New Zealand

Advancing Public Policy.

An agenda for applied statistics and the social sciences

Charles Sturt University, 2014

COMPASS RESEARCH CENTRE

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THE UNIVERSITY OF AUCKLAND

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The University of Auckland

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Outline

- The social sciences and public policy
- Making knowledge claims
- Improving our methods
  - Inference by design
  - Making it count
  - Virtues of the virtual
- Concluding thoughts
  - “Public” social science
  - Applied statistics

World Economic Forum (Davos) – Top 10 Global Risks, 2014

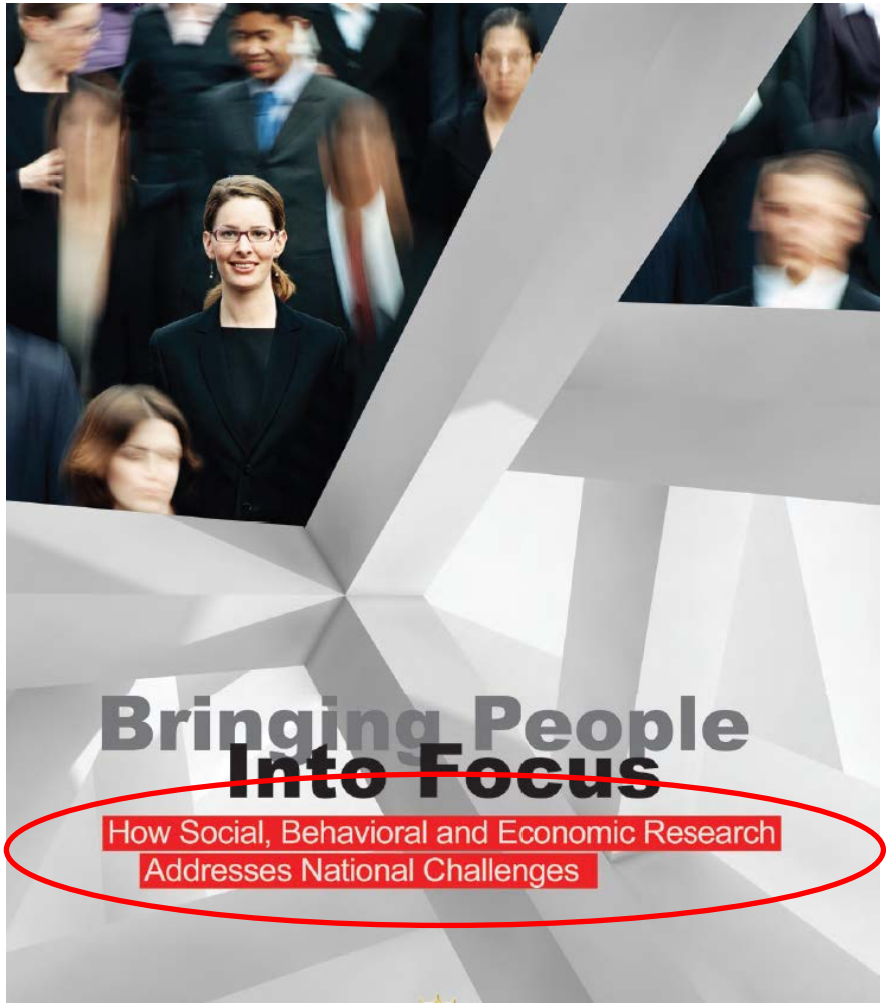
1. Fiscal crises
2. Unemployment
3. Water crises
4. Income disparity
5. Climate change
6. Extreme weather
7. Governance failure
8. Food crises
9. Financial failure
10. Political/social instability

Role of the Social Sciences – 40 Years

- Gibson report (1970)
  - "recommended that the Council develop a social science arm to foster development of research activity" (Neil Lunt PhD Thesis, 2004, p. 20)

- Gluckman discussion paper (2011, p.15)
  - "Social science is not well constituted within the New Zealand science system and across or within those ministries and agencies that need such information to develop policy options".

