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Academic Appointments

University of Oxford, Department of Economics & Nuffield College,
British Academy Postdoctoral Research Fellow 2015-now

University of Oxford, Department of Economics & Nuffield College,
Co-Principal Investigator & Co-Director of the Project "[Climate Econometrics](#)" 2015-now

University of California, Berkeley, Visiting Research Scholar Feb.-May 2017

References:

David F. Hendry Katarina Juselius
Univ. of Oxford, Dept. of Economics Univ. of Copenhagen, Department of Economics
david.hendry@nuffield.ox.ac.uk katarina.juselius@econ.ku.dk

Robert K. Kaufmann James H. Stock
Univ. of Boston, Dept. of Earth & Environment Harvard University, Department of Economics
kaufmann@bu.edu james_stock@harvard.edu

Graduate Studies

University of Oxford, Nuffield College, DPhil (PhD) in Economics 2012-2015

Supervisor: David F. Hendry; PhD on econometric time series modelling

University of Oxford, Nuffield College, MPhil in Economics 2010-2012

Undergraduate Studies

MA in Economics, University of Edinburgh, first-class honours. 2005-2009

Exchange Year at University of British Columbia (UBC) 2007-2008

Research and Teaching Fields

Econometrics, Environmental Economics, Natural Resource Economics

Teaching Experience

Lecturer, MPhil Advanced Econometrics (Graduate), University of Oxford 2016-now

Lecturer, Econometrics (Undergraduate), University of Oxford 2015-now

Graduate Teaching Assistant, MPhil Econometrics (Graduate), Univ. of Oxford 2012-2015

Visiting Asst. Professor, Econometrics (UG) Akita Intl. Univ. (Japan) Spring 2014 & 2016

Visiting Lecturer, Model Selection & Forecasting, Nat. Auton. Univ. of Mexico Jul 2015

Visiting Lecturer, Model Selection & Forecasting, University of Havana, Cuba Apr. 2013

Econometric Summer Schools, George Wash. Univ., & Aix Marseille-Univ. 2015 & 2016

Undergraduate Teaching Assistant, Econometrics, University of Edinburgh 2008-2009

Supervision Experience:

Moritz Schwarz "Estimating Economic Impacts of Climate", (*awarded thesis prize*), Univ. Oxford 2017

Professional Activities

Editorial: Guest editor, *Journal of Econometrics*

Conference Organisation: Co-organiser of Climate Econometrics Conference Series (1st in Aarhus CREATES, 2016; 2nd at Univ. of Oxford, 2017; 3rd University of Rome Tor Vergata, 2018)

Network Organisation: Creator and administrator of the [Climate Econometrics Research Network](#) including more than 100 researchers.

Refereeing: Nature, International Journal of Forecasting, Nature Energy, Energy Journal, Journal of Asian Economics, North American Journal of Economics and Finance, Climatic Change, Climatic Change Letters, Environmetrics, Intl. Journal of Disaster Risk Reduction.

Research Grants

British Academy Fellowship (Principal Investigator, ~\$420,000)	2015-2018
Robertson Foundation “ Climate Econometrics ” (Co-Principal Investigator, ~\$900,000)	2015-2018

Awards & Scholarships

INET at the Oxford Martin School Doctoral Studentship, University of Oxford	2012-2015
Nuffield College funded MPhil and DPhil Studentship, University of Oxford	2010-2015
Mary Theresa Rankin Prize in Economics (1 st out of 90), (U. of Edinburgh)	2005-2009
Merchant Company Prize for best UG Dissertation (1 st out of 90), (U. of Edinburgh)	2005-2009
Lanfine Bursary in Economics (1 st out of 180), (U. of Edinburgh)	2006-2007

Selected Research Papers in Progress

“Econometric Modelling of Climate Systems: The Equivalence of Energy Balance Models and Cointegrated Vector Autoregressions”

(Job Market Paper, Revise and Resubmit at the *Journal of Econometrics*)

Estimates of both the human impact on climate as well as the economic impacts of climate change are crucial to inform policy decisions. Econometric modelling allows us to quantify these impacts and their uncertainties, but models have to be consistent with the underlying physics and the time series properties of the data. Here, I show that energy-balance models of climate are equivalent to an econometric cointegrated system and can be estimated in discrete time. This equivalence provides a basis for the use of cointegration methods to estimate climate responses and test their feedback. Further, it is possible to use the estimated parameters to quantify uncertainties in integrated assessment models of the economic impacts of climate change. In an application I estimate a system of temperatures, ocean heat content, and radiative forcing including greenhouse gases and find statistical support for the cointegrated energy balance model. Accounting for structural breaks from volcanic eruptions highlights large parameter uncertainties and shows that previous empirical estimates of the temperature response to increased CO₂ concentrations may be misleadingly low due to model-misspecification.

