "successful". We explore these hypotheses with case studies involving the emergence of the Swedish Social Democratic Party at the turn of the 20th century, the spread of the SARS virus in 2002-2003, and blogging dynamics associated with real world protest activity. These empirical studies demonstrate that network community-based diffusion metrics do indeed possess predictive power, and in fact can be more predictive than standard measures.

The cognitive psychology of forecasting

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Human thinking is not completely rational, but based on information processing heuristics that work quite well for most of the time but can lead us seriously astray. This is not a new insight; the theory of cognitive biases was established by Kahneman and Tversky starting in the 1970s and has since entered the mainstream. Cognitive biases also affect forecasting. While laypersons may be most susceptible to cognitive biases – which creates unique challenges for forecasters in a consulting engagement – forecasting experts are not immune either. Consequently, cognitive biases have regularly been noted as a challenge to forecasting in specific fields, e.g., forecasting software development effort, industry shipments or company earnings. However – and somewhat surprisingly – there appears to have been no systematic review of the implications of the results of cognitive psychology on the practice and process of forecasting in general. This talk attempts to give a first overview of the role of cognitive biases in forecasting and how to mitigate their harmful effects.

Telecommunications 2 [TL2] [Practitioner Track]

Organized Session:

Tuesday, June 22, 2:00pm-3:30pm
      Room: America's Cup B

Chair: James Alleman
University of Colorado, USA

Mobile-Money: Impacts of combining cellular phone service and micro-finance

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It goes without saying that developing countries lack effective infrastructure: transportation, telecommunications, financial systems, etc. Most recently, the growth of cellular telephone service has helped ameliorate one of these bottlenecks by bypassing the traditional fixed line service. In all developing countries, the number of mobiles far exceeds the number of fixed line phones. The positive economic impact of the improved infrastructure has been demonstrated. Concurrently, the ability of microfinance has been shown to stimulate and enhance economic activity. Now a hybrid of the technologies has begun to emerge: mobile-money. The cell phone serves as a bank account, debit card, and money. The ubiquity of cell phone service, coupled with the notion of microfinance offers the possibility of service in remote areas of a country where it would be otherwise economically unsustainable to provide banking services. Mobile-money has all of the attributes of money including store of value and medium of exchange. Mobile money replaces the inefficiency of barter and the problem of the "double coincidence of wants." Just as with currency, security and counterfeiting will be issues.   Kenya already has nearly seven million or 38 percent of its cellular customers using a mobile-money system (Economist, 24 September 2009). Other countries are using mobile money systems.

Long-term broadband forecasts and the saturation level

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Broadband was introduced in the market late 90s. During a ten years period the broadband penetration starts to approach saturation in some countries. The presentation shows that the broadband penetration time

series fit very well to a four parameter Logistic model. A review of earlier long-term forecasts both for the Norwegian and the West-European market documents that the four parameter Logistic model gives good results. The model parameters are estimated based on earlier observations. When the number of observations is limited, the parameter representing, the saturation level, has been estimated separately by using market research. However, when the time series is approaching the broadband saturation level, the saturation level can also be estimated based on the available observations. This presentation shows how the Logistic forecasting model is expanded because of additional factors. The saturation level is influenced by growth of new households. Forecasts of the household evolution are built into the model. On the other hand Mobile broadband has started to capture broadband customers. The evolution is a two step process. The first step is affected by younger user groups which cancel their broadband subscription and instead order a mobile broadband subscription. The next step occurs during some years when the mobiles broadband network increases their capacity by replacing the technologies GPRS/EDGE/CDMA/HSPA with LTE (Long Term Evolution) with significantly higher speed. The consequences will be that part of the broadband subscribers – especially part of the DSL subscribers will be offered higher speed by mobile broadband (LTE). The presentation show how the introduction of new mobile broadband technology is assumed to affect the fixed broadband saturation level and the long-term broadband forecasts.

Model Construction and Forecasting Using Data from an Internet Panel

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This paper discusses the reliability of constructing forecasting models from survey data obtained from Internet panels. Whereas cost considerations have fueled the increase in demand for use of Internet panels, serious issues remain in terms of the reliability of such data for analysis and modeling applications. Virtually all survey data are weighted before they can be used to produce unbiased estimates of population parameters. While reflecting the selection probabilities of sampled units, weighting also attempts to compensate for practical limitations of a sample survey, such as differential nonresponse and undercoverage. Since Internet panels are not compiled using probability-based samples, however, the selection probabilities (and hence design weights) for panel members are often missing and cannot be computed independently.

Cognizant of the above limitation, an alternative can be considered that involves blending data from a probability-based survey with an Internet panel whereby proxy design weights can be constructed for the panel respondents. Subsequently, pooled interim weights can be computed for the combined survey data in an optimal fashion. Finally, analysis weights can be developed by applying further adjustments along several

marginal distributions simultaneously using the method of iterative proportional fitting, more commonly known as raking.

The probability-based sample component used in this research is from the Centris' omnibus survey, which relies on an address-based sample where each address in the US has a known probability of selection. The Internet panel used in this investigation comes from Luth Research, for which a separate set of weights are constructed for ad-hoc modeling and projection purposes. For illustrative purposes the authors will discuss the role of weighting in improving the reliability of estimates for wireless broadband demand by comparing weighted and unweighted estimates. By investigating such differences potential issues will be highlighted that can result if weighting is either ignored or misapplied.

Adventures in Micro-forecasting: Analyzing Linear Street Features as Predictors of Broadband Availability

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Accurately geocoding the spatial location of a 'real world' residential street address in a GIS framework is highly dependent upon the reliability and precision of the street center-line file used during the process. Street center-line files are digital vector line files that form a network of intersecting line segments. Each segment within a network is assigned a set of address values; two for each side of the segment to represent the range of addresses assigned to the left and right sides of the center-line. Research studies based on the hierarchical relationship between census geography and geocoding accuracy are most susceptible to error.

Volatility 5 [VO5]

Contributed Session:

Chair: Brajendra Sutradhar
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Efficient Estimation for the Parameters of Volatility Models

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Volatility model for time series is developed to represent the dynamic relationship among the non-stationary variances of the data. Before any forecasting based on such a volatility model, it is, however, important to estimate the parameters of the model as consistently and efficiently as possible. The existing quasi-maximum likelihood (QML) and the generalized method of moments (GMM) may produce consistent but inefficient estimates. In this work, we introduce a weighted least squared (WLS) and a generalized quasi-likelihood (GQL) approach, and demonstrate that both of the proposed approaches produce more efficient estimates than the existing QML and GMM approaches. We then discuss the forecasting of the variance at a future time to explain any possible future volatility.

Forecasting tail risk in financial time series using a mixture of distribution approach

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Financial return distribution is well recognized for its fat-tail behavior and its tail asymmetry. One natural question is whether the tail asymmetry is still significant after accounting for the conditional heteroskedasticity in returns. In this paper, we propose a mixture of distribution approach under a GARCH framework to capture the tail asymmetry. A key idea is to use the Peak-over-Threshold method of extreme value theories to construct a mixture distribution for the

innovation in GARCH models. This mixture distribution combines a common distribution, like asymmetric normal, and two generalized Pareto distributions for the two tail parts to capture both the leptokurtosis and the tail asymmetry. A Bayesian approach is adopted to estimate unknown parameters by using Markov Chain Monte Carlo (MCMC) methods. A Bayesian test for tail asymmetry is also established. We perform simulations to analyze the performance of the MCMC and the effectiveness of using a mixture distribution to approximate common distributions. We also study the performance of our approach in forecasting volatility and the tail risk, like Value at Risk and expected shortfall, using real data.

Intraday Correlation Matrix and Portfolio Risk Forecasting with Application to the Hong Kong Stock Exchange

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With the advancement in trading technology, high-frequency trading becomes popular in the financial market. For day traders who hold portfolios of assets, the measure of portfolio risk needs to be extended to intraday time intervals, therefore requires the estimation of intraday stock correlations. In this paper, we apply the Multivariate GARCH model with seasonal indexes and time-varying correlations to the intraday stock returns in the Hong Kong Stock Exchange. The seasonal indexes show significant seasonal patterns in intraday volatilities, with the largest volatility appearing after the lunch break. We also discover that time-varying correlations for 30 minute intervals increase substantially after the market crash in September 2008. Using the predicted correlation matrix and stock volatilities, we construct a portfolio with equally weighted stocks and forecast the portfolio Value-at-Risk (VaR) at intraday horizons. The empirical coverage is satisfactory for 0.5% and 1% VaR. Our findings about intraday seasonality and 30-minute correlation matrix would be interesting and helpful to high-frequency traders in the stock market.

The role of macroeconomic variables in predicting Australian CDS spreads

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Credit risk can be defined as the uncertainty surrounding the repayment of a bond or a loan. The quantification of this risk is of paramount significance as market participants use the credit measure to make

informed decisions on the granting of credit, the interest rate demanded and the accurate reflection of the risks being undertaken. This paper analyses Credit Default Swap (CDS) spreads of corporations constituting the European and Australian Itraxx indices to investigate the largest drivers of changes in credit risk. A number of models are then applied to forecast the changes in CDS spreads in each region at daily and weekly frequencies between 2005 and 2009. The results of Granger Causality analysis show that changes in CDS spreads are predominantly caused by systematic risk factors, in contrast to a classical structural credit modelling approach where the credit risk is forecasted from firm specific factors such as the value of equity and firm leverage. Further, our results indicate that there is a difference between the two markets examined. In the Australian market, domestic systematic risk measures fail to explain changes in spreads, whereas the European results show that domestic equity market volatility is a reasonable predictor of changes in spreads. Interestingly, the US equity volatility index (VIX) is the best predictor of the changes in credit in both markets. This finding provides strong evidence of a high degree of integration in the markets for credit risk, widely felt during the "Global Financial Crisis". It also suggests that current pricing models need to be recalibrated to take local market conditions into consideration. Both of these findings present a challenge, to ensure that pricing models correctly reflect firm specific and market wide risks including the transmission of offshore equity volatility shocks into credit markets.

Forecasting Methods 5 [FM5]

Contributed Session:

Chair: Ester González-Prieto
Universidad Carlos III de Madrid, Spain

Does disagreement amongst forecasters have predictive value?

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Forecasts from various experts are often used in forecasting models and in forecast combinations by taking the mean or median of the survey data. A well-known example concerns the Survey of Professional Forecasters (SPF). Most studies analyzing SPF type data focus on the predictive value of the mean or median of these SPF forecasts. In the present study we take a different stance as we examine the predictive power of potential disagreement amongst forecasters. The premise is that the degree of disagreement could signal upcoming structural or temporal changes in an economic process or in the predictive power of the survey forecasts. In our empirical work, we examine a variety of macroeconomic variables, and we use different kinds of measurements for the degree of disagreement, together with measures for location of the survey data and autoregressive components. Forecasts from simple linear models and forecasts from Markov regime-switching models with constant and with time-varying transition probabilities are constructed in real-time and compared on forecast accuracy. We obtain promising preliminary results for a Markov regime-switching model with time-varying transition probabilities which incorporates autoregressive AR components and the mean or median of the survey data, where their relative contribution depends on the standard deviation of the survey data.

An automatic procedure for time series decomposition

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In time series analysis is commonly accepted to decompose the time series into interesting unobserved components such as trend and seasonality, among others. This paper applies independent component analysis (ICA) to estimate those unobserved components. ICA can be seen as a factor model with non-linear factors that are maximally independent. We show that ICA provides good estimates for trend and seasonal components, and can be considered as the starting point of an alternative procedure for automatic time series decomposition. Several simulations and an empirical application to the industrial production index (IPI) of six European countries will be presented to illustrate the results.