National Science Foundation, 2012



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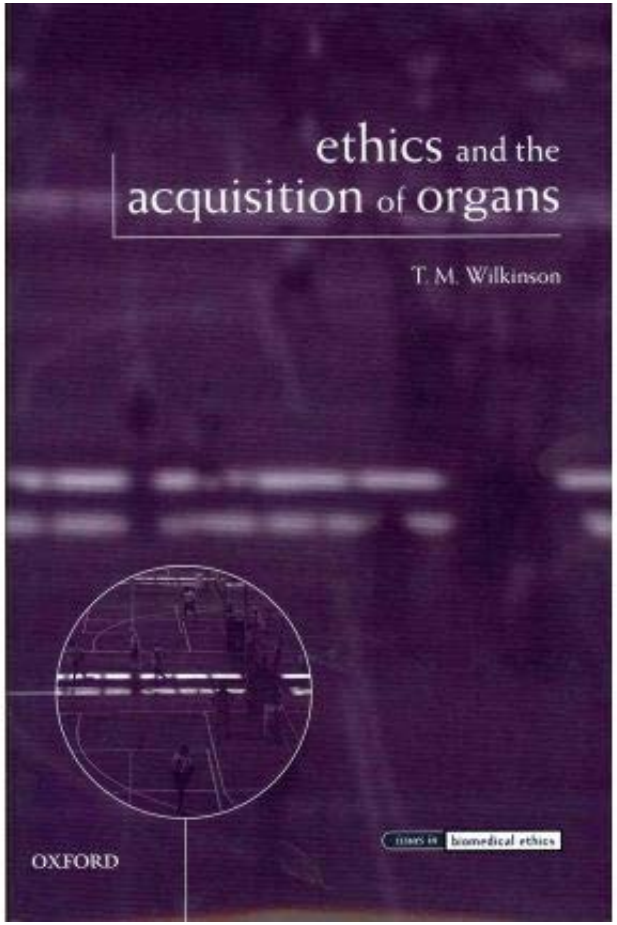
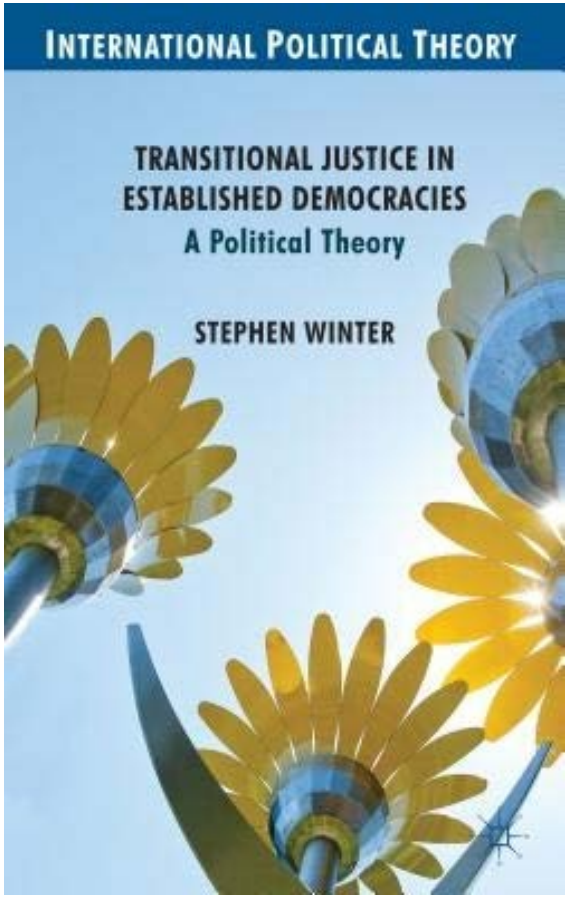
These Books Needed “Facts”!





