

Government
Statistical Service

Twentieth
Methodology
Symposium

Westminster Conference Centre
London
1 July 2015

09.00	Registration			
10.00 – 11.00	MORNING KEYNOTE SESSION, <i>Syndicate Room 1</i> Chair: Glen Watson, Deputy National Statistician for Population and Public Policy Claire Miller, Trinity Mirror Anna Vignoles, University of Cambridge: “Social mobility, regression to the mean and the cognitive development of high ability children from disadvantaged homes”			
11.00	Refreshments & Exhibits <i>Room: Outside Syndicate Room 1</i>			
11.20 – 13.00	Session 1, <i>Syndicate Room 1:</i> Software-aided Innovation Chair: David Best, ONS	Session 2, <i>Syndicate Room 2:</i> Harmonisation and Quality Chair: Ria Sanderson, ONS	Session 3, <i>Syndicate Room 3:</i> Administrative and Big Data Chair: Pete Brodie, ONS	Session 4, <i>Syndicate Room 4:</i> Sampling and Data Collection Chair: Simon Compton, CMA
11.20	The importance of developing your data scientists Nigel Armstead, The SAS Institute & Daniel Hulme, University College London	A Basis for Better Decision Making: Improvements to Quality Reviews and Reporting Catherine Bremner & Sarah Tucker, Office for National Statistics	An address register for all: Bridging the gap between a vision and reality Neil Hopper, Office for National Statistics	Changes to the collection of short walk data in the National Travel Survey Glenn Goodman, Department for Transport
11.50	<i>Five minute break</i>			
11.55	A comparison of automatic model selection procedures for seasonal adjustment Cathy Jones, Office for National Statistics	The statistical implications of proposed devolution of further powers – the “Balkanisation” of the UK statistics system? James Gillan, Northern Ireland Statistics and Research Agency	*Using weather data in official statistics Jennifer Davies & Duncan Elliott, ONS Peter Helm, Department for Environment Food & Rural Affairs & Mark McCarthy, Met Office	Investigating the Potential of Using Non-Probability Samples Debbie Cooper, Office for National Statistics
12.25	<i>Five minute break</i>			
12.30	*An R vs SAS Experiment Megan Pope & Gareth Clews, Office for National Statistics	Harmonisation is good news! Or is it? Rachel Leeser, Greater London Authority & Emma Emery, RSS	Assessing the feasibility of using web scraping for consumer price statistics Robert Breton, Office for National Statistics	Analysis of the characteristics of internet respondents to the 2011 Census to inform 2021 Census questionnaire design Orlaith Fraser & Cal Ghee, ONS
*These projects have been financially supported by the GSS Quality Improvement Fund (QIF).				

13.00	Lunch & Exhibits				Room: Outside Syndicate Room 1
13.45 – 14.35	AFTERNOON KEYNOTE SESSION, Syndicate Room 1 Chair: Tricia Dodd, Chief Methodology Officer, Office for National Statistics Heather Savory, Deputy National Statistician for Data Capability “Open Data, Open Methodology” Rodrigo Moreno-Serra, University of Sheffield: “Causality, instruments and global health policy”				
14.35 – 16.15	Session 5, Syndicate Room 1: Decision Making & Policy Evaluation Chair: Sumit Rahman, BIS	Session 6, Syndicate Room 2: Controlling for Unobserved Variation Chair: Frances Pottier, BIS	Session 7, Syndicate Room 3: Innovations in Analysis Chair: Bethan Evans, VOA	Session 8, Syndicate Room 4: Getting More from Data Chair: Tom Orford, HMT	
14.35	Using propensity score matching to understand what works in reducing re-offending Sarah French & Aidan Mews, Ministry of Justice	The impact of training on productivity – econometric analysis using the ONS VML Matthew Bursnall, Dept. for Business, Innovation & Skills	Prediction of Cracking in the Graphite Core of Advanced Gas Cooled Nuclear Reactors Nick Warren <i>et al.</i> , Health and Safety Laboratory	New Methods of Disseminating Statistics Hiren Bhimjiyani, Department for Business, Innovation & Skills	
15.05	<i>Five minute break</i>				
15.10	Bridging the gap: measuring changes in educational inequality Kylie Hill, Department for Education	An ecological analysis of crime and antisocial behaviour in English Output Areas, 2011/12 – Regression modelling of spatial count data Chuka Ilochi, BIS	Better Census statistics for Civil Parishes – When “best-fitting” just isn’t good enough Bruce Mitchell, Office for National Statistics	Reviewing the ONS’ Perpetual Inventory Method and Capital Stocks Estimation Chris Stapenhurst, Office for National Statistics	
15.40	<i>Five minute break</i>				
15.45	*Improving coverage of Crime Statistics Joseph Traynor, Office for National Statistics	Dealing with location in the valuation of office rents in London by using advanced regression techniques to account for spatial autocorrelation – a multilevel and semi-parametric approach Aniel Anand, BIS	A comparison of established and newly developed benchmarking methods Jennifer Davies & Duncan Elliott, Office for National Statistics Homesh Sayal & John Aston, University of Cambridge	Creating Open Data whilst maintaining confidentiality - Guidelines and example Philip Lowthian & Caroline Tudor, Office for National Statistics	
16.15	Refreshments & Exhibits				Room: Outside Syndicate Room 1
16.30	CLOSING SESSION, Syndicate Room 1 Chair: Tricia Dodd, Chief Methodology Officer, Office for National Statistics “ESS Peer Review of the UK Statistical System” Emma Wright & Laura Clarke, Office for National Statistics				
17.00	Close				

*These projects have been financially supported by the GSS Quality Improvement Fund (QIF).