Combination of linear and non-linear forecasts using information criteria

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We propose to use information criteria to select when to combine forecasts from linear models with forecasts produced using non-linear models. The liner models are ARs, whereas the non-linear ones use support vector machines, Kriging, and treed Gaussian processes. Our application is to 14 macroeconomic time series from the United States and to 10 macroeconomic time series from Mexico. In pseudo-out-of-sample exercises, we allow the selection of the lags and of the non-linear forecasts to be exhaustive. We find that our method performs well with respect to a series of linear, non-linear, and traditional combinations alternatives. Most of the time, only the linear forecast is used, however: (i) the non-linear forecast is selected when the period has non-linear features; and, (ii) the non-linear forecasts is not selected when a simple linear approximation is enough to capture the dynamics of the time series. Hence, our method seems to be able to overcome the trade-off between over-fitting and the modeling of the non-linear features of the series that are useful for out-of-sample forecasting.

Hierarchical Forecasting with Dynamic Modeling

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In this paper, we propose a new forecasting method that builds a predictive relationship between different levels in the data hierarchy, incorporating the relationship derived from the empirical data at the multiple levels and the forward-looking judgment calls. We use multinomial distribution for modeling the split units from the upper level to the lower level, and Dirichlet distribution for modeling the

split rates. For the Dirichlet distribution, we solicit for and use the specification from judgment calls for the mean values and the coefficient of variation values of the split percentages. We perform forecasting at the upper level, and derive forecasts for the lower level using the above top-down hierarchical modeling method. We will describe the business context and the rational for our model specification with a real world application in HP.

Business Cycles 5 [BC5]

Contributed Session:

Chair: Antonio Garcia-Ferrer
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Forecasting Recession Exits

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During recession periods, the question always arises, how can we forecast when the recession will end? The prior research in this area is rather meager as interest in the subject seems to wane until the next recession begins. For example, conventional wisdom suggests that the stock market is a leading indicator by about six months, but the variability associated with this number is considerable. The National Bureau of Economic Research identifies the beginnings, troughs, and ends of U.S. recessions. Using data that extends twelve months before and after each trough, we examine ten recessions from 1949 to 2001. A database containing the key macroeconomic indicators has been developed for these recessions. Preliminary results suggest that the principal determinants of the exit time from a recession are: business loans, dividends, unemployment, the S&P composite index, and the manufacturing index.

Should we trust in leading indicators? Evidence from the recent recession

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This paper analysis the out-of-sample forecasting performance of leading indicator models before and during the financial crisis period 2008/2009 for GDP and industrial production in Germany. While our data set comprises survey based measures, financial market indicators, real activity variables and composite
leading indicators, we particularly focus on financial indicators as predictors for real activity since the origin of the recession is often viewed in the financial sector. Our second contribution is to make extensive use of forecast combination schemes. Several weighting schemes are applied: simple averaging schemes (mean and median

forecast), the trimmed mean, in-sample criteria (AIC, R^2), weights computed by relative mean square forecast errors, OLS weights as well as shrinkage techniques. To assess the forecasting performance we assume standard loss functions and use Giacomini and White's (2006) pairwise test of equal forecast ability. We also conduct a joint significance test as suggested by White (2000) to test for the adequacy of leading indicator forecasts in general. To yield robust results, we further split our forecasting sample in a pre-crisis period and a crisis period. We use an end-of-sample instability test as proposed by Andrews (2003). This approach is unique in a forecasting setting and makes it possible to adequately test for the stability of forecasting quality at the end of the sample. In the pre-crisis period, 2001-2007, only some single indicator models show favorable forecasting properties. These are: survey based measures (e.g. ifo indicators) and stock market returns. Many forecast combination schemes (AIC, disc. MSFE) often significantly outperformed the benchmark model. Joint tests indicate that there is basically no single indicator model that significantly outperforms the benchmark AR model. However, considering forecast combination schemes yield significant improvements. During the recession, the relative performance of individual indicator forecasts increases substantially (e.g. term and risk spreads, survey indicators).

Forecasting Employment Growth across States using Bagging, Beta and Clusters Methods

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Although employment growth is one of the most closely watched monthly macroeconomic statistics, the academic literature is sparse on both forecasting job innovations, particularly on the state level. State policy makers are especially concerned with forecasting downturns in employment growth as recessions lead to declining budgetary revenues, sharp curtailment of services and layoffs of public workers. However, again, the academic literature has lagged behind in providing insight in forecasting employment growth across states during downturns. We consider several methodologies for forecasting state employment growth relative to an autoregressive benchmark: combination forecasts methods, a General to Specific modeling coupled with bootstrap aggregation, a factor/Beta estimation method and a novel procedure that combines all three forecasts. The coalescing theme of these frameworks is their usefulness in forecasting variables given considerably model uncertainty - a state's employment growth, like many regional variables, is subject to inherent supply and demand shocks and instabilities in the data. Results clearly show that the Cluster-bagging-beta model (CBB) that combines all three forecasts leads to additional improvements in forecasting performance as it consistently outperforms the benchmark in all states except AK and ND by an average of 21% with only moderate variation in MSFE ratios across states. This approach further beats the benchmark in all states except AK by an average of 34%

Predicting Recessions with Factor Linear Dynamic Harmonic Regression Models

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Historically, time series forecasts of economic variables have used only a handful of predictor variables, while forecasts based on a large number of predictors have been the province of large structural econometric models. The past decade, however, has seen considerable progress in the development of time series forecasting methods that exploit many predictors, switching the challenge of turning dimensionality from a curse into a blessing. In recent years, the method of "diffusion index forecasts" and other variants of factor models have been able to incorporate information in a large number of predictors into the forecasts in a simple and parsimonious way. However, this does not preclude refinements to this methodology. As a matter of fact, a practical question in this approach is how much data are really needed? In several recent papers it was found that expanding the sample size simply by adding data that bear little information about the factor components does not necessarily improve forecasts and, when the data are too noisy, we can be better off by throwing away some data even though they are available. Therefore, the primary focus of this paper is how to reduce the influence of uninformative predictors for our variable of interest within the confines of the factor model framework, identifying a subset of variables to construct a composite leading indicator index. When applied to recent Spanish monthly data we find that, contrary to popular wisdom, clear signals of recession were evident in the economy before the bursting of the financial bubble in August 2007. This announcement was generalized across economic sectors and indicators.

Forecasting Methods 6 [FM6]

Contributed Session:

Chair: Emre Yoldas
Bentley University, USA

Autocontour-based Evaluation of Multivariate Predictive Densities

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We extend the recently proposed autocontour methodology (González-Rivera et al. 2010, and González-Rivera and Yoldas, 2010) to evaluate univariate and multivariate density forecasts. The out-of-sample autocontour framework involves a battery of t-statistics and chi-squared statistics for density functional form and i.i.d-ness of the vector of generalized one-step-ahead forecast errors. Depending on the complexity of the multivariate density, the autocontour plots may be difficult to construct. In these cases, we propose to apply a second transformation to normality of the probability-integral- transformed variables, and on doing so, our forecast evaluation is reduced to testing for multivariate normality and i.i.d-ness of the so-called "quantile residuals". Monte-Carlo simulations show that the proposed tests have very good size and power properties. We provide an empirical application to several bivariate portfolios of asset returns.

Nonlinear & Nonparametric Models for Generating Density Forecasts of the US GNP

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The impact of an unanticipated financial crisis can have a significant impact on our society. We need accurate and timely forecasts to

mitigate risk associated with these changes through well informed policy and decision making. Given that Gross National Product (GNP) is one of the most common macroeconomic indicators used by policy-makers, we focus on generating reliable GNP forecasts. The complex dynamics underlying the GNP time series, along with limited number of post-war observations, however, make the task of generating reliable forecasts quite challenging. Nonlinear models, like the self exciting threshold autoregressive (SETAR) and Markov-switching autoregressive (MS-AR) have been previously proposed for characterizing the underlying structure in the GNP time series. The aim of our work is to propose and investigate the efficacy of a class of simple nonlinear and nonparametric models, which can outperform complex classical models and suitable benchmarks in terms of out of-sample forecasting accuracy. As it is important to quantify the uncertainty in forecasts, leading to more informed policy-making, we generate both point and density forecasts. Finally, we show that simple models based on the estimation of a few parameters can outperform classical models on varying forecast horizons. We evaluate point forecasts for proposed and classical models using the root mean square error (RMSE) and mean absolute error (MAE), while density forecasts are evaluated using the continuous ranked probability score (CRPS).

Volatility Density Forecasting and Model Averaging

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The scope of this paper is to investigate the different volatility density forecasting methods that exist and how model averaging can help eliminate significantly model uncertainty. We focus first on real world densities using bootstrap based - GARCH type models on the S&P 500 index and second on the acquisition of risk neutral densities from option prices on the VIX index. Afterwards we transform the risk neutral distribution acquired from options to the objective. The total number of alternative modelling proposals under consideration is distinctively large all in an attempt to address the difficulty created by model uncertainty. Empirically we prove that there is no distinctive optimal model that can capture all the attributes of the dependent asset's distribution. Not only that but also by combining all or just the top performing models together one can achieve even better forecasting performance. We apply two of the most popular methods used in the past to perform model averaging, Thick Modelling and Bayesian Approximation Model Averaging. Additionally we implement stock trading strategies based on the forecasted densities and we show that both econometrically and empirically model averaging helps significantly to increase performance of our forecasts and ultimately profitability.

Quantile Forecasting of the Arrival Volume and Arrival Rate at a Call Centre

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Call centre staff deployment is a balance between service quality and operating costs. A forecast for the number of calls arriving is a key input to the staffing process. We assess the uncertainty in the arrival process by modelling the quantiles of the distribution of arrival volumes using methods based on exponential smoothing and quantile regression. It is often assumed that arrivals follow a Poisson process with stochastic arrival rate. A quantile of the arrival rate can be plugged into the Erlang C formula to give a stochastic guarantee for the service level, which is defined as the fraction of calls whose delay falls below a specified target. Forecasting these quantiles is particularly challenging because the arrival rate is unobservable. We address the problem by using Poisson models, based on exponential smoothing, with a gamma distributed stochastic arrival rate. We also introduce an approach that models the quantiles of the rate directly, within a Poisson framework, through the use of a form of quantile regression, which has the appeal of avoiding a distributional assumption for the rate. We use intraday data to illustrate and compare the methods.

Finance 6 [FN6]

Contributed Session:
Tuesday, June 22, 2:00pm-3:30pm
Room: Cunningham C

Chair: Maxwell Stevenson
The University of Sydney, Australia

Predicting Australian Takeover Targets: A Logit Analysis

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Maurice Peat
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Positive announcement-day adjusted returns to target shareholders in the event of a takeover are well documented. Investors who are able to accurately predict firms that will be the subject of a takeover attempt should be able to earn these excess returns. In this paper a series of probabilistic regression models were developed that use financial statement variables suggested by prior research as explanatory variables. The models, applied to in-sample and out-of-sample data, led to predictions of takeover targets that were better than chance in all cases. The economic outcomes resulting from holding a portfolio of the predicted targets over the prediction period are also analyzed.

The disposition effect in hedge funds

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The purpose of this paper is to investigate the presence of the disposition effect in hedge funds and how it differs from the mutual funds case. We examine if the behavior of hedge fund managers towards the disposition effect and news announcements differ dramatically over mutual funds managers, making them smarter and more successful, as the literature proposes. Additionally we look at other institutional investors like banks and pension funds and check if they demonstrate the disposition effect in their investment strategies and also we want to see how the disposition effect affects hedge fund performance and profitability. Our results illustrate that while hedge funds exhibit strongly the disposition effect, creating stock price predictability, it differs significantly from the disposition effect showed by mutual funds, in terms of stock characteristics and stock overlapping. Trading strategies based on the hedge fund disposition effect seem to be more stable and more profitable than the equivalent of mutual funds. Finally we document the fact that the effect is less stable in later years when

we split the sample period into two periods of pre-2002 and post-2002,
providing evidence that fund managers become smarter as time passes.