“Knowledge Claims” in Social Science – Some of the Issues

1. By its nature, social science detects patterns beyond everyday observation

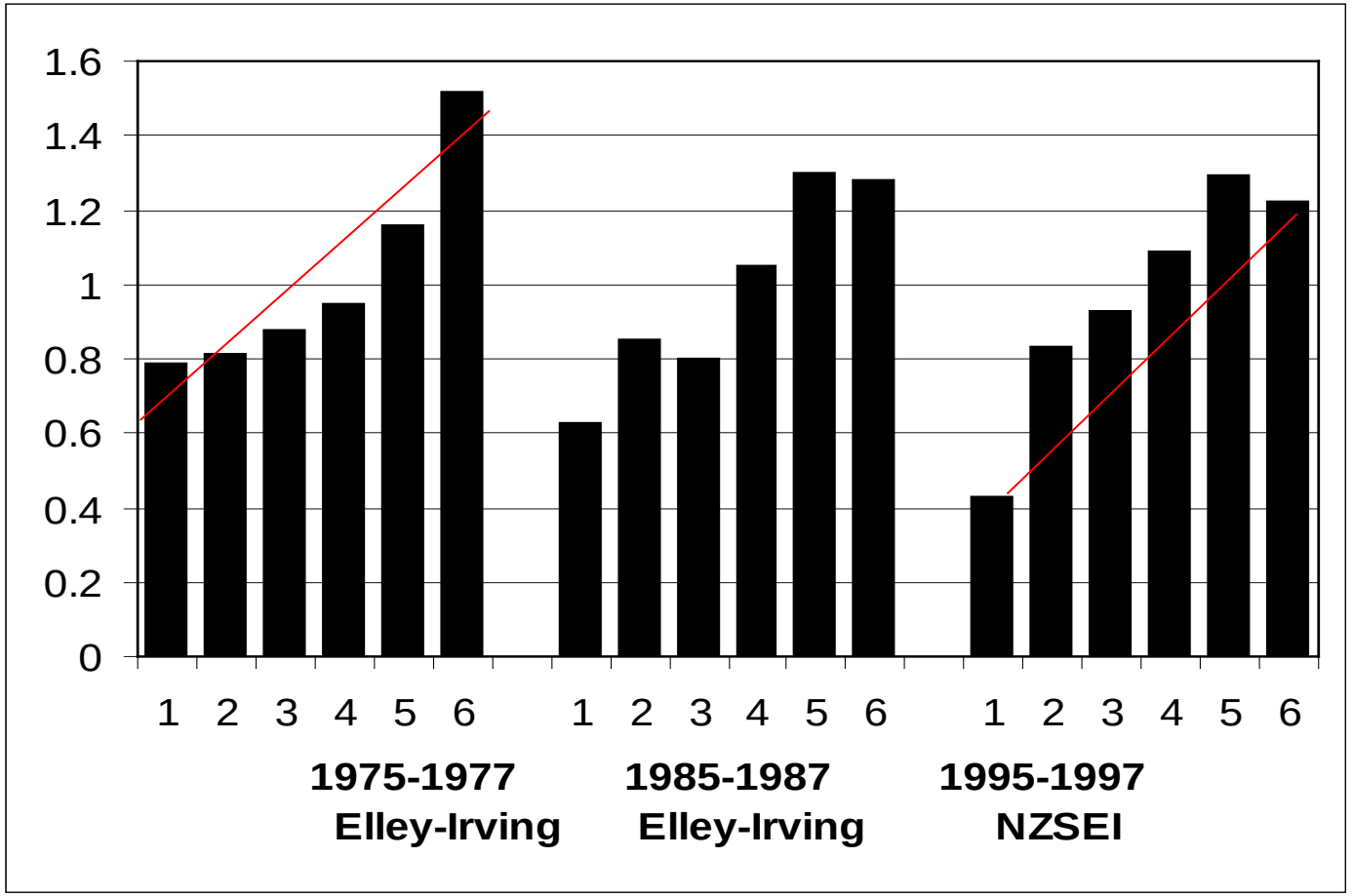
2. “Common sense” can lead you astray

3. Common mistakes can be made in public debate (e.g. not comparing “like with like”)

4. Governments are looking for “evidence”

1. Patterns “below the surface” – Death Rates by Occupational Class

RII=1.8 RII=2.1DeDa RII=2.3



2. “Common sense” can be astray – Improving Driver Education

OFFICE OF THE PRIME MINISTER'S SCIENCE ADVISORY COMMITTEE

Towards better use of evidence in policy formation: a discussion paper

Sir Peter Gluckman KNZM FRSNZ FRS
Chief Science Advisor to the Prime Minister

April 2011

Driver education: misplaced confidence

It would appear intuitive that formal driving education within the school curriculum would reduce the high rate of road accidents that teenagers experience. Indeed there has been much advocacy for such programmes over the years in various countries – from politicians, families of road victims and insurance companies. But when such programmes were introduced in both Europe and the US, it became evident that these initiatives either had no beneficial effect on, or even actually increased, the accident rates of young people.

Formal evaluation with controls showed that driver education does lead to earlier licensing, but provided no evidence that driver education reduces road crash involvement and suggested that it may lead to a modest but potentially important increase in the proportion of teenagers involved in traffic crashes. An earlier study from New Zealand in the 1980s reached similar conclusions.