20th GSS Methodology Symposium: Keynote Speakers

Claire Miller

Senior Data Journalist, Trinity Mirror



Anna Vignoles

Professor of Education, University of Cambridge

Professor Anna Vignoles is Professor of Education at the University of Cambridge. She has published widely on widening participation in higher education, social mobility, the impact of school resources on pupil achievement and on the socio-economic gap in pupil achievement. Her research interests include issues pertaining to equity in education, school choice, school efficiency and finance and the economic value of schooling. Anna is a Research Fellow at the Institute for Fiscal Studies and a Visiting Professor at the Institute of Education.



Heather Savory

Deputy National Statistician for Data Capability

Heather Savory became Deputy National Statistician for Data Capability in April 2015. Heather has a strong commercial track-record and extensive board and senior management experience in entrepreneurial and high technology businesses, consulting and central government.

Heather served as Chair of the Open Data User Group (ODUG), an independent advisory group to the Government's Public Sector Transparency Board, for three years from May 2012; she also served as an independent member of the Royal Institute of Chartered Surveyors (RICS) Regulatory Board for four years.

Heather has previously worked at 3Dlabs as Vice President of Engineering and Operations and eComData as Managing Director. Her Government experience includes two years in HM Treasury (HMT) and three in the Department of Business, Innovation and Skills working for the Better Regulation Executive (BRE).

Heather graduated from Loughborough University of Technology with a 1st class B.Sc. (Hons) in Electronic and Electrical Engineering and a diploma in Industrial Studies and studied for her MBA at London Business School.



Rodrigo Moreno-Serra

Lecturer in Economics, University of Sheffield

Rodrigo Moreno-Serra is a lecturer in Economics at the University of Sheffield (Department of Economics). Rodrigo was born in Chile and raised in Brazil, where he obtained a BSc and MSc in Economics, both from the University of São Paulo. He then worked as a lecturer in Brazil before moving to the United Kingdom, where he received a PhD in Economics from the University of York. Before joining the University of Sheffield last October, he was a MRC Postdoctoral Research Fellow at Imperial College London (Centre for Health Policy). Previous professional appointments include spells at the World Bank and the University of São Paulo, Brazil. He has also served as a consultant for international organisations such as the World Health Organization, OECD, the Global Fund to

Fight AIDS, Tuberculosis and Malaria, the Rockefeller Foundation and Save the Children UK. From his research work on health and development economics, Rodrigo has published peer-reviewed papers in leading economic and medical journals, as well as various book chapters and reports. His main research interests lie in the area of international comparisons of health systems performance, in particular health system financing and financial risk protection, and the impact evaluation of health policies and programmes.

Keynote Session 1

Syndicate Room 1 – 10.00 – 11.00

Claire Miller, Trinity Mirror

Social mobility, regression to the mean and the cognitive development of high ability children from disadvantaged homes

Anna Vignoles, University of Cambridge

A gap in cognitive skill between richer and poorer children is evident from a very early age. Some studies have also suggested that highly able children from disadvantaged homes are overtaken by their rich but less able peers before the age of 10 years, in terms of their cognitive skill. We show that this finding is vulnerable to a spurious statistical artefact known as regression to the mean and we propose the application of an alternative methodology to address this problem. We also present some new empirical evidence for England to inform the debate on how we might improve social mobility through education.

Keynote Session 2

Syndicate Room 1 – 13.45 – 14.35

Open Data, Open Methodology

Heather Savory, Deputy National Statistician

Causality, instruments and global health policy

Rodrigo Moreno-Serra, University of Sheffield

Progress towards universal health coverage involves providing people with access to needed health services without entailing financial hardship, and is often advocated on the grounds that it improves population health. I will present the results of our recently published study that offers econometric evidence on the effects of health coverage on mortality outcomes at the national level. We use a large panel dataset of countries, examined using instrumental variable specifications that explicitly allow for potential reverse causality and unobserved country-specific characteristics. The econometric methodology applied in our study is generally applicable in the case of policy interventions in which reverse causality or simultaneity are key potential sources of endogeneity. We employ various proxies for the coverage level in a health system. Our results indicate that expanded health coverage, particularly through higher levels of publicly funded health spending, results in lower child and adult mortality, with the beneficial effect on child mortality being larger in poorer countries.

Parallel Session 1: Software-aided Innovation

Syndicate Room 1 – 11.20 – 13.00

Session 1.1 – The importance of developing your data scientists

Nigel Armstead, The SAS Institute & Daniel Hulme, University College London

Syndicate Room 1: 11.20 – 11.50

Keywords: Productivity. Staff Development. Staff Retention.

This paper presents a methodical and repeatable approach to the development and retention of analytical skills and capability within an organisation.

The paper addresses the challenges faced by organisations in retaining, attracting and developing their teams. It highlights the benefits and the areas of improvement, to date, that have been experienced by other users of SAS software working the SAS User Adoption team.

We discuss an innovative solution for the provision of SAS® Software skills combined with business and interpersonal skills. Taking a structured approach to developing their staff, SAS customers have developed proven mechanisms for introducing efficiencies and improving the quality of how their day-to-day work. Benefits accrued include analytical team members being more engaged with their organisation and job role and establishing a culture of continuous improvement.