“Testing the Presence of Outliers to Assess Misspecification in Regression Models” (with Xiyu Jiao)

The presence of outlying observations in a regression model can be indicative of model misspecification, consequently it is important to check for outlier contamination. However, algorithms used to detect outliers have a positive probability to find outliers even when, in fact, the data generation process has no outliers. Deriving distributional results on the expected retention rate of falsely discovered outliers, we propose two set of tests for the overall presence of outliers: first, tests on whether the observed proportion and number of detected outliers deviate from their expected values. Second, ‘scaling’ tests on whether the number of detected outliers decreases proportionally with the level of significance used to detect outliers. We derive the asymptotic distribution of the tests based on iterated 1-step Huber-skip M-estimators. The tests are valid for stationary as well as (stochastically) trending regressors and have power against the number as well as magnitude of outliers. In applications of the tests we consider a cross-sectional macroeconomic model of economic growth, and re-visit a set of previous studies using indicator saturation. The tests can readily be implemented in PcGive or the R-package ‘gets’.

“Local Emissions Affect Local Climate: Attribution, Impacts, and Policy”
(with Robert K. Kaufmann and Sucharita Gopal, Boston Univ.)

To date, most empirical economic studies of the impacts of climate change assume that temperatures are strictly exogenous to (unaffected by) local economic activity, as the climate effects of emissions of most radiatively-active gases (e.g. CO₂) are well mixed in the atmosphere. Here we test the hypothesis that local forcings from local emissions measurably affect local temperatures beyond global forcings by estimating a spatially explicit econometric energy balance model from a panel which includes observations for global radiative forcing, surface temperature, and proxies for local forcing from 1970 to 2008 for 5° spatial grid cells. Results indicate that the proxies for local forcing have explanatory power about local temperatures that extends beyond global radiative forcing. SO₂ emissions lower local temperatures, whereas local CO₂ emissions lead to a transitory local warming. This implies that temperatures are not strictly exogenous to local economic activity, and omitting this spatial component may cause econometric models to bias the estimated economic impacts of climate change. The results also suggest that climate policy can generate local effects, which changes the attractiveness of policy by moving costs and benefits from the ‘global commons’ partly to those who reduce emissions.

“Uncertain Impacts on Economic Growth When Stabilizing Global Temperatures at 1.5°C or 2°C”
(Accepted for publication in the *Philosophical Transactions of the Royal Society A*, with Moritz Schwarz, Kevin Tang, Karsten Haustein, and Myles R. Allen)

Little is known about the relative impacts of climate change onto economic outcomes when global mean surface temperature is stabilized at 1.5°C or at 2°C warming relative to pre-industrial levels as proposed in the Paris Agreement. Here we use a new set of climate simulations under 1.5°C and 2°C to assess changes in economic growth using empirical estimates of climate impacts in a global panel dataset. Estimation results that are robust to outliers and breaks suggest that within-year variability of monthly temperatures and precipitation has little effect on economic growth beyond global non-linear temperature effects. Accounting for estimation and climate uncertainty, the projected impacts onto economic growth of 1.5°C warming are close to indistinguishable from current climate conditions, while 2°C warming suggests significantly lower growth for a large set of countries. Lower income regions are projected to experience greater losses, which may increase economic inequality between countries.

Journal Publications

1. “Uncertain Impacts on Economic Growth When Stabilizing Global Temperatures at 1.5°C or 2°C” with M. Schwarz, K. Tang, K. Haustein, & M. R. Allen (2017) *Philosophical Transactions of the Royal Society A*. Accepted, in press.
2. “General-to-Specific Modelling and Indicator Saturation”, with G. Sucarrat & J. Reade (2017) *Journal of Statistical Software*. Accepted, in press.
3. “The Spatial Heterogeneity of Climate Change as an Experiential Basis for Skepticism” with R. K. Kaufmann, M. L. Mann, S. Gopal, J. A. Liederman, P.D. Howe, X. Tang, & M. Gillmore (2017) *Proceedings of the National Academy of Sciences (PNAS)*, vol.114(1).
4. “CO₂ Emission-Intensity in Climate Projections: Comparing the Observational Record to Socio-Economic Scenarios”, with M. Roser. (2017) *Energy*, vol.135.
5. “A new archive of large volcanic events over the past millennium from reconstructed summer temperatures”, with L. Schneider, J. Smerdon, C. Hartl-Meier, and J. Esper (2017) *Environmental Research Letters*, vol. 12.
6. “Detecting Volcanic Eruptions in Temperature Reconstructions by Designed Break-Indicator Saturation”, with L. Schneider, J. Smerdon, & D.F. Hendry (2016) *J. of Econ. Surveys*, vol.30(3).
7. “Detecting Location Shifts during Model Selection by Step-Indicator Saturation”, with D.F. Hendry, J.A. Doornik, & J.L. Castle, (2015) *Econometrics*, vol.3(2).
8. “Testing Competing Models of the Temperature Hiatus: Assessing the effects of conditioning variables and temporal uncertainties through sample-wide break detection”, with R. K. Kaufmann, & M. L. Mann (2015) *Climatic Change*, vol.131(4).
9. “Climate Science: Breaks in Trends”, with M.R. Allen (2013) *Nature Geoscience*, vol.6.
10. “Some Hazards in Econometric Modelling of Climate Change”, with D. F. Hendry. (2013) *Earth System Dynamics*, vol.4.