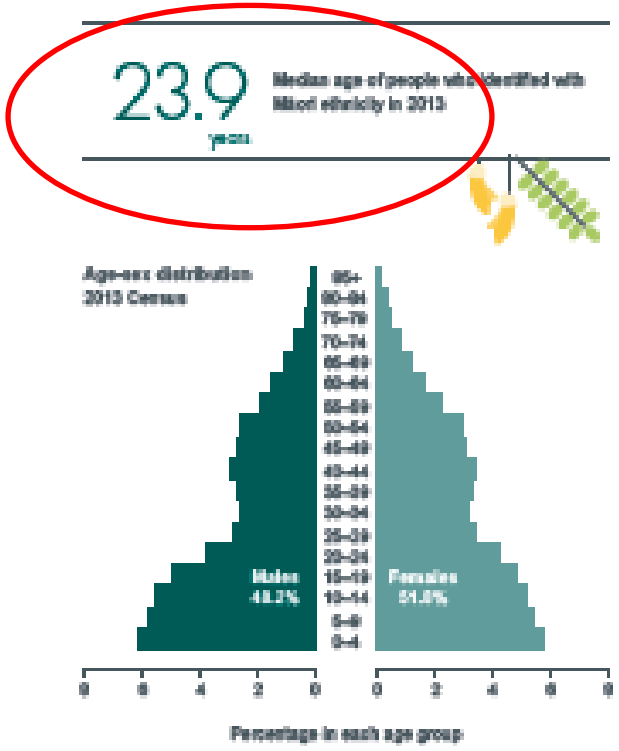
This negative view of such programmes was initially vehemently rejected by some advocacy groups, but the scientific view became compelling and has been integrated into policy. The data do not even support driver education as a rationale for accelerating the passage through graduated licensing systems. Why does this counterintuitive outcome occur? In part because it leads young people to wanting to get their driver licence at an earlier age, and in part because it can lead to over-confidence in people who are already at a stage of their lives when they are most likely to engage in risk-taking activities.

This is a classic example of why an evidence base is desirable even when what seems like ‘obviously sensible’ new programmes are introduced, and of why programmes should be introduced in a pilot fashion capable of evaluation. The assumption that formal driver education would be of value led to investment in programmes which in fact did more harm than good.