Forecasting the Real Exchange Rate using Long Spans of Data. A Rematch: Linear versus Nonlinear Models

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This paper deals with the nonlinear modeling and forecasting of the dollar-sterling real exchange rate using long spans of data (1791-2005). Our contribution is threefold. First, we provide significant evidence of smooth transition dynamics in the series by employing a battery of recently developed in-sample unit root tests, linearity tests, as well as bootstrap methods, which enable us to obtain a parsimonious specification of the nonlinear real-exchange-rate model. Second, we use Monte-Carlo simulation techniques to examine the empirical size and power properties of several forecast accuracy and encompassing tests. The former measures include the MSE-t of Diebold and Mariano (1995), the MSE-F test of Clark and McCracken (2005) and the Weighted MSE-t proposed by van Dijk and Franses (2003). The latter are the ENC-t of Harvey et al. (1998) and the ENC-F of Clark and McCracken (2005). Although their application in our context is appealing, it is not straightforward due to the fact that their derivation is based on the assumption that the regression models are linear in parameters and the processes are stationary. We relax these assumptions and examine the finite properties of the tests in this paper. Finally, we run a forecasting race for the post-Bretton Woods era between the nonlinear real exchange rate model, a random walk, and a linear autoregressive model. Regarding the comparison of nonlinear with linear AR models, numerous studies suggest that in many cases the in-sample superiority of the former is not accompanied by better predictive ability. In this framework, power issues turn out to be serious. Our results illustrate the difficulty of detecting the superiority of STAR models to AR models. Despite the low power of out-of-sample evaluation tests, we find that recursive ESTAR forecasts for the actual real exchange rate series outperform all rival forecasts. Density forecasts are also evaluated.

Forecasting the Overnight Inter-bank Rate

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Private banks use overnight inter-bank market to net out their liquidity position to meet daily requirements. Therefore, the associated rate can jump if there are liquidity problems or if some banks have shortage of it and other banks do not borrow. The recent financial crisis provides examples of the phenomenon. The events in the recent years have also changed the attention of policy makers, economists and agents to this market, moving from a tool to stabilize the system to one of the main indicator of liquidity problems. In this

paper we investigate models for inferring and forecasting the overnight inter-bank rate. We propose ARMA and ARFIMA models augmented with variables for the counterpart risk and a set of dummies to take into account seasonal effects due to calendar restrictions. We implement a bootstrapping scheme to produce density forecasting for the overnight inter-bank rate that bounds interval forecasts for interest rates to be positive. We collect daily European overnight rate over the sample period January 1, 2007 to April 30, 2009 and use two measures of counterpart risk: the spread between the 3 month Eurobir and the EONIA swap, and the Credit Default Swap (CDF) of the major European banks. We show that our models fit reasonably well to the data and produce well-calibrated predictive densities for the daily European overnight rate with forecast horizons up to 2 week, in particular when the CDF measure is used as counterpart risk. Point forecast results are also encouraging. Our models cannot, however, anticipate (unpredictable) spikes in the rate as in August 2007 and September 2008. Complete probability distribution can only help to provide ex-ante information that uncertainty and risk were increasing.

Judgemental & Scenario Forecasting 2 [JF2]

Contributed Session:

Tuesday, June 22, 4:00pm-5:30pm   Room: America's Cup A

Chair: Dilek Onkal
Brunel University, United Kingdom

Trusting forecast advice: The importance of interval format and point forecasts

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Prediction intervals convey useful information to practitioners, but they may also be subject to problems of comprehensibility and consistency. Interviews indicate that interval forecasts may prove to be difficult to understand and trust, and that more intuitive ways to present forecast uncertainties may be preferable. An alternative format might entail giving best-case and worst-case values instead of the traditional interval forecasts. Additionally, the presence or absence of point forecasts may produce differential effects depending on the interval formatting that is used. This study examines the potential effects of these factors on the "stated" vs "revealed" trust placed in forecasting advice. Results are discussed and future research directions are given.

Carry-over Effects in Judgmental Forecasting

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People using their judgment to make forecasts from time series often make forecasts for a number of different variables (e.g., sales of various consumer products) in close succession. Forecasts for any one of these variables should depend only the time series of that variable. Forecasters should not be influenced by patterns in the time series of variables that they have forecast previously. However, our experiments show that their forecasts are affected in systematic ways by this information. In a first experiment, one group of participants made forecasts from a series with a lag-1 autocorrelation of 0.4 after having made forecasts from eight series, all of which contained lag-1 autocorrelations greater than 0.4. Another group made forecasts from a series with lag-1 autocorrelations of 0.4 after having made forecasts from eight series with lag-1 autocorrelations less than 0.4. The perceived autocorrelations implied by participants' forecasts for the 0.4 autocorrelation series were significantly higher in the first group (more than 0.6) than in the second one (less than 0.3). In a second experiment, two groups of participants made a sequence of eight forecasts from linearly trended series. For one group, trends were shallow (0.6, 1.4, 2.2, 3.0, 3.8) and, for the other, they were steep (3.0, 3.8, 4.6, 5.4, 6.2). In each group, trends were randomly ordered for each participant. We examined the trends in the sequence of eight forecasts from the data series that had trends of 3.0 and 3.8. The trends in the forecasts sequences for these two series were higher when participants had previously seen steeper trends than when they had seen shallower ones. Carry-over effects in these experiments suggest that people adapt to the patterns that they see in the series that they forecast. Implications for practitioners will be discussed.

Intuition in combined model-manager forecasts: Evidence from the music industry

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Our study analyses the effects of task ambiguity, domain-specific expertise and individual and collective judgments on the relative importance of analytical models and intuition in performance forecasts. Results from a field study carried out in the music industry indicate that task ambiguity moderates the predictive performance of analytical

models and of managers. Also, the importance of intuition increases as managers with high levels of domain-specific expertise make predictions in highly ambiguous contexts. The study then delineates the conditions in which collective intuition is most likely to increase judgmental accuracy. Finally, our findings challenge previous research proposing an optimal 50:50 split between analytical model predictions and managerial intuition forecasts when engineering higher quality decisions. In the music industry, the split shifts to 80:20 in low and 40:60 in high task ambiguity contexts for the most experienced managers. For managers with less experience, the optimal split becomes 90:10 when task ambiguity is low and 56:44 when it is high. These differences illustrate the moderating effects of task structures and domain-specific expertise in delineating the role of analytical and intuitive information processing in judgmental forecasting.

Marketing 2 [MK2] [Practitioner Track]

Contributed Session:

Chair: Robert Fildes
Lancaster University Centre for Forecasting, United Kingdom

Structural Breaks and the Value of Promotional Information for Forecasting Retail Product Sales

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Sales forecasting at the UPC level is important for the retailers in inventory planning. In practice, many retailers produce the forecasts using simple models with subjective adjustment for promotional events. Econometric models, which could be an effective way of incorporating promotional information, are not widely applied. This paper examines the performance of the econometric models in forecasting the product sales at the UPC level, asking whether this lack of application arises from poor performance compared to simple benchmarks. Standard models assume constant structure which may subsequently expose the models to structural breaks and then forecast failure. To tackle the problem, we modify the econometric models with three approaches: impulse saturation, intercept correction and estimation window combining. Categories are considered as a basis for generalising the empirical results. Twenty-nine categories were segmented using conceptual mapping technique and experiments were conducted for those which are distinguishable and representative. The results show that the econometric models outperform the benchmark (simple) models for most of the categories and their forecasting performance can be further improved by the three approaches we apply, especially for the non-promoted forecast period. This is probably because econometric models take into account any competitive promotional information. However, for one distinct category, the "Front-end-candies", the benchmark models proved superior. For the promoted period, the unmodified econometric models generally yield the best performance. One implication of our research is to use the econometric models and the modified econometric models to forecast the promoted period and the non-promoted period separately.

Understanding multinational diffusion of 3G mobile phones

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To discover why 3G mobile phones diffuse differently in different countries, we propose a multi-country non-linear mixed model where we explain within-country growth parameters using a number of between-country factors. Our primary objective is to investigate the impact of market factors such as price and competition. We incorporate socio-economic and telecommunications data covering geographically and economically diverse countries. We demonstrate model validity by measuring its predictive accuracy.

Forecasting Innovations – Aligned or Disconnected From Modeling Research?

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Research in forecasting methodologies for new products and services have been primarily focused on the post-launch phase of the innovation. The literature is rich and extensive. Forecast accuracy of new product launches have also been studied for some time. However, research on forecasting and associated risk measures for pre-launch stages of the innovation from idea to launch are much more difficult to identify. Understandably, there is a lack of 'hard data' and most of the information is kept proprietary within the organization. In this presentation, we would like to explore the modeling requirements for forecasting, accuracy measurement and risk assessment for the early stages of innovation evolution. We will specialize our discussion for the high-tech and CPG markets.

Forecasting Methods 7 [FM7]

Contributed Session:

Chair: Pilar Poncela
Universidad Autónoma de Madrid, Spain

Dimension Reduction in Time Series

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We develop a sufficient dimension reduction theory for time series,
which does not require specification of a model but seeks to find a p
(lags) times d (dimensions) matrix with the smallest possible number d
such that the conditional distribution of current value given past
vector with p lags is the same as that of current value given past
linear combinations, resulting in no loss of information about the
conditional distribution of the series given its past p values. We
define the subspace spanned by the columns of a p times d matrix as the
time series central subspace and estimate it using Kullback-Leibler
distance. We show that the estimator is consistent when p and d are
known. In addition, for unknown d and p, we propose a consistent
estimate of d and a graphical method to determine the lag p. Finally,
we present examples and real data analysis to illustrate the proposed
theory, which may open new research avenues in time series data
analysis.

Structural vs. Non-structural Multivariate Macroeconomic Forecasting

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The main objective of this paper is to compare the forecast performance
of a bundle of multivariate time series models, oriented towards the
main macroeconomic aggregates, ie: GDP, Consumption, Investment,
Employment, Wages, Inflation and Interest Rates. The economic

structural relationships will come from standard New Keynesian models (Dynamic Stochastic General Equilibrium set-up). Using Spanish National Accounts Quarterly Data, we will run a horse race against a benchmark Unrestricted VAR (UVAR) model. The latest available data will do as a comparative set-up to perform pseudo-forecast analysis. The models will be compared according to their corresponding Root Mean Square Error (RMSE) of short, medium and long-term forecasts.

Parameter Space Restrictions in State Space Models

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The state space model is widely used to handle time series data driven by related latent processes in many fields. In this article, we suggest a framework to examine the relationship between state space models and ARIMA models by examining the existence and positive-definiteness conditions implied by the auto-covariance structures. This study covers broad types of state space models frequently used in previous studies. We also suggest a simple statistical test to check whether a certain state space model is appropriate for the specific data. For illustration, we apply the suggested procedure in the analysis of theUS real Gross Domestic Product data.

New approach to identification of the order "p" in the periodic autoregressive model PAR(p)

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The periodic autoregressive model, a particular structure of the Box & Jenkins family, denoted by PAR(p), is employed to model the series of hydrological streamflow used for estimating the operational costs of the Brazilian hydro-thermal optimal dispatch. A computer program, called NEWAVE, is used to implement such procedure. Recently, some aspects of this approach began to be questioned and several researches on this topic are being developed. The present paper focuses on the identification phase of the order "p" of the PAR(p), essential to the correct definition of the structure of the process generating the streamflow at the reservoirs, as well as to generate synthetic scenarios of future streamflow to be used in the optimization procedure. Nowadays, the identification is based on evaluating the significance of the estimated partial autocorrelation coefficients function (PACF),

based on the asymptotics results of Quenouille. The purpose of this study is on the application of a computer-intensive technique, called Bootstrap, to estimate the real statistical significance of such the estimated. The results show that the Bootstrap led to the identification of lower orders models, in comparison with the traditional approach, in almost all cases. Hence, it can be considered a more parsimonious approach. The obtained results were quite satisfactory, corroborating some points raised in previous studies concerning the danger of lack of parsimony by the traditional approach.