Session 1.2 – A comparison of automatic model selection procedures for seasonal adjustment

Cathy Jones, Office for National Statistics

Syndicate Room 1: 11.55 – 12.25

X-13ARIMA-SEATS is the recommended seasonal adjustment software for the Government Statistical Service (GSS). The software uses a technique called RegARIMA modelling which incorporates both ARIMA modelling and regression. This approach models the time series and cleans it by estimating and removing modelled effects before seasonal adjustment takes place and allows forecasting to be carried out.

Within the X-13ARIMA-SEATS software there are two methods available to the user that will allow an ARIMA model to be automatically selected for any given time series. The first of these methods is chooses the best model from a list of five specified ARIMA models that were chosen based on research by Statistics Canada, and the second method is based on the automatic model procedure from TRAMO (Time series Regression with ARIMA noise, Missing values and Outliers) which proceeds by successively improving upon the first simple model with tests to check for over differencing incorporated within the process.

This paper compares the results of both methods used on a number of series published by the Office for National Statistics; it assesses the forecast performance and the impact on the stability of the seasonally adjusted estimates for each method.

Session 1.3 – An R vs SAS Experiment

Megan Pope & Gareth Clews, Office for National Statistics

Syndicate Room 1: 12.30 – 13.00

ONS currently uses the SAS based Generalised Estimation Software (GES) to process its business and household surveys. The software is used to calibrate data to population totals and estimate survey parameters. ReGenesees is an R package developed by Istat (the Italian statistics office) to be an alternative to GES. As part of an ongoing drive to investigate new innovative technologies within an ever more challenging resource environment, ONS is running a project to compare these two software solutions. This project is a collaboration between two teams in methodology, and will use social and business surveys to evaluate the impact of migrating between software.

The presentation explains how the R Development Group in ONS is supporting the use of R within ONS, with the aim of increasing the user base and to eventually have the language used more widely across the GSS. We describe the work we have done to compare the software on several surveys, testing whether we are able to replicate the processes currently run in SAS in R. We will also consider how the software can be adapted for different designs, how they deal with processing large datasets and the subsequent run times, whether they deal with missing values and outliers, general ease of use, as well as the consistency of estimates produced.

This presentation will provide a history of R within the ONS, motivation for adoption of R and a recommendation on which software is most appropriate for the production of official statistics within the UK Government Statistical Service.

Parallel Session 2: Harmonisation and Quality

Room: Syndicate Room 2 – 11.20 – 13.00

Session 2.1 – A Basis for Better Decision Making: Improvements to Quality Reviews and Reporting

Catherine Bremner & Sarah Tucker, Office for National Statistics

Syndicate Room 2: 11.20 – 11.50

ONS publish Quality and Methodology Information (QMI) reports for every Statistical Bulletin which are designed to give users of statistics enough information to decide what the data is suitable to be used for. They also allow us to meet our obligations under the Code of Practice (Principle 4 Sound Methods and Assured Quality) and to report on the European Statistical System 5 Dimensions of Quality.

In light of recent User Persona work undertaken by ONS examining the characteristics of users and the need to update the report to be compatible with the forthcoming new ONS website, now is a good time to review current reports and investigate the possibility of making QMIs accessible to as many users of data as possible. We will also consider how these improvements could work for the GSS in the future.

This paper will briefly discuss why ONS reports on quality and how this is currently done. It will discuss some of the issues and constraints with our current system, where we would like to be and ideas for how we can achieve this. Finally, we will report on the first steps that we are taking towards the goal of making QMI accessible to a wide range of ONS users.

There is a requirement under the Code of Practice for Official Statistics to ensure official statistics are produced to a level of quality that meets users' needs and to seek to achieve continuous improvement in statistical processes by undertaking regular reviews.

In January 2015 the Quality Centre rolled out a new process for assessing the quality of an output within the Office for National Statistics (ONS). This new process is called a 'Regular Quality Review (RQR)' and replaces the use of a self assessment tool to carry out quality reviews. The decision to develop a new process was made based on feedback from statistical output managers during a user engagement exercise.

The RQR process reduces the burden on the data producer/output manager, as instead of completing a large self assessment tool they discuss their output in the context of the five quality dimensions and the Generic Statistical Business Process Model with a methodologist. The process also results in recommendations tailored to improving the quality of the statistical output.

To date 10 RQRs have been successfully completed. Customers feel the new process is proportionate and the recommendations useful. Currently RQRs have only been implemented within the ONS, however this is a process that the GSS could adopt.

Session 2.2 – The statistical implications of proposed devolution of further powers – the “Balkanisation” of the UK statistics system?

James Gillan, Northern Ireland Statistics and Research Agency

Syndicate Room 2: 11.55 – 12.25

Keywords: Harmonisation, Devolved administrations, Comparability Scale.

The proposed devolution of further powers to Scotland, Wales and Northern Ireland will bring with it increased demands from their legislatures for tailored official statistics to inform local decision making. Such statistical diversification is not particularly new given that each of the four constituent countries of the UK have been measuring deprivation using their own distinct index for many years, the better to reflect local conditions. However it is the potential scale and variety of the forthcoming devolution settlements that offer some particular challenges for official statistics.