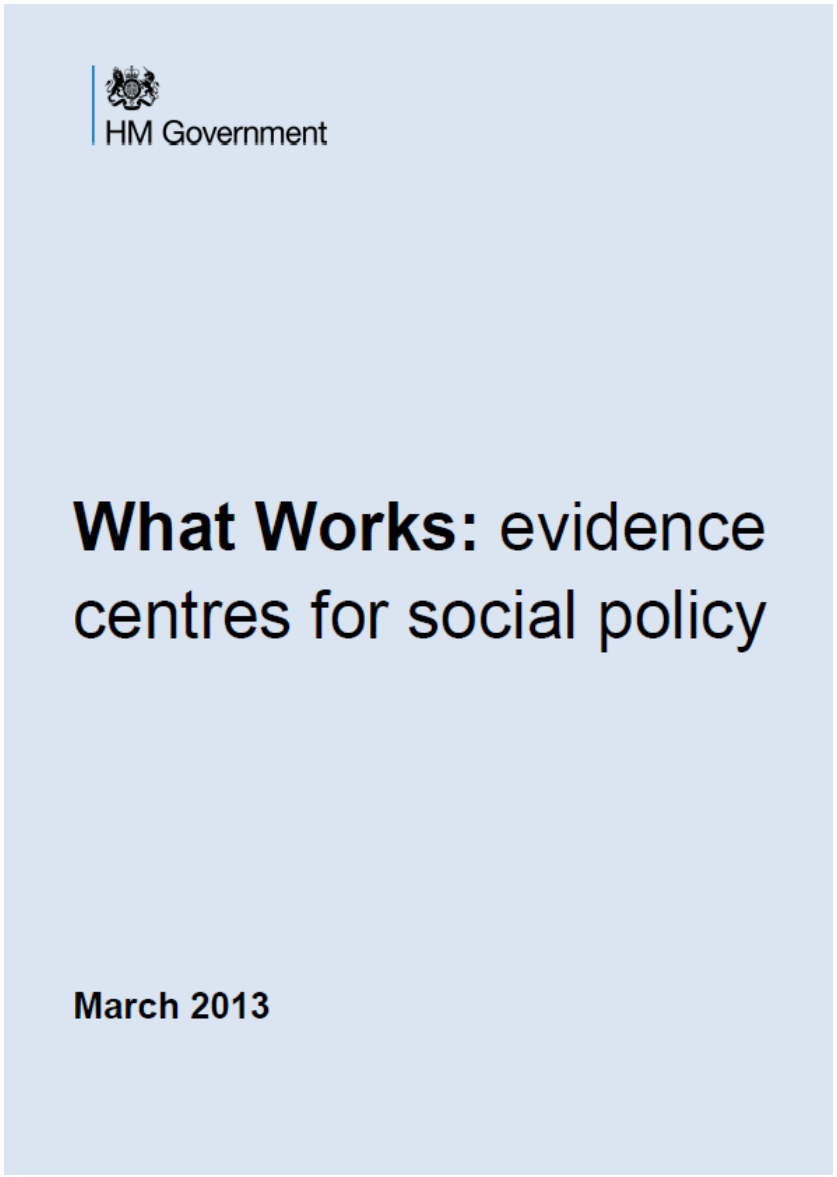
3. Common mistakes in public debate

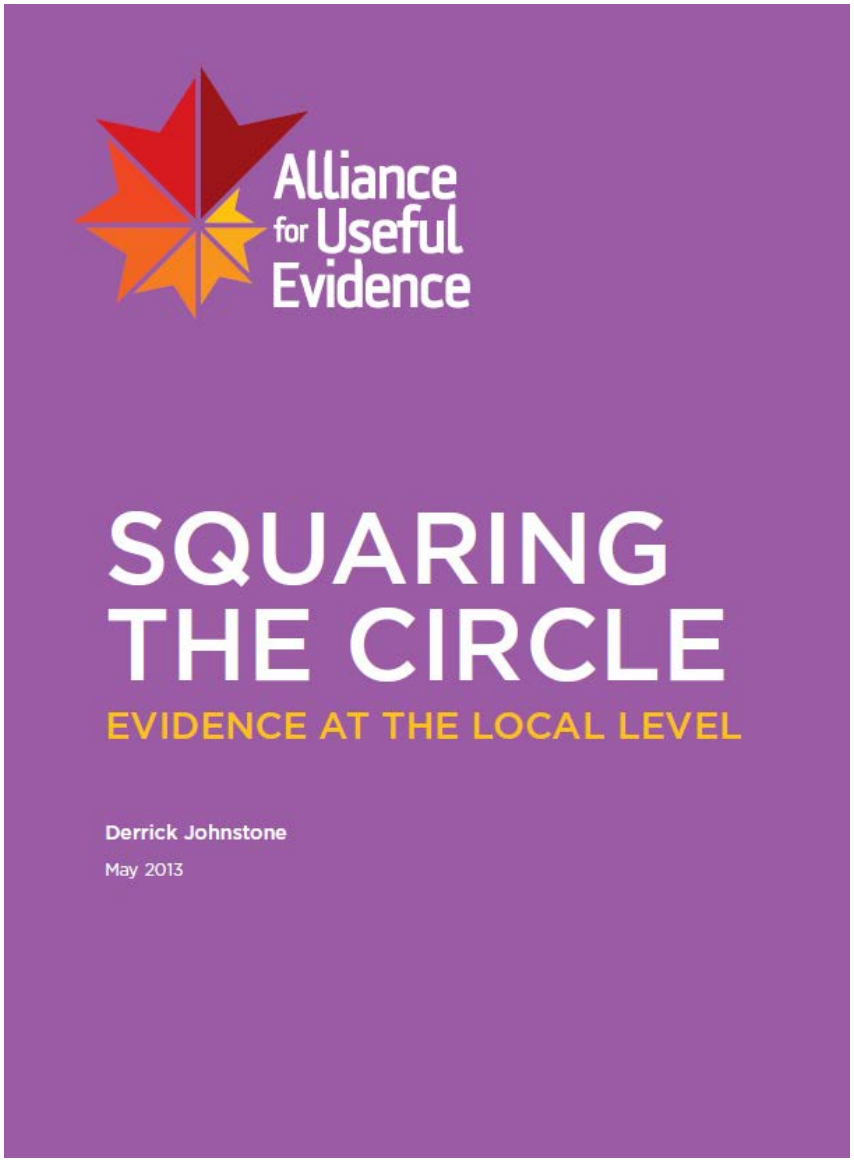
Closing gaps favour young (NZ Herald)
By Vaimoana Tapaleao, James Ihaka, Simon Collins, Harkanwal Singh
5:30 AM Monday Mar 17, 2014

Gaps that are barely budging
* Imprisonment rate - gaps may close in 1170 years.



4. Governments and “evidence”





Outline

- Improving “our” methods
  - **Inference by design**
  - Making it count
  - Virtues of the virtual

Test, Learn, Adapt:

Developing Public Policy with Randomised Controlled Trials

Laura Haynes

Owain Service

Ben Goldacre

David Torgerson

CabinetOffice
Behavioural Insights Team

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Data Inference in Observational Settings

Four-Volume Set

SAGE Benchmarks in Social Research Methods

Edited by **Peter Davis** *University of Auckland*

Most social research is carried out in observational settings: that is, most social researchers collect information in the 'real world' trying to do as little possible to alter the circumstances of study. However, there is a fundamental problem with this kind of research, in that it is very hard to draw 'causal' conclusions, because of the complexity and obduracy of social reality. This is not just a problem for social scientists interested in policy or social action. It applies across the board, more generally, because it becomes difficult to know, without the conditions for credible inference, what conclusions can be drawn from any piece of empirical research that aspires to be anything more than descriptive of social phenomena.

Drawing from a variety of sources - from logicians and philosophers, to applied statisticians, computer scientists, econometricians, epidemiologists and social researchers - this collection provides an invaluable resource for scholars in the field.