State/local Government [GO]

Contributed Session:

Tuesday, June 22, 4:00pm-5:30pm
    Room: America's Cup D

Chair: Elaine Deschamps
Washington State Senate, Ways and Means Committee, USA

Forecasting Election Results: Application to the 2008 Municipal Election in Brazil

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This paper presents a forecasting model developed to produce election night forecasts of the final results for the major municipalities' mayor in Brazil, in October 2008. Since 2004, elections in Brazil are using an electronic system, where microcomputer-based ballots are allocated to each electoral section (ES), which corresponds to one electronic ballot. As a consequence, the counting time of the ballot papers has been drastically reduced, from days to a few hours. Indeed, in the last election, 5 hours after polls closed, the elected mayor of Rio de Janeiro was known. The official counting system starts immediately after the polls close at 5 p.m. The officer in charge of each electoral section adds up the votes from the electronic ballot and sends the results to the corresponding electoral zone center (ZE). Each ZE includes 300 to 500 ES´s. The model developed uses principles of Bayesian statistics to sequentially update results as the counting votes of the ZEs are concluded and published. For each city, the ZEs are also aggregated into geographical clusters. The system starts with a prior distribution for the candidates' proportions in each cluster and the entire universe based solely on the previous day opinion polls. As the information of a ZE arrives, these priors change into posteriors that take into account the new information brought by the ZE. The model produces the estimates of the final result for each candidate, for each cluster and for the universe. The model also produces the posterior variances (and the 95% confidence interval for the sequentially updated results). The model signals the final result of the election whenever these 95% confidence intervals for all the candidates show no overlapping. The results for some of the municipalities are shown including the performance of the model throughout time after ballots closed.

Are government forecasts different? Empirical evidence for Europe and political economy arguments

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The fact that the literature tends to find national biases in fiscal projections has led to a growing claim in the academic arena for the need to introduce independent forecasts in the fiscal domain, prepared by independent institutions, like the European Commission (EC) in the case of Europe. Nevertheless, two findings from the literature would argue against this latter possibility: (i) information matters, as outside forecasts (from independent forecasters, like international organisations) tend to be less accurate than inside forecasts (from staff of the relevant organisations); (ii) there seems to be a significant correlation between EC fiscal forecasts and electoral cycles. Within this debate the aim of this paper is to test four basic hypotheses. First: is the forecast performance of governments as regards budgetary projections worse than that of international organisations? Second: is there robust evidence of political economy distortions in fiscal projections prepared by international organisations? Third: is it the case that government projections are less independent than EC (and OECD) fiscal forecasts? Fourth: is it the case that for "unproblematic countries" (i.e. countries with a sound fiscal position) EC and OECD fiscal forecasts tend to imitate government fiscal forecasts? In this paper we use a common methodology (same econometric method, same empirical specification), to look at alternative datasets, over the same sample period. We build up a large real-time dataset and focus on a period with a common monetary policy regime and a common fiscal policy regime. Finally, we try to rationalise all the empirical results in the framework of a model in which the EC tries to minimise the distance to an unbiased government forecast. We exploit the idea that government's information set includes private information not available to outside forecasters. We show some examples of how such a framework can rationalise the observed empirical evidence.

Society's Comparative Estimate Prediction for Regional-Significant Event Efficiency

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At present when experts society and the highest level politicians declare that it is important to carry out significant reforms in socio-economical relations as all sections of population would participate in such reforms a problem to find out efficiency of such reforms or just announcements about by society's estimate comes to the foreground. We suggest not only estimate but predict such efficiency by sudden changes in homicide and suicide time series in given region. Upward sudden changes in homicide time series indicate that an event leads to significant changes in society's life when in suicide time series this

is indicated by downward sudden changes. Downward sudden changes in homicide time series indicate that an event leads to no significant changes in society's life when they waited significant changes. By this way we may formalize situation described by the phrase "ruin of hopes". As we may predict upward sudden changes in homicide number by other crimes time series we believe we may predict society's comparative estimate of regional-significant events efficiency. This way of estimation is sensible for wide range of time intervals and regions and has more responsiveness in comparison with public opinion poll, especially on short or large enough time intervals as one week or year correspondingly. Moreover, suggested method takes less additional costs of time and funds to obtain required results as police keep monitoring homicide and suicide and other crimes number in real time.

Forecasting the State Medicaid Budget during Economic Crisis

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This paper presents the strategies employed and preliminary results of the forecasting process for the Medicaid budget in Washington State during the worst economic downturn in decades. We review the impact of the economy on the Medicaid caseload and forecasting process, and the strategies employed to forecast how policy changes impact Medicaid expenditures. We conclude with a summary of lessons learned related to Medicaid forecasting during challenging budget times.

Business Cycles 6 [BC6]

Organized Session:

Tuesday, June 22, 4:00pm-5:30pm   Room:
Cunningham A

Chair: Gaetana Montana
EUROSTAT, Luxembourg

Density nowcasts and model combination: nowcasting Euro area GDP

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Timely and reliable information about macroeconomic variables is crucial for policy makers and business cycle analysts. Such need has been emphasized by the recent financial and economic crisis. Many studies have presented and compared alternative methods of computing timely estimates or "nowcasts". But these studies have tended to focus on the "point" estimate, which does not provide any indication of the degree of uncertainty associated with the nowcast. This paper examines density nowcasts for GDP growth, in out-of-sample simulations using Eurostat real-time database. We evaluate the uncertainty associated with alternative real-time nowcasts, focusing on key events such as the probability of a (one quarter) recession. Density nowcasts are computed using a novel method, the ensemble nowcasting method, which integrates out uncertainty about the preferred model (or indicators) to use when nowcasting. Ensemble density nowcasts combine (potentially many) "component" model nowcasts. The components are distinguished by their use of "hard" and "soft" indicators, and the vintage of data used. The ensemble forecasts are constructed at various points within or just after the quarter of interest, reflecting the staggered release of monthly information. Monthly indicators of economic activity can also be added to our set of component models. We compute density nowcasts of GDP growth for quarter t at t-30, t-15, t+0, t+15 and t+30 days. We assess the ability of the ensemble methods to anticipate the last recession, and evaluate ex post the reliability of density nowcasts. We also look at the time-varying weights the ensemble method gives to different variables at each nowcasting horizons, and which can be interpreted as posterior probabilities. We conclude by discussing the relative merits of statistical offices publishing density nowcasts, rather than point nowcasts, noting that unless the users of the nowcast have a symmetric, quadratic loss function the density nowcasts are more informative.

A GDP nowcasting approach using selection variables techniques and combining methods

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In the last two years Eurostat funded a research project for flash estimation of three PEEIs: the quarterly gross domestic product (GDP), the monthly industrial production index (IPI) and the quarterly labour cost index (LCI). The goal of this paper is to extend methodologies developed in the project providing a real time flash estimation of the quarterly GDP within 30 days after the end of the reference quarter. As a starting point we consider two different variables and model selection techniques, one based on cluster analysis and the other related to the dynamic factor model approach. Cluster analysis arranges variables into groups, where there is within-cluster similarity and across cluster dissimilarity. Dynamic factor model could be used for the classification of the series as being leading or coincident according to the phase delay calculate on the estimated common component. Both methods, independently used during the project, perform a reduction of the number of the candidate series for the final flash estimation equation. We extend these results along two directions. Firstly, for each method we look at the persistence of the leading characteristics of the variables over the business cycle. Secondly, we compare the results of the selection mechanism for each method trying to identify a set of robust explanatory variables. Finally, we consider all the information available for the flash estimation (leading and robust variables, hard and soft data already available before the estimation, etc.) inside a combination framework. As a feature of this study, together with the usual methods utilized for the determination of the weights, we propose also a new algorithm based on the so-called directional forecasts that have mainly been applied in the marketing environment. As we argue, in presence of time series with a high degree of persistence, this method outperforms the others.

Testing the number of factors for dynamic factor modelling: An empirical assessment for forecasting

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GDP forecasts based on dynamic factor models applied to a large data set are now widely used by practitioners involved in nowcasting and short-term forecasting. One recurrent question that arises when dealing with such models is the way to determine the optimal number of factors. At the same time, statistical tests have been recently put forward in the literature in order to optimally determine the number of significant factors. In this paper, we propose to reconcile both fields

of interest by selecting the number of factors, through a testing procedure, to include in the forecasting equation. Through an empirical exercise on French GDP, we assess the impact of a battery of well-known tests for forecasting purpose.

Forecasting Spanish GDP by means of disaggregation and using monthly information

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The aim of this paper is to forecast GDP in Spain and the Euro Area dealing with monthly interpolation, consideration of econometric models for disaggregated series and selection of exogenous indicators applied to different disaggregated GDP components. This methodology allows us to obtain monthly latent series for each of the different disaggregated GDP components and to update their future evolution according to the information provided by a number of monthly and quarterly indicators. Our preliminary results clearly indicate that using sectoral disaggregated information is especially useful to forecast GDP. Moreover, forecasting Spanish GDP from aggregating projections from GDP supply breakdowns is a better strategy than forecasting the aggregate variable from a single model.

Forecasting Methods 8 [FM8]

Contributed Session:

Tuesday, June 22, 4:00pm-5:30pm
Room: Cunningham B

Chair: Antonio Arroyo
Universidad Autónoma de Madrid, Spain

Dynamic Determination of Appropriate Time Series Data

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One of the most important factors in time series analysis is
determining the appropriate data to be used. Traditionally this is
predetermined, or more recently it is one of the factors of the model
to be analysed as in a Markov switching model. This research proposes a
novel method of dynamically determining the appropriate data using
modern heuristic methods. This method is shown to provide a more
accurate and less constrained model than alternatives.

Month-based error-correcting methods for out-of-sample combinations of forecasts

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Traditionally, forecast combination methods have considered fixed
weights during the combination period. Our idea is that the weights
need not have to be the same if we use more efficiently the information
given by the data. The goal of this paper is to exploit more profitably
the disaggregated information given by the intrinsic, time-varying,
behavior of each month's past forecast errors from different models to
form out-of-sample combination of forecasts. When applied to monthly
data for different traffic accident variables in Spain, our results
outperform the traditional model averaging and least squares
combinations by standard accuracy criteria. Of course, this methodology
may also be applied to data of other standard frequencies.

Nonlinear Forecasting Using a Large Number of Predictors

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The aim of this paper is to introduce a nonlinear model to forecast macroeconomic time series using a large number of predictors. The technique used to summarize the predictors in a small number of indexes, is principal component analysis, while the method used to capture nonlinearity is artificial neural networks. Commonly, in this literature, the forecast are made using a linear model. However linear models are often misspecified and the resulting forecasts provide only a poor approximation to the best possible forecast. The technique we propose is based on Feedforward neural networks. The forecasting ability of this method is studied for eight monthly series of the U.S. economy, grouped in real and nominal variables, for a period between 1974 and 2008. A general conclusion coming from the empirical study is that the nonlinear model has the same forecasting ability of linear models and provides some improvements only for real series and for short horizon.

Sparse Methods for Factor Forecasting: A Comparison

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Factor methods have been applied extensively for forecasting when high dimensional datasets are available. Within this framework, instead of using all available predictors, we focus on the choice of the appropriate ones, a specification issue that remains open in the literature. We consider the variable selection process as one possible refinement to factor forecast; in particular, we propose sparse partial least square and/or sparse sliced inverse regression techniques as a way to improve the forecast efficiency. We use the Stock and Watson data base in order to compare the forecasting performance of the sparse methods to those widely used nowadays as principal component and partial least square regressions.

Finance 7 [FN7]

Contributed Session:

Tuesday, June 22, 4:00pm-5:30pm
Room: Cunningham C

Chair: Juan-Angel Jimenez-Martin
Complutense University, Spain

VaR Prediction with a Duration Based POT Method

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Isabel Fraga Alves
Faculdade de Ciências da Universidade de Lisboa, Portugal

Threshold methods, developed under the acronym POT (peaks over threshold), are based on fitting a stochastic model to either the exceedances or the peaks over a threshold. In this work we propose a model based approach within the POT framework, for Value-at-Risk (VaR) prediction. The proposed POT method allows for the presence of duration as covariate in order to eliminate the tendency to clustering of violations that often occurs with quantitative risk models. Previous comparative studies show that a two-stage hybrid method which combines a GARCH filter with a Extreme Value Theory (EVT) approach, known as Conditional EVT, performs better for VaR prediction under heterocedastic financial time series. We compare the out-of-sample performance of the proposed duration based POT method with the Conditional EVT method, using a new independence test for interval forecasts evaluation.