The paper looks at the issue of maintaining comparability, coherence and quality between statistics published by the 4 nations of the UK in the context of greater devolution occurring at different speeds across different policy areas. It asks whether the work done in preparing a cross UK “Comparability” scale in the run up to the recent Scottish referendum to help inform the policy debate could have wider applicability. Consideration is also given to the implications of forthcoming legislation in response to the Smith Commission, the St. David’s Day Announcement and the Stormont House Agreement. Subject areas affected include welfare benefits, income tax, VAT and Corporation Tax, in terms of both their uptake and impact.

Some principles outlined by a recent GSS / Devolved Administrations group on Devolution are also discussed. ONS’s need for official statistics that are internationally and domestically comparable are not necessarily seen as being in conflict with the Devolved Administrations’ need for local relevance. Greater reliance on the Code of Practice, the Quality Management Harmonisation Tool, better collaborative working arrangements and enlightened self interest are proposed as the way forward.

Session 2.3 – Harmonisation is good news! Or is it?

Rachel Leeser, Greater London Authority & Emma Emery, Royal Statistical Society

Syndicate Room 2: 12.30 – 13.00

Keywords: Harmonisation, Income, Earnings, Deprivation, Understanding user experiences.

Harmonisation has made many aspects of survey and administrative data analysis easier for researchers – using the same geographic areas and identifiers, the same categories for topics such as ethnicity across many data sources, and asking the same questions such as about health on different surveys. The programme’s vision is to achieve this harmonisation across all topics. However, in doing this, it is important to understand how statistics are used and the impact of changes to data collections and statistical production on the range of uses of statistics.

This presentation provides some examples of user harmonisation experiences and GSS harmonisation work, with a particular focus on the more complex topics of earnings, income, poverty and deprivation. It considers whether greater harmonisation is needed on these topics or whether in fact it would erode the utility of the data that are produced.

Parallel Session 3: Administrative and Big Data

Room: Syndicate Room 3 – 11.20 – 13.00

Session 3.1 – An address register for all: Bridging the gap between a vision and reality

Neil Hopper, Office for National Statistics

Syndicate Room 3: 11.20 – 11.50

Our vision is a universal address register containing all businesses, communal establishments and residences in a single unified source that is the reference library by which all address information is captured and recorded in England and Wales. With appropriate classification and indexing, this universal address register could form the basis of a frame for the residential population and of businesses. Universal use would eliminate the complexity of address linkage thereby opening the door to use address intelligence before, after and maybe even instead of data collection to produce government statistics.

The National Land and Property Gazetteer should include everything man-made and non-moving. The National Address Gazetteer is a subset of this that addresses buildings. A Unique Property Reference Number (UPRN) is assigned to every service delivery point and defines a record. Thus, all distinct living spaces and, therefore, households should have a UPRN which is ideal for a frame for the population. Data from the National Address Gazetteer is provided by GeoPlace and made is publically available through Ordnance Survey as a six weekly freeze in the form of AddressBase.

Currently, AddressBase is not universally used as an address reference library at source. Consequently, a high quality address matching solution is required to achieve our goal of producing an address frame for social and business surveys and the 2021 Census; Assessment, and improvement, of AddressBase along with the creation of an enhanced address register that links resident attribute data to an address/household frame all depends on address linkage. The presentation aims to provide an account of our vision for a universal address register with a view of how it might be achieved and will incorporate an overview of AddressBase and our progress towards a high quality address matching solution.

Session 3.2 – Using weather data in official statistics

Jennifer Davies & Duncan Elliott, Office for National Statistics,

Peter Helm, Department for Environment Food & Rural Affairs & Mark McCarthy, Met Office

Syndicate Room 3: 11.55 – 12.25

Weather and climate potentially affect many official statistics series. Users and producers of official statistics are often interested in the impact of weather when interpreting movements in time series. A consortium of GSS departments was established, including Defra, ONS, Met Office, DfT, and with Quality Improvement Fund backing, looked at understanding what weather and climate data is available and how it can be used to analyse time series. The project focussed on three case studies; retail sales, road accidents and ambulance response times. GSS guidance was produced to support commentary and improve knowledge of available weather and climate data and methods for time series analysis. The project ran successfully and more detail of how the work has been of benefit will be shared at this presentation.

Session 3.3 – Assessing the feasibility of using web scraping for consumer price statistics

Robert Breton, Office for National Statistics

Syndicate Room 3: 12.30 – 13.00

This pilot project uses web scraping techniques to collect prices for a sample of grocery prices. The project explores the feasibility of using web scraping for consumer price statistics. The rationale for the project is that: web scraping could lead to cost savings and the ability to produce higher frequency, timely and more detailed statistics.

This paper/presentation will cover the progress made on this pilot, which went live in January 2014. It will present exploratory indices and statistics, in comparison to the conventional Consumer Price Index. It will also cover the technologies used in this project, the challenges faced and how these were overcome.

The solutions and ideas come from the world of Data Science and Big Data, such as machine learning. All technologies used are open source, from the operating system to the programming language. The techniques and tools go beyond this project, and will be of interest to other government organisations and other institutions.

The Consumer Price Index (CPI) and the Retail Price Index (RPI) are key economic indicators produced by ONS. Web scraping could provide an opportunity for ONS to collect prices for some goods and services automatically rather than physically visiting stores. This is potentially a much cheaper way of collecting prices than in-store collection.

Supermarket grocery prices have been identified as the initial area for investigation. A sample of 35 CPI defined grocery and drink items have been chosen from three supermarket websites. This amounts to around 6500 prices collected daily. These data volumes do not constitute true 'big data'. However, it is unstructured, noisy and varies considerably across websites. This provides certain big data and data science challenges to the project.