Volume One: Background
Volume Two: Analytical Techniques
Volume Three: Temporal Relations
Volume Four: Experimental Analogues

December 2013 • 1628 pages
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(on print orders received before the end of month of publication)

SAGE

Rationale of Handbook

1. **Traditional statistical theory**
   mainly about representation not causation (i.e. sampling)

2. **Statistical inference=>causal inference**
   random assignment and manipulation of treatment conditions

3. **Counterfactual/potential outcomes**
   conceptually bridges experimental/observational settings

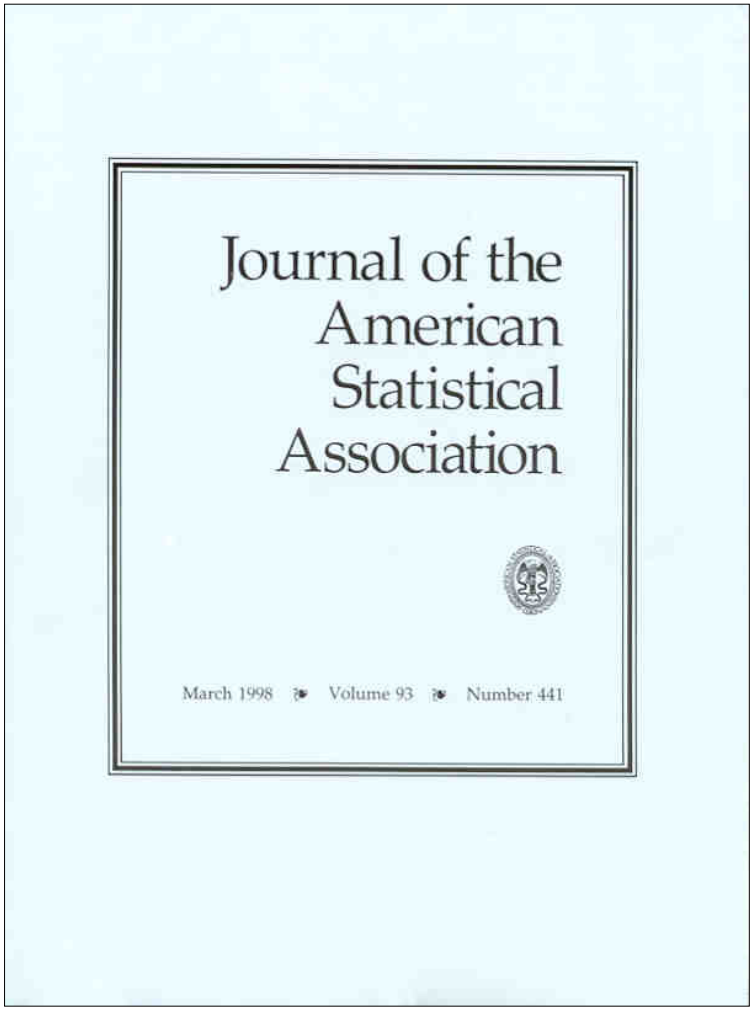
4. **Forward causation only**
   cause-to-effect (e.g. impact of policy intervention)

5. **Econometrics**
   a parallel community of policy practice (e.g. to public health)

Five Background Papers

- Counterfactual thinking
- Statistical reasoning
- Causal diagrams
- The econometric paradigm
- Within-study comparisons

Rubin



Causal Inference Using Potential Outcomes: Design, Modeling, Decisions

Donald B. RUBIN

Causal effects are defined as comparisons of potential outcomes under different treatments on a common set of units. Observed values of the potential outcomes are revealed by the assignment mechanism—a probabilistic model for the treatment each unit receives as a function of covariates and potential outcomes. Fisher made tremendous contributions to causal inference through his work on the design of randomized experiments, but the potential outcomes perspective applies to other complex experiments and nonrandomized studies as well. As noted by Kempthorne in his 1976 discussion of Savage's Fisher lecture, Fisher never bridged his work on experimental design and his work on parametric modeling, a bridge that appears nearly automatic with an appropriate view of the potential outcomes framework, where the potential outcomes and covariates are given a Bayesian distribution to complete the model specification. Also, this framework crisply separates scientific inference for causal effects and decisions based on such inference, a distinction evident in Fisher's discussion of tests of significance versus tests in an accept/reject framework. But Fisher never used the potential outcomes framework, originally proposed by Neyman in the context of randomized experiments, and as a result he provided generally flawed advice concerning the use of the analysis of covariance to adjust for posttreatment concomitants in randomized trials.