Has the Basel II Accord Encouraged Risk Management During the 2008-09 Financial Crisis?

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The Basel II Accord requires that banks and other Authorized Deposit-taking Institutions (ADIs) communicate their daily risk forecasts to the appropriate monetary authorities at the beginning of each trading day, using one or more risk models to measure Value-at-Risk (VaR). The risk estimates of these models are used to determine capital requirements and associated capital costs of ADIs, depending in part on

the number of previous violations, whereby realised losses exceed the estimated VaR. In this paper we define risk management in terms of choosing sensibly from a variety of risk models, and discuss the selection of optimal risk models. A new approach to model selection for predicting VaR is proposed, consisting of combining alternative risk models, and comparing conservative and aggressive strategies for choosing between VaR models. We then examine how different risk management strategies performed during the 2008-09 financial crisis. These issues are illustrated using Standard and Poor's 500 Index, with an emphasis on how market risk management practices were encouraged by the Basel II Accord regulations during the financial crisis.

Value at Risk for Large Portfolios

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In this paper we address the question of how to properly assess the risk in large financial portfolios. In risk assessment it is usually assumed that the entire position can be sold at the market price (or mid-price), though one realizes that this can be a quite misleading valuation approach. The reason is that for large enough positions the seller (buyer) of an asset does not face a horizontal demand (supply) curve. Thus, there is an element of liquidity risk involved and this should reasonably be taken into account in risk assessment. Here, the primary focus is on incorporating the liquidity risk in the Value at Risk (VaR) measure, which is the standard way of quantifying the risk of adverse price movements. Our proposed approach relies on essentially the same idea as in Giot and Grammig (2006). Rather than the mid-price at the end of the horizon they consider the average price per share that would be obtained upon immediate liquidation. Their VaR is volume dependent and it is based on the difference between the mid-price at the beginning of the horizon and the average price at the end of it. We argue that the relevant initial price is not the mid-price, but that the portfolio should be valued at the average price in the beginning of the period as well. We have assets traded on an order driven market with a visible limit order book in mind and the context is intra-day. Our modelling framework allows for spatial (in the volume dimension) as well as serial correlation in the time dimension.

Impacts of asymmetric volatility and dynamic higher moments on Bayesian Value-at-Risk

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Richard Gerlach

University of Sydney, Australia

A parametric method to estimate and forecast Value-at-Risk (VaR) and Expected Shortfall (ES) for a heteroskedastic financial return series is proposed. Analysis focuses on the recent popular topics of asymmetric volatility and dynamic higher moments. A smooth transition GARCH (STGARCH) models the asymmetric volatility process, in which the conditional variance complies to two different regimes with a smooth transition function continuous between zero and one. As a zero threshold is not necessary in the occurrence of regime switch, it is estimated as a parameter in this paper. To take account of potential skewness and heavy tails, the model assumes an asymmetric Laplace distribution as the conditional distribution of the financial return series. Dynamics in higher moments are captured by allowing the shape parameter in this distribution to be time-varying. The model parameters are estimated via an adaptive Markov Chain Monte Carlo (MCMC) sampling scheme, employing the Metropolis-Hastings (MH) algorithm with a mixture of Gaussian proposal distributions. The model is illustrated by a simulation study as well as an empirical experiment with four international stock market indices and two exchange rates, generating one step-ahead forecast of VaR and ES. Model comparison is investigated together with TGARCH and GJR-GARCH for volatility process, as well as Hansen's skewed student t distribution accounting for dynamic skewness. Standard and non-standard tests are applied to forecasts from these models. The results favor the proposed model in general.

Macroeconomics [MC]

Organized Session:

Tuesday, June 22, 4:00pm-5:30pm
     Room: Oxford

Chair: Herman Stekler
George Washington University, USA

Has the Accuracy of Germany Macroeconomic Forecasts Improved?

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Herman Stekler
George Washington University, USA

The major focus of this paper is to determine whether the accuracy of German macroeconomic forecasts has improved over time. We examine one-year-ahead forecasts of real GDP and inflation for the years 1967 to 2008 made by three major German forecasting groups and the OECD. We examine the accuracy of the forecasts over the entire period and in four sub-periods. We conclude that, with some exceptions, the errors of the German forecasters were similar to those of their U.S. and U.K. counterparts. While the absolute size of the forecast errors has declined, this is not the case for relative accuracy. A benchmark comparison of these predictions with the ex post forecasts of a macroeconometric model indicates that the quality of the growth forecasts can be improved but that the expected increase in accuracy may not be substantial.

Evaluating Labor Market Forecasts

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In preparing macroeconomic forecasts, economists also estimate the unemployment rate, but these forecasts have not been analyzed as extensively. Consequently, this paper reviews results relating to the modeling and forecasts of this variable. I also review the methodology for evaluating long term labor market projections and present some results relating to employment by industry and occupation.

Cross-Country Evidence on Forecasting Turning Points: Consensus and Disagreement

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The paper examines the performance of private sector forecasts for real GDP growth around turning points in about 80 industrialized, emerging and developing economies during January 1989–December 2008. We study the response of both the mean forecast ("consensus") and the standard deviation across forecasters ("dispersion") in the run-up to recessions. We present stylized facts on the speed and extent of adjustment of the consensus forecast towards the actual forecast over the course of a recession; the results support the assumption of significant informational rigidities commonly made in the recent macroeconomic literature (e.g. Mankiw and Reis, 2002). There is a striking difference in the behavior of the dispersion of forecasts during recessions between the industrialized economies on the one hand and the emerging and developing economies on the other. This difference may prove useful in judging the relative merits of alternate models of informational rigidities. We also present stylized facts on the behavior of forecasts around turning points associated with crises, particularly banking crises, and during recoveries.

A Disaggregated Model for Austrian Inflation

Friedrich Fritzer
Oesterreichische Nationalbank, Vienna

Austrian inflation is modelled at a disaggregated level beyond the five sub-components energy, services, unprocessed food, processed food and non-energy industrial goods. At the most disaggregated level in total 19 items of Austrian inflation are modelled. Monthly models are estimated for January 1995 to March 2009 and the pseudo real time out-of-sample forecasting performance for January 2006 to March 2009 is examined. The disaggregated approach to forecasting outperforms in most cases the aggregated forecast of headline inflation. The level of disaggregation is central for capturing idiosyncratic shocks. The commodity price shock of 2007 and 2008 had a particular strong impact on some processed food items but not on others. Hence, five items of this component are modelled separately. In case of the energy component the disaggregation into three fuel items (liquid, transport fuel and solid fuels) as well as gas and the remainder of the energy sector (electricity plus heat energy) helped to improve the forecast performance. The reason is that only fuel items have a clear and tight link to crude oil prices. The services component was disaggregated into five services items (package holidays, restaurants and hotels, rentals, administered prices and the remainder of services). Some items show strong seasonality, some prices are regulated and others are predominantly linked to macro developments like, for instance, wage and income developments. Similar is the situation for unprocessed food. Fruit and vegetables are highly seasonal and furthermore driven by

shocks while meat and fish are to a larger extent driven by macro developments. The non-energy industrial goods sector was disaggregated into a predominantly seasonal item, namely clothing and footwear, administered prices controlled by central institutions and the remainder of the sector which is determined by more structural features, for instance unit labour costs and real exchange rates.

Keynote Speech [K3]

Plenary Session:

Wednesday, June 23, 8:30am-9:30am
Room: Randle AB

Chair: Antonio Garcia-Ferrer, Universidad Autonoma de Madrid, Spain

Dating business cycles using many indicators (Joint with James H. Stock, Harvard University)

The NBER Business Cycle Dating Committee and the CEPR Business Cycle Dating Committee date business cycle turning points using a small number of aggregate measures of real economic activity. In contrast, when the NBER research program on dating business cycles commenced, researchers examined turning points in hundreds of series and dated business cycles by detecting clusters of specific-cycle turning points, see Arthur Burns and Wesley Mitchell (1946, p. 13 and pp. 77-80). The dating of turning points evidently has shifted from aggregating the turning points of many disaggregated series to using the turning points of a few highly aggregated series. This shift raises a methodological question: should reference cycle turning points be determined by aggregating then dating, or by dating then aggregating? This paper discusses the question of whether it is better to date then aggregate or aggregate then date using a large number of monthly disaggregated real economic indicators.

Mark Watson (Clive Granger Memorial Keynote Address)
Princeton University, USA

Mark Watson is the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs at Princeton University and a research associate at the National Bureau of Economic Research. He is a fellow of

the American Academy of Arts and Sciences and of the Econometric Society. His research focuses on time-series econometrics, empirical macroeconomics, and macroeconomic forecasting. He has published articles in these areas and is the author (with James Stock) of Introduction to Econometrics, a leading undergraduate textbook. Watson has served on the editorial board of several journals including the American Economic Review, Journal of Applied Econometrics, Econometrica, the Journal of Business and Economic Statistics, the Journal of Monetary Economics, and Macroeconomic Dynamics. He currently serves as a Co-Editor of the Review of Economics and Statistics. He has served as a consultant for the Federal Reserve Banks of Chicago and Richmond. Before coming to Princeton in 1995, Watson served on the economics faculty at Harvard and Northwestern. Watson did his undergraduate work at Pierce Junior College and California State University at Northridge, and completed his Ph.D. at the University of California at San Diego.

Featured Speech [FS4]

Featured Session:

Wednesday, June 23, 9:40am-10:40am   Room: Cunningham AB

Chair: P. Geoffrey Allen, University of Massachusetts, USA

Is climate really predictable on 15-20 year time scales?

An overview of major climate forcing mechanisms is presented. For each of the mechanisms, sources of major uncertainties and whether or not the forcing mechanisms are predictable is discussed. In addition, I review estimates of the natural variability of climate over the last 1000 years. It is concluded that the natural variability of climate is larger than suggested by several investigators as indicated by the Medieval Warm Period and the Little Ice Age. The implication to long term climate prediction is that there are components to the climate system that are stochastic and unpredictable (like volcanoes), that there are forcing factors that still are not explained physically, or quantified well in existing models (like solar/cosmic ray forcing), and that CO_2 greenhouse warming is only important to climate forcing everything else being the same. It is therefore concluded, that climate on time scales of 10-50 years is inherently an unpredictable system.

William Cotton

Colorado State University, USA

William Cotton earned a B.A. in mathematics at [University at Albany, The State University of New York](#) (SUNY) in 1964, a M.S. in meteorology at [SUNY](#) in 1966, and a Ph.D. in meteorology at [Pennsylvania State University](#) in 1970. He was appointed to the academic faculty at [Colorado State University](#), Department of Atmospheric Science in 1974. He assumed the position of an Assistant Professor in the Department where he is now a tenured full Professor. He has been actively involved in observation and computer simulation of cumulus clouds and thunderstorms as well as other intermediate-scale cloud systems. His current interests are largely in the area of observation and modeling of larger clusters of thunderstorms that occur preferentially at night over the central United States, the simulation of severe thunderstorms including tornadoes and the application of the RAMS cloud model to forecasting agriculture and aviation impact variables.

Judgemental & Scenario Forecasting 3 [JF3]

Contributed Session:

Wednesday, June 23, 9:40am-10:40am   Room:
America's Cup A

Chair: Nicolas Savio
Manchester Business School, United Kingdom

Forecasting the Effectiveness of Policy Implementation Strategies through Structured Analogies

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Konstantinos Nikolopoulos
Cambridge University, United Kingdom

Once a government has set targets for a given policy, something that is usually done at the implementation stage, it faces the difficult task of determining the nature and characteristics of the strategy to be used for attaining these targets. Such a decision is made even more difficult by ever-present financial and time constraints as well as the dilemma of having several different, rivalling, types of such policy implementation strategies (PIS) for attaining the same objective (but at different costs) to choose from. Hence, it is argued that an *ex-ante* prediction of the effectiveness of a new PIS can serve as a much needed decision support tool and should be an integral part of any cost-benefit analysis. As suggested by the literature, this research proposes the use of Structured Analogies (SA) for producing such forecasts. A 3-stage study to test the approach in the hands of non-experts and experts is carried out and the results presented here. For each stage of the experiment, half of the participants were asked to use the SA approach and half were asked to use an Unaided Judgment (UJ) approach, for the purpose of benchmarking the SA approach against a popular, unstructured judgmental method. For each of three policy scenarios, each participant was given a brief description of the PIS and then asked to produce a forecast using the approach assigned to him or her. In stage 1, the SA approach was tested on a group of non-experts with no training in forecasting. In stage 2, the SA approach was tested on a panel of non-experts but with training in forecasting methods. In stage 3, the SA approach was tested on a group combining experts from academia, the private and public sector and the media. The results are presented here.