Parallel Session 4: Sampling and Data Collection

Syndicate Room 4 – 11.20 – 13.00

Session 4.1 – Changes to the collection of short walk data in the National Travel Survey

Glenn Goodman, Department for Transport

Syndicate Room 4: 11.20 – 11.50

Keywords: Methodological change, household surveys, travel.

The National Travel Survey (NTS) is a long-running household survey of 16,000 individuals which provides one of few key sources of evidence to inform policy on walking.

Walking data is collected via a seven-day travel diary where respondents record details of all trips they make during the week. However, walks under one mile, which we define as 'short walks', are recorded on day 7 only to reduce the burden on the respondent. It has been suggested that short walks are under-recorded in the survey.

In 2013, an experiment was carried out to test whether there is a difference in recording short walks on day 1 of the diary instead of day 7, and a public consultation run to gather user views. The results of the experiment suggested a significant difference between the two days, meaning there is a need to consider changing the design of the NTS in regard to the collection of short walks data.

This paper will discuss the findings of the experiment and consultation, ongoing work with ONS methodology advice service to develop a strategy for weighting past results (to ensure a consistent time series should a change be made) and how we plan to use the results to improve the quality of the data on walking.

Session 4.2 – Investigating the Potential of Using Non-Probability Samples

Debbie Cooper, Office for National Statistics

Syndicate Room 4: 11.55 – 12.25

Keywords: Non-probability sampling, data collection, survey methods.

In recent years there has been increasing concern regarding nonresponse and coverage in surveys using probability sampling. This, along with the high costs associated with probability sampling and the accessibility of online data collection, have led a few survey methodology researchers to investigate the potential of using non-probability samples.

The main challenge associated with non-probability samples is the lack of selection probabilities. This makes unbiased estimation difficult or impossible. It also causes issues in assessing the quality of estimates. Although non-probability survey methods research is still in its infancy, a number of techniques have been developed to attempt to overcome the challenges associated with these methods. These include the use of sample matching, poststratification adjustments and alternative quality measures such as participation rates and credibility intervals.

The aim of this project was to conduct a review of research on non-probability sampling in order to provide timely guidelines to Government statisticians and researchers regarding the use of non-probability sampling. This paper will provide a concise review of types of non-probability samples, highlight the key challenges, describe a few methods which attempt to overcome these challenges and provide guidance to inform decision-making with regards to the use of non-probability sampling.

Session 4.3 – Analysis of the characteristics of internet respondents to the 2011 Census to inform 2021 Census questionnaire design

Orlaith Fraser & Cal Ghee, Office for National Statistics

Syndicate Room 4: 12.30 – 13.00

Keywords: Census, quality, internet.

The 2021 Census aims to be predominantly online. Around 16% of households filled their 2011 Census questionnaires online. The Census Quality Survey was conducted shortly after the 2011 Census and asked a sample of respondents each census question again. The responses were compared and the Census Quality Survey report published in 2014. Further analysis has been done looking at the difference in agreement rates between paper and internet responses to examine for mode effects such as the use of soft reminders online. Robust conclusions could not be drawn on these comparisons, however, until the results were controlled for the different characteristics of internet respondents. This analysis has now been done and will be presented here.

Parallel Session 5: Decision Making and Policy Evaluation

Room: Syndicate Room 1 – 14.35 – 16.15

Session 5.1 – Using propensity score matching to understand what works in reducing re-offending

Sarah French & Aidan Mews, Ministry of Justice
Syndicate Room 1: 14.35 – 15.05

The Justice Data Lab (JDL) run by Ministry of Justice (MoJ) supports organisations, particularly the Voluntary and Community sector (VCS), in understanding their specific impact in reducing re-offending. This service offers an innovative approach to using re-offending data to support organisations working with offenders to understand their impact – allowing them to improve future services with offenders, and providing evidence for future funding.

VCS organisations struggle to access and analyse government data, and when they do they find it difficult to show the impact of their work to benefactors, as they neither have the capacity or expertise to use control groups or a counterfactual to produce an assessment. Using quasi-experimental impact evaluation (propensity score matching) techniques the JDL provides tailored analysis to help fill this gap, without resorting to expensive and potentially disadvantageous randomised control trials.

Propensity score matching with linked administrative data has also enabled MoJ to assess the effectiveness of various sentences and sentencing requirements. The most recent analysis evaluating the ‘impact of short custodial sentences, community orders and suspended sentence orders on re-offending’ was published in January.

This session is aimed at explaining how the JDL was established, how propensity score matching is used by the JDL and more generally in MoJ, the problems and issues encountered, and the plans for the future.

Session 5.2 – Bridging the gap: measuring changes in educational inequality

Kylie Hill, Department for Education
Syndicate Room 1: 15.10 – 15.40

Keywords: Educational disadvantage, inequality, mean rank difference.

A key aim of education systems is to reduce the gap in educational achievement between pupils from different socio-economic backgrounds. However, far-reaching reforms to the assessment system in England – new GCSE grading and the removal of national curriculum levels - make this increasingly difficult to monitor. How can we tell whether the gap is getting smaller year on year when pupils sit different exams and receive different grades?

Key attainment thresholds before and after these changes will not be equivalent, meaning a clean break is needed in the current method. What’s more, point scores cannot be easily converted between grading scales, and are not normally distributed – making simple measures such as the gap in mean or median attainment misleading, and standardisation problematic.