KEY WORDS: Analysis of covariance; Assignment-based causal inference; Assignment mechanism; Bayesian inference; Direct causal effects; Fieller-Creasy; Fisher; Neyman; Observational studies; Principal stratification; Randomized experiments; Rubin causal model.

1. PROLOGUE

I greatly appreciate the invitation of the COPSS selection committee to contribute this year's R. A. Fisher Memorial Lecture. It certainly is humbling to consider the massive contributions of this giant of twentieth century statistics, as well as the published versions of the previous Fisher lectures. I will not attempt to compete with the incredibly encompassing lecture by Jimmie Savage (1976), with an assist from John Pratt, who helped complete it posthumously, but rather focus on one part of Fisher's work that has influenced me greatly, the design of experiments for causal inference, and attempt to relate some aspects of his contributions to current developments concerning inference for causal effects in more general settings. This presentation, however, will be more idiosyncratic than Cox's (1989) Fisher lecture on a somewhat similar topic, in that I will make no systematic attempt to refer to the many outstanding contributions made by others to this area, but rather will concentrate on how Fisher's work connects to the perspective that I advocate.

I never met Fisher in person; he died in 1962, a time when I was still doing physics as an undergraduate at Princeton University. Most of my knowledge of him, besides that obtained through reading his contributions, was gained from my Ph.D. advisor at Harvard University, Bill Cochran. Bill was a wonderful man with a charming and warm sense of humor.

Bill noted that Fisher, as everyone familiar with him knew, was a man of seemingly unbounded brilliance and arrogance. Bill had a variety of stories that he used to illustrate both of these characteristics, often with great humor with Bill as the butt of the story. One story, which illustrates the arrogance more than the brilliance, is relevant to the topic of this presentation, a connection made in the final section. It concerned the Fieller–Creasy controversy as recorded in the Royal Statistical Society (RSS) Symposium on Interval Estimation in 1954. Fieller (1954) and Creasy (1954) proposed two distinct "fiducial" solutions to the problem, in essence, of obtaining an interval estimate for the ratio of two means of independent normal distributions with known variances. Mr. Fieller, an established researcher, had proposed a solution years earlier that had Fisher's endorsement as *the* fiducial solution. Moreover, Fieller (1944) showed that it satisfied Neyman's (1934) criterion for a confidence interval.

Miss Creasy, in contrast, was a young researcher who had proposed a fiducial interval based on the same framework that Fisher had used to obtain the fiducial distribution for the difference between the means of two independent normal distributions with unknown variances, the Behrens–Fisher problem. Fisher was fairly brutal to the young Miss Creasy in his published discussion and, apparently, according to Bill, was even more disparaging of her efforts at the meeting.

At the time of the meeting, however, Cochran could not understand why the Creasy derivation was faulty, based as it was on Fisher's endorsed fiducial solution to the Behrens–Fisher problem. Cochran found Fisher in his office a few days after the RSS meeting, and Fisher immediately went to the blackboard, muttering words to the effect that only an idiot could not understand something so simple. Fisher began to write the assumptions with accompanying condescending comments, and Cochran could see after a few lines that Fisher was heading toward the Creasy solution! Fisher abruptly stopped writing, paused, and then quickly rubbed out all of his "derivation" and concluded his "proof" with something like, "From here it's obvious, even to you!" He proceeded to dismiss Cochran, having wasted enough time on this junior Scottish fool.

Cochran, who had daughters, told me that he felt that Fisher was undoubtedly especially dismissive of Creasy because she was Miss Creasy, and such people had little place in such scientific debates. Bill clearly thought otherwise.

Savage's (1976, p. 446) conclusion on the merits of Fisher's argumentation on this topic is consistent with Cochran's:

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Statistical Reasoning - Design and Decisions

- Science and design vs. analysis and decisions
  - Fisher never related his work on likelihoods and models to his work on experimental design
- Neyman – potential outcomes of treatment
  - defines causal effects for both randomised and non-randomised studies ("Neyman-Rubin" model)
- Causal inference and assignment mechanism
  - assigns treatments to units (randomised in experiments), creating special type of missing data

Angrist and Pischke

Journal of Economic Perspectives—Volume 24, Number 2—Spring 2010—Pages 3–30

The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics

Joshua D. Angrist and Jörn-Steffen Pischke

Just over a quarter century ago, Edward Leamer (1983) reflected on the state of empirical work in economics. He urged empirical researchers to "take the con out of econometrics" and memorably observed (p. 37): "Hardly anyone takes data analysis seriously. Or perhaps more accurately, hardly anyone takes anyone else's data analysis seriously." Leamer was not alone; Hendry (1980), Sims (1980), and others writing at about the same time were similarly disparaging of empirical practice. Reading these commentaries as late-1980s Ph.D. students, we wondered about the prospects for a satisfying career doing applied work. Perhaps credible empirical work in economics is a pipe dream. Here we address the questions of whether the quality and the credibility of empirical work have increased since Leamer's pessimistic assessment. Our views are necessarily colored by the areas of applied microeconomics in which we are active, but we look over the fence at other areas as well.