~~**Scenario-Based Forecasting in Macroeconomic Regional Growth Models**~~
CANCELLED

Danila Karbaev
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This paper considers the practical aspects of scenario-based forecasting models in limited data set environment. In particular, the present paper provides models of regional macroeconomic growth. The purpose is to forecast medium-term trends (the scenarios were created with 5 year horizon) of macroeconomic indices according to statistical classification of economic activities. Future macroeconomic tendencies are obtained under three different scenarios: inertia development, maximization of production, production crisis. As the new system of classification of economic activities was introduced in Russia, the data set available for analysis is extremely small. The new scenario-based forecasting approach based on spreadsheet solving methods was introduced. A practical example is given for the one of the leading regions of Russia in comparison with official forecasts.

Forecasting the success of Digital Planning policies through interaction groups and interviews

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Konstantinos Nikolopoulos
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This paper describes an experiment on forecasting the success of Digital Planning Policies in Greece. The experiment was organized at the Forecasting System Unit of National Technical University of Athens. It included cases of policies of the Greek government that provided incentives to citizens aiming at the adoption of new technologies. We organised various cases as forecasting problems and conducted forecasting experiments with semi-experts (pre-graduate students) and experts, asking them to give their individual forecasts through suitably formed questionnaires. From the experts that gave individual forecasts, we created 2 groups of 4 persons. Each group had a face-to-face meeting so as to produce group forecasts for the exact same policies and provide comments on them. We also conducted in-depth interviews with experts in the groups in order to enlighten even more issues concerning the way they made their forecasts and their views about the success of the policies. The results were satisfactory, since we got more accurate forecasts than those given by the individuals and we also obtained suggestions and remarks about the forecasting process and about policy making in Greece.

Business Cycles 7 [BC7]

Contributed Session:

Wednesday, June 23, 9:40am-10:40am   Room:
America's Cup C

Chair: Thomas Trimbur
Federal Reserve Board, Washington, USA

A Bunch of Models, a Bunch of Nulls and Inference about Predictive Ability

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In this paper we argue that traditional tests of predictive ability, which compare forecasts from two competing models, sometimes are not adequate to capture the problems that a forecaster is confronted with. This is because when a new forecasting device is presented, there is uncertainty surrounding some aspects of this new method, and rather than a new method, a family of methods is introduced. A similar situation occurs with the benchmarks available in the literature. In the case of inflation, for instance, the number of well established and accepted forecasting models is huge. Therefore a more realistic inference approach would be one in which families of models are compared and not just a couple of competing models. In this article we present an adequate set up that enables us to make inference about the predictive ability of two families of forecasting methods. We also illustrate how our inference approach compares with the traditional approach in an empirical application in which two families of inflation forecasting methods are compared for Chile, Mexico, Sweden and the U.S.A.

Predicting Recessions and Upturns in Real Time: The Euro Area-wide Leading Indicator (ALI)

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Gabe de Bondt
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This study develops a monthly euro Area-wide Leading Indicator (ALI) for the euro area business cycle which is based on the concept of deviation cycles. The ALI is derived as a composite index of nine leading series which are carefully selected from a large pool of data. Particular emphasis is put on ensuring a good mixture of the leading series to guarantee that information from different sources is exploited and enhance the robustness of the ALI. The cyclical component of the series is determined by applying a one-sided band-pass filter,

which reduces revisions of the indicator to those of potentially revised components and helps to achieve clear turning point signals in real time use. Our main findings are that i) the reference business cycle indicator (BCI) derived from industrial production excluding construction is close to identical to the real GDP cycle, ii) the ALI reliably leads the BCI by 6 months and iii) the longer leading components of the ALI are good predictors of the ALI and therefore the BCI up to almost a year ahead and satisfactory predictors by up to 2 years ahead. A real time analysis for predicting the euro area business cycle during the 2008/2009 recession and following upturn confirms these findings. It suggests that the ALI provided even clearer turning point signals during this period than the only comparable and regularly published leading indicator that was available over the whole of this period, the OECD Composite Leading Indicator (CLI) for the euro area, which is derived as an aggregate of OECD CLIs for euro area countries, while the Conference Board Indicator for the euro area was launched too late for this comparison (in January 2009).

The cyclical component of economic time series

Thomas Trimbur
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Business cycle analysis has a long history, and recently, time series models have been developed to capture the periodic variation in macroeconomic variables around their long-run trend. At the same time, researchers have increasingly used band-pass filters to extract the cycle in economic data. These two approaches are closely intertwined. In this paper, I discuss the properties and estimation of the cyclical component in economic time series and link these aspects with band-pass filters. By constructing a model with stochastic cycle, this captures the movements of interest, and it leads naturally to band-pass filters designed from the model, which adapt to the series of interest. In applications, I show a model-based representation of the "ideal" filter that has better gain properties than the Baxter-King filter and that addresses the sample endpoint problem. I make comparisons with the adaptive model-based filter. The gain functions of the adaptive filters have curvature at low and high frequencies that depends on the properties of the input series.

Energy 5 [EN5]

Organized Session:

Wednesday, June 23, 9:40am-10:40am   Room: America's Cup D

Chair: Steven Vitullo
Marquette University, USA

Day-ahead electricity price forecasting with semi-nonparametric regime switching models

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As a consequence of the worldwide liberalization of electricity markets, day-ahead price forecasting has become a crucial task for market agents in order to optimize their bidding strategies. Since market clearing prices are obtained by crossing stepwise supply and demand curves constructed from aggregated bids of buyers and sellers, electricity prices in spot markets are generally erratic and ill-behaved. In this context, electricity market agents assume a more intense risk exposure than in the traditional framework. This risk analysis requires the estimation of the probability density function of future electricity prices, complementing the information of point forecasts. In this work, a novel semi-nonparametric regime switching model is proposed. The general structure corresponds to a regime switching transfer function model with ARCH disturbances, where we have incorporated two important features: the ability of the model to identify different hidden regimes from explanatory variables and the nonparametric distribution of the innovations. On the one hand hidden regimes are inferred from explanatory variables by estimating the conditional probability density function of each regime of the system by means of a Radial Basis Function Network (RBFN). On the other hand we assume a semi-nonparametric (SNP) formulation of innovation distributions suggested by Gallant, able to approximate densities from a large class including fat tails and skewed densities. This configuration leads us to a novel Hybrid Regime Switching model where each inner model (or expert model) is specified by a SNP transfer function with fixed parameters. The forecasting ability of the proposed model is empirically tested in the context of short-term forecasting of Spanish day-ahead electricity market prices and compared to other reference models.

Forecasting medium and long term electricity prices

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Alberto Campos

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Cristian Diaz
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Electricity sector liberalization has introduced important changes in the generation activity with the creation of wholesale electricity markets that regulate the interaction among generation companies and system demand. Market operators determine the market-clearing prices intercepting the aggregated supply and demand functions. Electricity prices are a relevant part of the total costs of many industrial activities, as well as a key variable for the market participants' strategy optimization. For the short term, time series tools are well suited to forecast electricity prices. They account for most relevant factors using a reduced set of external inputs, such as demand and wind forecasts, very often available from the system operator. However when medium and long term forecasts are needed, fundamental approaches become essential. Indeed there are several factors that may drastically modify market price forecasts that cannot be considered by time series tools. These are for instance new regulation policies, participant merging, new participants, generation capacity expansion, technological changes, and in general any market structural modification that makes useless recent past history. The approaches most used for the medium and long term are those based on the Nash equilibrium, where the participants maximize simultaneously their profits with their competitors' strategies supposed to be fixed and at the equilibrium. They provide the expected market price and the participants equilibrium strategies, but require a much more detailed description of the market structure. Among these approaches are Cournot Equilibrium, where generators' strategies are represented in terms of quantities, Conjectural Variation Equilibrium that also considers the reaction of the competitors, Supply Function Equilibriia where generators' strategies are their supply functions, and Conjectured Supply Function Equilibrium that assumes a local first-order approximation of the supply functions. This work introduces these different modelling approaches with special emphasis on the Conjectured Supply Function Equilibrium.

ANN Modeling of Electric Energy Spot Prices

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Forecasts of electric energy spot prices in Colombia using ANN are obtained with some subtleties that might be useful when applied to other commodities. Observed hourly history is January/96-December/08. At a daily level, the chosen architecture is feed forward input time delay backpropagation, using an output node of 24 elements. This net consists of 3 layers, with 15 neurons in the first two and 1 neuron in the third. Transfer functions are tansig, poslin and purelin. Biases are left at 0.0. Maximum number of iterations used is 20. Two additional hourly variables are used: 7 day difference and its absolute value. Delays of each variable are [1,7,8]. Daily arithmetic averages (of 24 hours) exhibit MAPE of 2% for 2008. For the monthly level the FFTD architecture is used again. Forecasted variable is the arithmetic mean, over the hours of the month. A pre-processing is done over this

variable aiming at stationarity in its variance; prices are
standardized, based upon means and variances local to temporal regions
characterized by states relative to the South Oscillation Index. Four
climatological variables are configured, for each one of the three
states of SOI runs: dry, normal, wet. Such variables are: run length
and SOI's run average, up the run ending in the previous month and the
one beginning in the actual one. Three layers are modelled, with 15
neurons in the first two and 12 in the last one; transformations are
tansig, in the first two layers and purelin in the last one. Biases
are left at 0.0 in each layer. Maximum number of iterations is 1000.
The delay of the climatological variables as well as the forecasted
variable is 1. When using the trained net to forecast 1997-2008, the
MAPE is between 9.9% (one month ahead) and 28.4% (12 months ahead).

Discussion

James Taylor

University of Oxford, United Kingdom

Forecasting the Crude Oil Price by Bayesian Inference

Chul-Yong Lee*

Korea Energy Economics Institute, South Korea

Moon Bai Lee

Time series models among many forecasting models have widely been used
to forecast the crude oil price. These models have suffered from
limitations in that they assume the internal structure of observations
will continue into the future. As the environment changes, however, the
internal structure of observations changes. The current study describes
a forecasting methodology designed for crude oil price that uses
subjective approach and Bayesian inference. In the estimation
procedure, initial information is derived through expert judgment, then
updated using Bayesian theorem with observations during the past
several years. The model is applied to the West Texas Intermediate
(WTI) crude oil market. In addition, the study tests whether the long
possible observations contribute to forecasting performance or not.

Forecasting Methods 10 [FM 10] (new session)

Wednesday June 23, 9:40-10:40 am
America's Cup C

Chair: Jose Luis Carmo
University of Algarve and CIO, Portugal

Models for irregular demand forecasting

Jose Luis Carmo *
University of Algarve and CIO, Portugal

Antonio Rodrigues
University of Lisbon and CIO, Portugal

This work focuses on the study of forecasting and optimal decision making problems, given irregularly observed demand processes. These processes are common, for instance, in the context of inventory management or production planning, with demand occurring irregularly spaced in time, and with variable distribution. In the proposed methodology, each decision is based on point predictions, and on the characterisation of the uncertainty associated to those predictions, namely through the estimation of probability density functions. Optimal decisions are derived after the specification of a cost, or loss function – usually asymmetric. We consider models based on gaussian kernels, both for point forecasting of the time and magnitude of future demand, as well as for density forecasting. For point forecasting, several appropriate neural and exponential smoothing models are been investigated, including different approaches for the identification of those models. In particular, adaptive methods for bivariate correlated processes ("when" and "how much") have been developed, through the application of gaussian basis function networks. Furthermore, a relatively simple approach, based on exponentially weighted gaussian kernel models, is used for the predictive estimation of densities. We produce extensive empirical comparative results, using both simulated and real irregularly spaced time series.