By focusing on the comparison of pupils’ ranked positions in the national cohort we have produced a novel measure of inequality between two groups with a range of methods to communicate this methodology to different audiences. This methodology, which is under consultation, would allow robust and holistic comparisons of inequality over time, regardless of the scale on which attainment is measured. This would not only allow us to measure change over time but also to draw comparisons between different age groups and assessments – and could be applied to a wide range of groups and data.

Session 5.3 – Improving coverage of Crime Statistics

Joseph Traynor, Office for National Statistics
Syndicate Room 1: 15.45 – 16.15

Funding for this project was requested from the Quality Improvement Fund to improve the scope and quality of crime statistics in light of users’ needs and the recommendations from the various reviews and assessments. These highlighted that the public trust was being affected due to some crime being missed, in particular e-crime (or cyber crime) which is enabled by the internet or new technology. Due to the UK Statistics Authority assessment and the removal of the National Statistics badge from the police recorded crime survey, it became critical that these potential gaps were addressed. Given the complexities of the project, external research organisations were invited to tender to carry out this work. This presentation will share how the successful outcomes were reached within the agreed time and deadline.

Parallel Session 6: Controlling for Unobserved Variation

Room: Syndicate Room 2 – 14.35 – 16.15

Session 6.1 – The impact of training on productivity – econometric analysis using the ONS VML
Matthew Bursnall, Department for Business, Innovation & Skills
Syndicate Room 2: 14.35 – 15.05

Keywords: Productivity; data matching; GMM; semi-structured data.

When estimating the productivity benefits of education and training we typically use wage increase as a proxy. This is a poor assumption unless there is a perfectly competitive labour market. As such, it is widely accepted in the literature that there is a 'wedge' between wage gain and productivity gain. There is limited empirical evidence for the size of the wedge.

BIS is sponsoring an econometric analysis using a data set that has matched publicly funded training spells to firms in the Annual Business Survey. Given the diverse range of factors that affect productivity we will attempt to control for unobserved heterogeneity by regressing on lagged values of our chosen measure of productivity, following a Generalised Method of Moments approach.

This paper will discuss the methodological issues we have faced in the 4 years since the project was first conceived. In particular we will be seeking fresh thinking from the audience to help us resolve some of the issues and fill this important gap in the evidence around human capital investment.

Session 6.2 – An ecological analysis of crime and antisocial behaviour in English Output Areas, 2011/12 – Regression modelling of spatial count data
Chuka Ilochi, Department for Business, Innovation & Skills
Syndicate Room 2: 15.10 – 15.40

Keywords: spatial multilevel negative binomial models; police recorded crime analysis; crime ecology.

Ecological (or area) studies of crime have established varying factors affecting crime incidence depending on the geographical unit of analysis. There are distinct factors at small area level which apply, sometimes differentially, to English areas in contrast to foreign studies.

This research provides a unique in-depth technical analysis of police recorded crime open data. With it small area characteristics affecting the incidence of crime in England at least in 2011/12 are discovered, and some evidence that these patterns can be generalised beyond that. A spatial multilevel negative binomial regression was applied to model the data and it was found to fit the data reasonably well. Models that do not account for this are prone to biased parameter estimates and standard errors.

The results indicate that a combination of social, demographic, socioeconomic, physical environment and opportunity factors are associated with micro-spatial crime occurrence. The strongest influence on crime rates is the urbanisation of the area and more urban areas are associated with higher crime incidence. Direct economic measures of average affluence were found to be insignificant but a measure of relative affluence is positively associated with crime.

Significant positive crime spill-over effects from neighbouring areas were discovered. It also appears that police forces are a confounding factor in analysis of ecological factors affecting crime rates in England and different patterns are exhibited across police force areas. This is likely to be a combination of real differences in crime rates across areas as well as differential policing practices across England.

Session 6.3 – Dealing with location in the valuation of office rents in London by using advanced regression techniques to account for spatial autocorrelation – a multilevel and semi-parametric approach

Aniel Anand, Department for Business, Innovation & Skills
Syndicate Room 2: 15.45 – 16.15

Keywords: Spatial autocorrelation; Valuation of office rents; Multilevel and semi-parametric modelling.

Properties within the same location are likely to have similar rents. Therefore, if location is not properly captured in a regression model which predicts rent, the error terms of nearby offices will be spatially correlated.

I therefore explored if locational economic characteristics from administrative sources and fixed effects for Local Authorities could be used to explain the variations in office rents. This showed a high degree of spatial autocorrelation still present so I considered how homogeneous England and Wales was by developing regional specific regressions and used Chow's test to identify structural breaks. Moran's I was used to determine the extent of regional spatial autocorrelation which showed London to have a unique property market.

Multilevel modelling can be used when the data structure is hierarchical to account for location and reduce spatial autocorrelation. This is an innovative approach as previous literature tended to focus on spatial regression models. I then contrasted this with an Ordinary Least Squares (OLS) and Generalised Additive Model (GAM) approach. The root mean square error is used to assess the prediction precision of the models both within the sample and the validation dataset. This showed that whilst the multilevel model had the best in-sample prediction, it performed the worst out of sample, indicating that the multilevel model over-fits the spatial element of the model.

The OLS and multilevel model did not sufficiently deal with the problem of spatial autocorrelation, still occurring up to 130 metres. The GAM however reduced spatial autocorrelation between offices to 20 metres.