Publications in Edited Volumes

1. “All Change: The Implications of Non-stationarity for Empirical Modelling, Forecasting and Policy”, with David F. Hendry, (2016) *Oxford Martin School Policy Paper* (peer-reviewed)
2. “Anthropogenic Influences on Atmospheric CO₂” with D. F. Hendry, (2013) in *Handbook on Energy and Climate Change*, R. Fouquet ed. Cheltenham: Edward Elgar.

Work in Progress

1. “Peak Everything: Are we running out of resources?” with C. Hepburn, A. Teytelboym, & A. Pfeiffer.
2. “Exogeneity in Climate Econometrics”, [Oxford Economics Working Paper](#)
3. “Assessing poolability, stability over time, and the presence of outliers in fixed-effects panel regressions using indicator saturation”, with J. Reade & G. Sucarrat
4. “Analyzing Differences between Scenarios” with D. F. Hendry
5. “Quantifying the Uncertainty around Break Dates in Indicator Saturation”, w. D. F. Hendry
6. “Managing the Next Glacial Cycles via Carbon Concentrations”, with R. K. Kaufmann
7. “Heterogeneity in the diffusion of innovations and its costs to the healthcare system measured through prescribing behaviour”, with B. Goldacre, & A. Powell-Smith
8. “Resource Management and Extraction Damages: Evidence from Bycatch in Fisheries”

Selected Media Coverage on Research

[Scientific American](#), [Forbes](#), [Forskning.no](#) (Norwegian Popular Science), [ORF](#) (Interview with Austrian National Broadcasting), [BBC](#), [National Geographic](#), [Science News](#), [Der Spiegel](#) (German Magazine), [Deutschlandfunk](#) (Interview with German National Radio)

Invited Seminars

BI Norwegian Business School (upcoming, 2017); University of California, Berkeley (2017); Stanford University (2017); Aix-Marseille University (2016); Yale University (2015); Statistics Norway (2015); Norwegian Univ. of Science and Technology (2015); Univ. of Copenhagen (2014); Univ. of Aarhus, CREATES (2014); Univ. of Havana (2013); Imperial College London, Epidemiology and Biostatistics (2013).

Conference Presentations

Econometric Models of Climate Change, Oxford Univ.; Econometric Models of Climate Change, Aarhus Univ.; 13th Intl. Meeting on Stat. Climatology; 16th OxMetrics Conference, George Washington Univ.; Computational and Financial Econometrics (CFE); Oxford EMoD Econometrics Conference; SAMSI/IMAGE International Surface Temp. Initiative, NCAR, Boulder; Bridging Worlds in Big Data, ESSEC, Paris (keynote speaker); 14th OxMetrics Conf., George Washington Univ.; 12th International Meeting on Stat. Climatology, Jeju; Econometric Applications in Climatology, Univ. of Guelph; 11th OxMetrics Conference, George Washington Univ.

Research Experience and Other Employment

World Bank Consultant: Review of economic impacts of climate on water resources	Jan. 2017
Oxford Centre for Evidence Based Medicine: Time-series analysis of healthcare data	Spring 2016
Environmental Defense Fund: Project management for Climate Econometrics	2015-now
Research Assistance for David F. Hendry (University of Oxford)	2011-2012
Research Assistance for Maia Guell and Olga Gorbachev (Univ. of Edinburgh)	2009-2010

Technical and Language Skills

Software: Co-developer of R-package [gets](#) (downloaded more than 27,000 times since release in 2015), Matlab, Ox, Gauss, Stata, Python (basic), MS Office, Latex
Languages: English, German (native), Spanish, French
Other: SCUBA diving guide (Divemaster), published nature photographer (incl. BBC Wildlife)