Instrumental variables estimation of a flexible nonlinear model

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POSCO Research Institute, Seoul, South Korea

Young-Wan Goo
Korea National Defense University, South Korea

The applicability of Hamilton's (2001) flexible nonlinear model for estimating simultaneous equations model or errors in variables model is placed under restraint due to the existence of endogenous explanatory variables. This paper proposes IVFM (instrumental variables estimation of a flexible nonlinear model) for solving the case of endogenous explanatory variables using a standard estimation method. The findings of this paper are as follows: this paper theoretically solves a flexible nonlinear model with the endogenous explanatory variables by using instrumental variables; and also empirically proves the applicability of IVFM for simultaneous equations model or error in variables model. As we applied the proposed model to Campbell and Mankiw's (1989) consumption function, we found that the relationship is

linear between the log difference of per-capita disposable income and the log difference of per-capita consumption on non-durable goods and services.

Climate & Environment 2 [C&E2]

Organized Session:

Wednesday, June 23, 11:00am-12:30pm   Room:
America's Cup A

Chair: Robert Fildes
Lancaster University, United Kingdom

A forecasters' assessment of the science behind long-range global climate forecasts: Why global warming alarm is an anti-scientific political movement

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Kesten C. Green
University of South Australia, Australia

We conducted a systematic analysis of the processes used by those who forecast dangerous manmade global warming. We found that they violate basic scientific procedures such as full disclosure of data and methods, assessment of reasonable alternative hypotheses, reporting of potential conflicts of interest, and ensuring that conclusions do not go beyond the findings. Moreover, they violate principles specific to scientific forecasting by using methods that have not been empirically validated and by making dramatic forecasts when there is great uncertainty about the situation. Based on our analyses of the procedures they used, we conclude dangerous manmade global warming alarmism is an anti-scientific political movement.

Outcomes of the global warming political movement: forecasts from structured analogies

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J. Scott Armstrong.
University of Pennsylvania, USA

We searched the literature and asked diverse experts to identify popular calls for action to prevent predicted manmade disasters that were endorsed by scientists, politicians, and the media. The search yielded 71 proposed analogies. We examined objective accounts to screen the proposed analogies and concluded that 26 met the criteria. Our preliminary findings include the following: The analogous alarms were presented as being products of science, but none were derived using scientific forecasting procedures. Every alarming forecast proved to be false in that the predicted adverse effects either did not occur or

were minor. Government policies were ineffective and they remained in place long after the predictions of disasters were shown to be false. The findings were insensitive to which analogies were included in our analysis. The structured analogies approach suggests that the current global warming alarm is simply the latest example of a common social phenomenon: an alarm based on unscientific forecasts of manmade calamity. We conclude that the global warming alarm will fade, but not before much additional harm is done by governments and individuals making poor decisions on the basis of unscientific forecasts.

Discussion by Robert Fildes
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Industry 2 [IN2] [Practitioner Track]

Contributed Session:

Wednesday, June 23, 11:00am-12:30pm   Room:
America's Cup B

Chair: Andy Waclawski
SAS Institute, USA

The Effect to Socio-Demographic and Econometric Data on Improving Time Series Forecasting of Medical Services

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Joe Katz
SAS Institute, USA

Medicaid was established pursuant to Title XIX of the United States Social Security Act of 1965. It is a cooperative venture jointly funded by the federal and state governments and is the largest source of funding for medical and health related services for low-income individuals. From a macroeconomic perspective, Medicaid serves approximately 45 million people and accounts for about $400 billion, or 2.4% of United States GDP. When combined with the Medicare Program, Medicaid represents approximately 22% of the federal government budget. In the State of North Carolina for FY 2009 Medicaid costs accounted for approximately 15% of the state budget or about $3.2 billion and annual year over year growth is expected to average 8%. Accurate accounting of expenditure categories, determining major causal factors driving expenditures and employing them to generate time series forecasts are critical elements to not only understanding the economic dynamics of Medicaid but to providing decision makers with actionable information relative to budget allocations. Researchers have found that fundamental economic factors can be used to forecast health care expenditures. However, what factors to include and how to model the relationship remain open questions. This paper describes our experience using socio-demographic and econometric data to augment time series forecasts of Medicaid claim expenditures by category of medical service in the State of North Carolina. Statistical constructs employed included correlation analysis, dimensionality reduction using principal components and factor analytic techniques, causality determination using stepwise regression, and modern time series forecasting using a portfolio of algorithms. The results are economically significant.

Common business and housing market cycles in the Euro area

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The 2007 sub-prime crisis in the United States, prolonged by a severe economic recession spread over many countries around the world, has led many economic researchers to focus on the recent fluctuations in housing prices and their relationships with macroeconomics and monetary policies. The existence of common housing cycles among the countries of the euro zone could lead the European Central Bank to integrate more specifically the evolution of such asset prices in its assessment. In this paper, we implement a multivariate unobserved component model on housing market variables in order to assess the common euro area housing cycle and to evaluate its relationship with the economic cycle. Among the general class of multivariate unobserved component models, we implement the band-pass filter based on the trend plus cycle decomposition model and we allow the existence of two cycles of different periods. The dataset consists of gross domestic product and real house prices series for four main euro area countries (Germany, France, Italy and Spain). Empirical results show a strong relationship for business cycles in France, Italy and Spain. Moreover, French and Spanish house prices cycles appear to be strongly related, while the German one possesses its own dynamics. Finally, we find that the GDP and house prices cycles are related in the medium-term for fluctuations between 4 and 8 years, while the housing market contributes to the long-term economic growth only in Spain and Germany.

Predicting the Past - Using Forecasting Methodologies in the Forensic Analysis of Industry Performance

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In Canada, the Special Import Measures Act (SIMA) is legislation that protects Canadian domestic producers from the harmful effects of unfair import competition. The unfair import competition comes from goods exported to Canada at prices that are lower than in the home market or lower than the cost of production (dumping), or from imported goods that have benefited from certain types of financial support provided by foreign governments (subsidizing). The Canadian International Trade Tribunal is tasked with determining if these imports have caused or are threatening to cause injury to Canadian industry. To make this assessment the Tribunal evaluates whether the prices of dumped or subsidized goods significantly undercut, depress or suppress the prices of similar domestic goods and whether the dumped or subsidized goods had a negative impact on the health of the domestic industry in terms of performance indicators such as output, sales, market share, profits, productivity, capacity utilization, inventories, cash flow, growth and the ability to raise capital. This is the predicting the past aspect of

our work. This paper describes how we do that by employing forecasting methodologies such as: time series analysis (with separation to examine trend, seasonality and cyclical components); vertical and horizontal analysis; linear regression and other formal statistical methods; or, alternatively, less formal judgmental methods. As with forecasting, risk and uncertainty are central to our work as well. We are also required to perform conventional forecasting because, if the Tribunal determines that the domestic industry has suffered no injury, it must then consider the future and decide whether there is a threat of injury. For this work, in addition to economic forecasting, the Tribunal looks at the capacity of foreign producers and the imposition of anti-dumping or countervailing measures on the same or similar products by other countries.

Symbolic Data [SD]

Organized Session:

Wednesday, June 23, 11:00am-12:30pm   Room: America's Cup D

Chair: Carlos Maté
Universidad Pontificia de Comillas, Spain

Forecasting turning points with interval methods

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Symbolic data incorporate uncertainty into the dataset itself. The analysis and forecasting of time series of complex data such as intervals and histograms can benefit from insights of the symbolic data analysis (SDA) field. In addition, new approaches to judgmental forecasting techniques based on non-crisp data such as interval or fuzzy data have been gaining importance, enlarging the scope of forecast methods based on experts' forecasts such as the Delphi method. This paper proposes the use of these methods based on interval-valued data to forecast output growth and business cycle turning points. The analysis is performed in-sample and out-of-sample, using revised as well as real time unrevised data. The analysis and results are compared to alternative methods.

Discriminant Analysis for Distribution Valued Data

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In this paper, we discuss discrimination for distribution valued data. There are many descriptions of objects (or targets) in the framework of Symbolic Data Analysis (SDA) including interval values, histogram values, and distribution values. Among them, descriptions with distribution values are very flexible and powerful. We assume that we have n training objects described by distribution values, for example, p- dimensional normal distributions and each object belongs to a predefined group. We define the distance between two objects, i.e. two distributions as Kullback-Leibler (KL) divergence, and show an important relation between likelihoods and KL divergences. We propose two methods of discrimination for distribution valued data. The first is based on nearest neighbor method and the second is based on parameter space of the distributions. We also show numerical examples.

Electricity Spot Price Forecasting Using Interval Time Series: A Comparison Between VAR and iMLP

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Electricity spot price forecasts play an essential role in the electricity industry. The energy, commercial and trading strategy adopted by an electricity generation or electricity retail company, greatly depends on such forecasts. In this article, the forecasting technique considered for the forecasting of the monthly electric spot price per hour in Spain is the new forecasting approach applied in García-Ascanio and Maté (2010) for electric power demand. Obtaining two bivariate models each hour, this novel approach considers vector autoregressive (VAR) forecasting models applied to interval time series (ITS) and the iMLP, the multi-layer-perceptron model adapted to interval data. In the present work, electricity spot prices per hour from 2000 to 2009 are analysed. The application of the two bivariate models, VAR and iMLP, for forecasting the electricity spot price per hour allows us to establish which method is more efficient. In addition, it makes it possible to establish which interval representation is more accurate, the one composed of the centre (mid-point) and radius (half-range), or the one based on the lower and upper bounds. The promising results of this work enable us to compare the accuracy of this novel approach in forecasting electricity spot prices and in forecasting electric power demand. In addition, some proposals for further research in the field of forecasting with symbolic data applied to energy markets are made.

Interval time series modeling and forecast evaluation

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Over recent years several methods have been proposed to deal with large data sets. An interesting approach is related to interval-valued time series. In this paper new methods for interval-valued time series modeling and forecasting are introduced as well as new forecast quality measures proposed. The latter are based on refinements of an Euclidean-type loss function and a normalized symmetric difference loss function. The proposed modeling framework includes new range descriptive statistics for interval-valued data sets and one of the models is designed to capture speculative bubbles in the stock markets. The results obtained are very encouraging and compare very favourably with available procedures.

Business Cycles 8 [BC8]

Contributed Session:

Wednesday, June 23, 11:00am-12:30pm   Room:
Cunningham A

Chair: Michael Owyang
Federal Reserve Bank of St. Louis, USA

Disaggregating United States Real Gross Domestic Product

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Gross Domestic Product (GDP) in the U.S. is reported four times a year
as a quarterly time series. In applications such as forecasting, it
frequently is necessary to disaggregate GDP into a monthly series to
produce monthly forecasts. We introduce methods that have been applied
to disaggregate natural gas and heating oil consumption as methods to
disaggregate U.S. Real GDP. We look at several methods of
disaggregating U.S. Real GDP and look at combining techniques from the
forecasting domain applied to disaggregation to obtain more accurately
disaggregated time series data. We use historical quarterly Real GDP
and monthly and quarterly coincidental economic indicators correlated
to Real GDP to disaggregate US Real GDP from a quarterly time series to
a monthly time series.

Forecasting Recessions Using the Mixed Frequency Probit

Michael Owyang

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The business cycle is often characterized as a movement through distinct phases [see Burns and Mitchell, 1946]. Many argue that these phases -- expansion and recession -- are asymmetric, resulting in very different behavior from consumers, firms, and policymakers. The NBER formed a Business Cycle Dating Committee tasked with analyzing and dating economic peaks and troughs in the U.S. Others [e.g., Hamilton, 1989] have adopted a more rigorous view, fitting nonlinear statistical models to macroeconomic data. Other previous studies have found that the term spread has significant information content for forecasting recessions. These studies typically use probit or logit models to assess the probability of recession at various horizons. For example, Estrella and Mishkin (1998) and many others have found that the term spread - the difference between long- and short-term interest rates (typically on government securities) can be informative about future turning points. The information content in the term spread for forecasting recessions is particularly apparent at longer horizons. Most of these models use monthly averages of interest rates, potentially discarding important information about the timing of changes in the yield curve. In this paper, we exploit the timing information present in daily data by implementing a mixed sampling probit, a binary variable extension of the MIDAS model suggested by Ghysels, Santa Clara, and Valkanov (2004). We find that allowing for variation in the weighting of the daily financial data improves business cycle phase forecasting both in- and out-of-sample.