Parallel Session 7: Innovations in Analysis

Room: Syndicate Room 3 – 14.35 – 16.15

Session 7.1 – Prediction of Cracking in the Graphite Core of Advanced Gas Cooled Nuclear Reactors

**N Warren, E Tan, K McNally, Health and Safety Laboratory
& M Fahad, G Hall, B J Marsden, and P Mummery, University of Manchester**

Syndicate Room 3: 14.35 – 15.05

Keywords: Nuclear safety, Bayesian emulation.

The AGR design is a second-generation gas-cooled reactor that is unique to the UK; it uses graphite as the neutron moderator and carbon dioxide as the coolant. The graphite also plays an important structural role providing channels for the fuel stringers, control rods and coolant. The need to ensure safe shut down and fuel cooling is the essential safety requirement of any nuclear reactor, hence the structural integrity of the graphite bricks, and the channels that they form, is of prime importance to the safety cases.

Over the life of the reactors, irradiation gives rise to degradation of the graphite core leading to internal stresses within the graphite bricks and a substantial decline in strength. Late in life these twin effects are predicted to lead to the formation of cracks that could challenge the safe operation of the reactors.

Much work has been conducted using Finite Element models on the structural integrity of graphite bricks but uncertainties in the material relationships in the FE models lead to significant uncertainties in the stress predictions. This paper focuses primarily on the validation of the predicted internal stresses and describes the methodology devised to identify and calibrate the relevant model parameters. A non-linear mixed-effect model is presented for calibrating the parameters of FE models that are sensitive to brick diameter, using channel geometry measurements obtained from periodic inspections. The work makes use of a novel technique: the development of a Bayesian emulator, which is a surrogate for the FE model. The use of an emulator delivers a substantial reduction in the computational burden of calibration. Finally, predictions of future rates of cracking are presented obtained using a probabilistic methodology that again utilises an emulator.

Session 7.2 – Better Census statistics for Civil Parishes – When “best-fitting” just isn’t good enough

Bruce Mitchell, Office for National Statistics

Syndicate Room 3: 15.10 – 15.40

Keywords: Census, Civil Parish, best-fitting.

The parish geography is not well served by the Government Statistical Service (GSS) National Statistics Geography Policy (ONS, 2010, 2015) mandated method of best-fitting, as over 10% of them do not contain an OA pop-weighted centroid (OA-PWC). These centroids are an essential pre-requisite for best-fit, a process which guarantees to produce non-disclosive statistics. ONS is therefore not able to publish data for parishes without OA-PWCs. The impact of this problem is varied, with particular concentrations in a small number of Local Authorities.

ONS is investigating alternative grid-based methodologies, as an exception to the policy.

Under the Local Government Act, 1972, small-population parishes too small to run their own council, or to be otherwise viable, are permitted to come together in a working alliance under a common grouped parish council. We are also looking at the impact of publishing to parish council level rather than to the individual civil parishes. Indications so far are very promising.

There is unfortunately, no single definitive centrally-held list of parish councils across England, the information being held separately by around 200 Local Authorities. ONS and DCLG are now working together to produce such a list.

ONS is continuing to assess the relative merits of the above grid-based methodologies, combined with publication to parish councils. We will publish a report on the findings and move on to a consultation with the user community.

Session 7.3 – A comparison of established and newly developed benchmarking methods

Jennifer Davies & Duncan Elliott, Office for National Statistics

& Homesh Sayal & John Aston, University of Cambridge

Syndicate Room 3: 15.45 – 16.15

National Accounts and other National Statistics often combine data from a variety of sources. For example, a variable may be measured in a quarterly and an annual survey. The quarterly data is usually less accurate at measuring the level of the variable of interest compared to the annual data. Benchmarking is a technique used to constrain higher frequency data to lower frequency benchmarks. For example, the sum of quarters within in a year is constrained to equal the annual data, providing consistent time series.

Well established methods for benchmarking include the Denton method that minimizes changes to the quarterly growth rates while meeting the constraints, and the Cholette and Dagum method, which allows for further modelling of potential bias and correlation structure in the errors. We test the development of a new method of benchmarking using wavelets and compare its performance to established methods using a mixture of simulated and real data.

Parallel Session 8: Getting More from Data

Room: Syndicate Room 4 – 14.35 – 16.15

Session 8.1 – New Methods of Disseminating Statistics

Hiren Bhimjiyani, Department for Business, Innovation & Skills

Syndicate Room 4: 14.35 – 15.05

This presentation is about how we can improve user engagement in official statistics by adopting modern methods in data dissemination. Open data and data transparency are high on the government agenda and the Civil Service has released an enormous amount of data in order to help improve efficiency and transparency. Currently there are already over 75,000 publications on the gov.uk website. However, in order for data to be used to further these aims, it has to be released in a format that will be accessible for the widest audience, including consumers of statistics and application developers. This presentation looks at how we might through improved dissemination meet the requirements of the different audiences as well as better informing policy development.

Modern methods of data dissemination, in particular interactive data visualisation, can improve user engagement by supporting exploratory thinking as it allows decision makers to actively interrogate the data. According to research, adopters of interactive visualisation achieve faster decision making, greater data access, and stronger user engagement. In addition, the data is normally held in an open format which is helpful for application developers and readable by internet search engines.