A Real Time Evaluation of the Central Bank of Chile GDP Growth Forecasts

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In this article we evaluate the Central Bank of Chile annual GDP growth forecasts during the period 1991-2009 using a real-time database. We compare the Central Bank of Chile forecasts with those of the Survey of Professional Forecasters (SPF), Consensus Forecasts, and simple time-series models. We compare all forecasts to first and quasi-final GDP growth vintages. We evaluate a number of different forecast properties, including forecast accuracy and efficiency. We report mixed results in terms of root mean squared prediction errors. Depending on the sample period, the forecast horizon and the vintage used in the analysis, forecasts from the Central Bank of Chile may outperform the benchmarks or may be outperformed by them. Despite these mixed results, differences in root mean squared prediction errors are in general moderate and with no statistical significance. Nevertheless, our efficiency analysis, in addition to the fact that in some periods the forecasts produced by the Central Bank of Chile have been outperformed by alternative forecasts, opens the question about the room for

improvement in the accuracy of the Central Bank of Chile forecasts. While the room for improvement may actually exist, our results suggest that this room seems to be small for point forecasts and larger for interval forecasts.

Forecasting Methods 9 [FM9]

Contributed Session:

Wednesday, June 23, 11:00am-12:30pm   Room:
Cunningham B

Chair: Michail Sverchkov
Bureau of Labor Statistics, USA

On bias and MSE of X-11 Seasonal Adjustment

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We define the seasonal and trend components under which the X-11 (X-12ARIMA, X-13) estimators of the trend and the seasonal components are almost unbiased in the central part of the series. The mean square error (MSE) of the X-11 estimators are then defined with respect to the estimation of these components over all possible realizations of the sampling errors and the irregular terms. We investigate the behavior of the X-11 estimators of the newly defined trend and seasonal components at the two ends of the series where they are biased, and propose bias correction procedures (parametric and non-parametric).

Model selection, estimation and forecasting in VAR models with short-run and long-run restrictions

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Joao Victor Issler
EPGE, Brazil
Farshid Vahid
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We study the joint determination of the lag length, the dimension of the cointegrating space and the rank of the matrix of short-run parameters of a vector autoregressive (VAR) model using model selection criteria. We consider model selection criteria which have data-dependent penalties for a lack of parsimony, as well as the traditional

ones. We suggest a new procedure which is a hybrid of traditional criteria and criteria with data-dependant penalties. In order to compute the fit of each model, we propose an iterative procedure to compute the maximum likelihood estimates of parameters of a VAR model with short-run and long-run restrictions. Our Monte Carlo simulations measure the improvements in forecasting accuracy that can arise from the joint determination of lag-length and rank, relative to the commonly used procedure of selecting the lag-length only and then testing for cointegration.

On Linear Pooling of Multiple Regression Prediction Models

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This paper discusses the problem of prediction by using a linear opinion pool. A linear opinion pool is a popular method of combining probability densities of the individual models to establish pooled probability. We combined the probability predictive values of three models (experts), multi-linear regression model, nonparametric regression model and a semi parametric model to find the pooled probability predictive value of a winning horse. It has been shown that the probability predictive value of the combined models is much closer to the actual value of the winner.

Estimating seasonal indices using grouping and shrinkage

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Forecasting short-term demand for various stock-keeping units (SKUs) is a substantial task faced by many organisations. Demand patterns for many of the SKUs exhibit seasonal variations. Miller and Williams (2003, 2004) applied James-Stein and Lemon-Krutchkoff shrinkage estimators on classical decomposition seasonal factors. Simulation and empirical findings showed improvement, but these shrinkage estimators were chosen without any theoretical justification. Our previous work showed theoretically and empirically how forecasting accuracy can be improved by estimating the seasonal indices from product families and/or different locations rather than using the standard individual approach. However, no previous studies have examined how forecasting accuracy can be further improved by bringing the grouping and shrinkage approaches together. This paper derives a shrinkage estimator from first principles. Theoretical results are then developed to show how to apply both grouping and shrinkage to minimise mean square forecasting errors. We will show results for both additive and multiplicative seasonalities.

Guidelines for Speakers, Chairs and Discussants at an International Symposium on Forecasting (ISF)

I. SPEAKERS

An ISF is organized for exchanging ideas. Its professional success is measurable by the amount of new ideas you get and how much you are able to attract peoples' attention to your own work. These guidelines are intended as support for those who are planning an oral presentation at an ISF and for session chairs.

Salespersons are masters in presenting even quite poor ideas in a way that excludes the possibility that a normally informed person would not get the message. More amateurish speakers, on the other hand, may make presentations that nobody understands. One doesn't need to participate in too many meetings before one encounters speakers with the following characteristics:

- the voice is too low
- the pronunciation is hard to follow
- the speaker speaks too fast
- the overhead (OH) text is unreadable, usually too small
- tables contain 40x30 entries of 7 digit numbers
- tables and graphs are poorly explained
- speaker has planned for a much longer talk and what he/she manages to say during the allotted time doesn't make sense when the talk has had to be stopped prematurely.

1. **Preparing the texts** An abstract of the presentation has to be submitted to the Program Chair at date given in the Call for Papers. At that time you should have at least a sketch of the paper to be presented. The paper can then be worked upon so that at least a provisional paper can be distributed to those who ask for it at the ISF.

2. **Rehearsal** Remember that many points sound differently when presented orally than when the reader can go back and forth over the printed words and symbols. Rehearse with some colleagues present, preferable persons who know nothing in advance about your presentation. Pay attention to time. Plan your talk so that you are able to choose in advance what you are going to say, so as to avoid an arbitrary cut at the session presentation.

3. **Visual aids** Your visuals are to convey the information in an understandable form to the audience. Remember that at a keynote session people with very different backgrounds may be present. Avoid complex mathematical texts and use Power Point type OHs. In specialized sessions, OHs can be more technical, but remember that most people will not be able to digest many complex derivations during a 20-30 minutes talk. Tables and graphs should be as simple as possible.

4. **At the ISF** Try to find your session chair and inform him/her about your arrival. Check the location of your room, so that you can arrive there in time, preferably 5-10 minutes in advance and be sure that the session chair knows you are there. Stay aware of the time for your presentation. The chair will stop your presentation at the end of the allotted time, regardless of whether or not you are finished.

Speak clearly and loud enough to be heard in the back of the room. Be aware of the fact that the ISFs are truly international; often more than half of the audience has another first language than English. If you yourself belong to this group, try to speak slowly and as clearly as possible.

Stay for the entire session, for the courtesy and benefit of your audience.

II. **CHAIRS**

1. **In advance** Check with the speakers in your session that they will come and ask them for their handouts.
2. **At the ISF** Be in the session room 5-10 minutes before the session starts. Check the condition of your meeting room, especially the projector and the microphone (if necessary). Check speakers' names and pronunciation, titles and affiliations.

3. **During a session** Start by stating the time rules of the session. Save five minutes after each talk for questions and comments. Keep introductions very brief. Insist that all speakers use microphones -when one is provided. Make sure the presenters do not block the screen. Hold each speaker to the allotted time as printed in the program. Remind speakers about remaining time. Prepare flash cards for five minutes and one minute remaining. Do not allow even one extra minute, because then you will deprive the next speakers of time that was promised to them and for which they have prepared their talks. If a presenter ends early, use the time for discussion. Do not start the next presentation early, because someone from another session may have planned to listen to selected talks in your session.

International Institute of Forecasters

The International Institute of Forecasters (IIF), a non-profit organization founded in 1981, is dedicated to developing and furthering the generation, distribution, and use of knowledge on forecasting through the following objectives:

- Develop and unify forecasting as a multidisciplinary field of research drawing on management, behavioral sciences, social sciences, engineering, and other fields.
- Contribute to the professional development of analysts, managers, and policy makers with responsibilities for making and using forecasts in business and government.
- Bridge the gap between theory and practice, with practice helping to set the research agenda and research providing useful results.
- Bring together decision makers, forecasters, and researchers from all nations to improve the quality and usefulness of forecasting.

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As the premier, international forecasting conference, the ISF provides the opportunity to interact with the world's leading forecasting researchers and practitioners. The ISF offers a variety of networking opportunities, through keynote speaker presentations, academic sessions, workshops, meals, and social programs. The IIF has held the International Symposium on Forecasting in cities around the world beginning with Quebec City in 1981 and most recently in Hong Kong in 2009. The ISF is usually held in the third or fourth week of June, if possible. Our general

policy is to alternate each year's location between North America and the rest of the world, to reflect the international member demographics of our organization.

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Annual membership to the International Institute of Forecasters offers the following benefits:

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- Listing as a consultant, job postings
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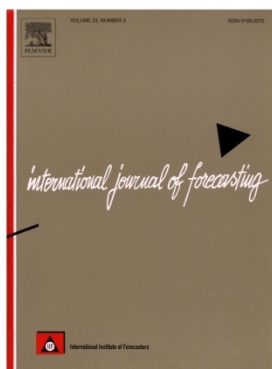
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Floor Plan

4th Level
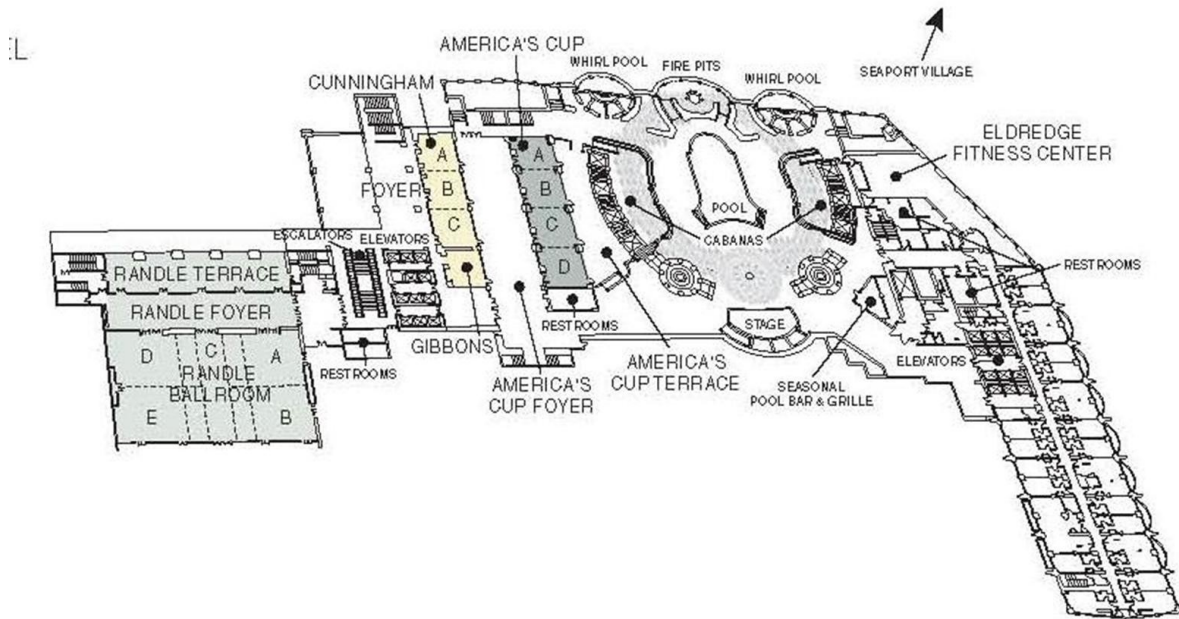
The Oxford meeting room is located on the THIRD LEVEL close to the stairs and elevators