Over the past 12 months, BIS has been developing an innovative approach using new methods to disseminate data. Examples of this include the BIS Pulse Survey, People Survey, The Economic Growth Dashboard and the UN Commodities Trade Map. We have also been sharing our learning and templates with our stakeholders including other government departments to facilitate an improved approach to data dissemination. This is just a snapshot: this presentation will show you the tools needed to begin your journey for better data dissemination.

Session 8.2 – Reviewing the ONS' Perpetual Inventory Method and Capital Stocks Estimation

Chris Stapenhurst, Office for National Statistics

Syndicate Room 4: 15.10 – 15.40

Keywords: Educational disadvantage, inequality, mean rank difference.

Capital assets are those which are used as inputs to the production process; the value of capital assets utilised by a given institution unit is referred to as its capital stock. Consumption of fixed capital (CFC) is the volume of investment necessary to maintain a given stock of capital assets. Office for National Statistics (ONS) publishes estimates of capital stocks and CFC for different industries and asset types. Due to the expense of direct capital stock measurement, ONS makes use of the Perpetual Inventory Method (PIM) which imputes stock levels from accumulated investment data available in the Capital Expenditure survey.

The aim of this paper is to review ONS estimation methodology in line with the recent National Statistics Quality Review of ONS National Accounts and in light of more up to date international guidance, including System of National Accounts 2008, European System of Accounts 2010 and the OECD Measuring Capital manual. Whilst we find that the PIM remains the most appropriate method for the task, we also identify some areas of potential improvement in the theory and practical application, both under existing data constraints, and in a more idealised world with fewer data constraints. We hope that this paper will stimulate wider debate on these issues and inform future implementation of the PIM within ONS.

Session 8.3 – Creating Open Data whilst maintaining confidentiality - Guidelines and example

Philip Lowthian & Caroline Tudor, Office for National Statistics

Syndicate Room 4: 15.45 – 16.15

Keywords: Data Confidentiality, Intruder Testing.

The Open Data movement has been instrumental over recent years in increasing the availability of government data to the public, outside the standard licensing restrictions. Many of these outputs have been in the form of microdata (record level data) which contain considerably greater detail than traditional tabular releases. This paper considers the confidentiality and privacy challenges given by the publication of Open Data. Additionally we discuss the data anonymisation processes required to produce a dataset of not only high utility but also with negligible risk of disclosure. UK Government Case Studies are presented along with ideas for including intruder testing to improve the process. policies and programmes.

Closing Session

Syndicate Room 1 – 16.30 – 17.00

ESS Peer Review of the UK Statistical System

Emma Wright & Laura Clarke, Office for National Statistics

Keywords: European Statistical System, Quality, Code of Practice.

A programme of European Statistical System (ESS) Peer Reviews is currently underway to assess the statistical system of each EU country against the European Code of Practice for Official Statistics (ESCoP). A team of ESS assessors visited the UK in January 2015 to assess compliance with ESCoP, coordination within the national statistical system and the level of cooperation/integration with the ESS. During their 5 day visit, the Peer Review team met with senior staff from ONS and other GSS departments as well as representatives from statistical producers, users, academia and the media. The resulting Peer Review report for the UK has recently been published, and an action plan has been developed to address the recommendations within the report. This presentation will outline the ESCoP principles, the findings and recommendations of the Peer Review team, and the implications for the UK Statistical System, as well providing a brief overview of findings across the EU.

GSS Methodology Advisory Committee

Has today left you wanting advice on a methodological problem back in your home department?

If so, you might want to submit an abstract for the next GSS Methodology Advisory Committee meeting. The Committee provides a forum for government statisticians to seek external advice from distinguished academics and statistics professionals. The Committee is available to all government statisticians and is an excellent way to provide an external challenge to developing methodologies used for Official and National Statistics. Topics at the most recent meeting included:

- A state space model for the Labour Force Survey estimates: agreeing the target and dealing with wave specific bias;
- Using web scraped data in price indices;
- Developing a weighting class approach for the 2021 Census.

Meetings take place twice a year in May and November at the ONS office in Drummond Gate in London - the next will be on **Monday 16th November 2015**.

Further information about the Committee, including full documentation from past meetings, can be found on the Committee's internet page:

<http://www.ons.gov.uk/ons/guide-method/method-quality/advisory-committee/index.html>

If you would like to gain from the Committee's advice by contributing to the November meeting or would just like some more information please contact the secretary (isabella.wheeler@ons.gsi.gov.uk).

GSS Quality Improvement Fund (QIF)

The Quality Improvement Fund (QIF) is provided the by the UK Statistics Authority

<http://www.statisticsauthority.gov.uk/> each year to the Government Statistical Service

<https://gss.civilservice.gov.uk/about/> (GSS) to support improvements in quality and trust in official statistics.

Official statistics producers can bid for QIF funding to support quality improvements to their official statistics.

QIF projects should meet at least one of the following criteria as well as showing their relevance to the wider GSS:

- be focussed on the UK Statistics Authority' strategic objectives set out in Better Statistics, Better Decisions <https://gss.civilservice.gov.uk/wp-content/uploads/2014/10/Better-Statistics-Better-Decisions-Strategy.pdf>: its Statement of Strategy 2015 to 2020;
- address Code of Practice <https://gss.civilservice.gov.uk/about/code-of-practice/> compliance issues highlighted in the UK Statistics Authority assessment process;
- require expertise to be brought in to assist with the project

Further information on QIF and reports from completed QIF projects are available on the GSS website:

<https://gss.civilservice.gov.uk/statistics/methodology-quality/quality-2/quality-improvement-fund/>