Leamer (1983) diagnosed his contemporaries' empirical work as suffering from a distressing lack of robustness to changes in key assumptions—assumptions he called "whimsical" because one seemed as good as another. The remedy he proposed was sensitivity analysis, in which researchers show how their results vary with changes in specification or functional form. Leamer's critique had a refreshing emperor's-new-clothes earthiness that we savored on first reading and still enjoy today. But we're happy to report that Leamer's complaint that "hardly anyone takes anyone else's data analysis seriously" no longer seems justified.

■ *Joshua D. Angrist is Ford Professor of Economics, Massachusetts Institute of Technology, Cambridge, Massachusetts. Jörn-Steffen Pischke is Professor of Economics, London School of Economics, London, United Kingdom. Their e-mail addresses are (angrist@mit.edu) and (s.pischke@lse.ac.uk).*

doi=10.1257/jep.24.2.3

Econometrics - “Better” Research Design

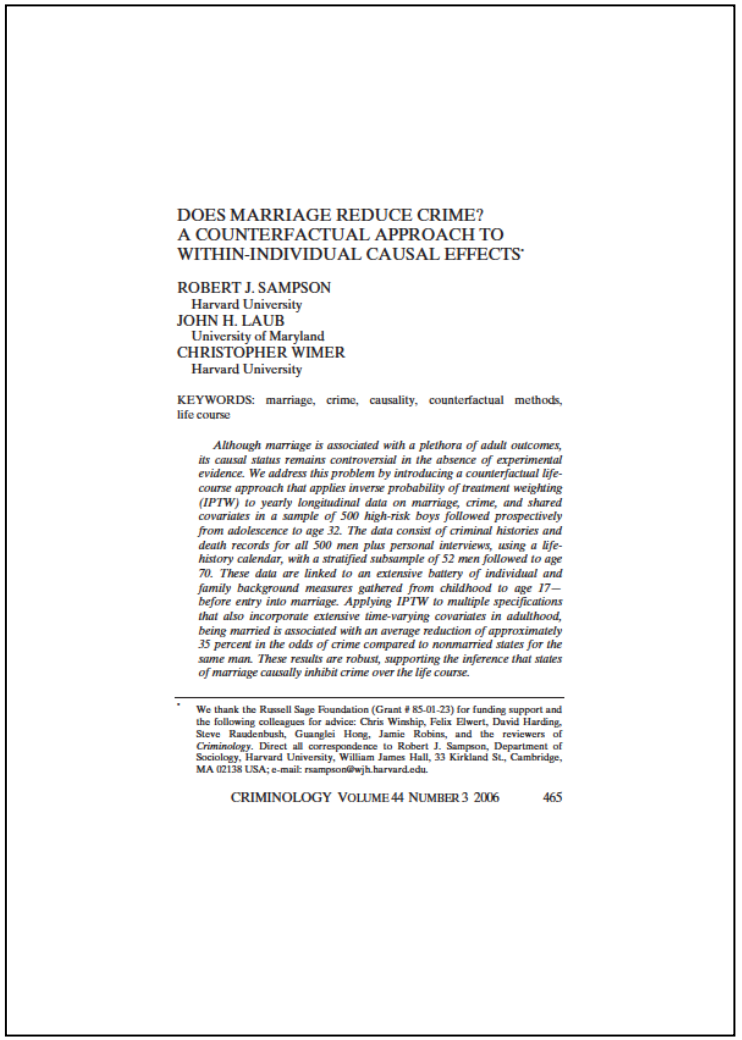
- “take the con out of econometrics” (1985)
  - Leamer “Hardly anyone takes data analysis seriously.”
- Better research design – quasi-experimental
  - Instrumental variables, regression discontinuity, differences-in-differences
- Has the design pendulum swung too far?
  - Lack of external validity; ignore the big questions?

Five Exemplar Papers

- Matching/Propensity scores
- Using panel data
- Fixed effects
- Instrumental variables
- A natural experiment

Sampson et al.

CRIMINOLOGY


DOES MARRIAGE REDUCE CRIME?
A COUNTERFACTUAL APPROACH TO
WITHIN-INDIVIDUAL CAUSAL EFFECTS*

ROBERT J. SAMPSON
Harvard University
JOHN H. LAUB
University of Maryland
CHRISTOPHER WIMER
Harvard University

KEYWORDS: marriage, crime, causality, counterfactual methods, life course

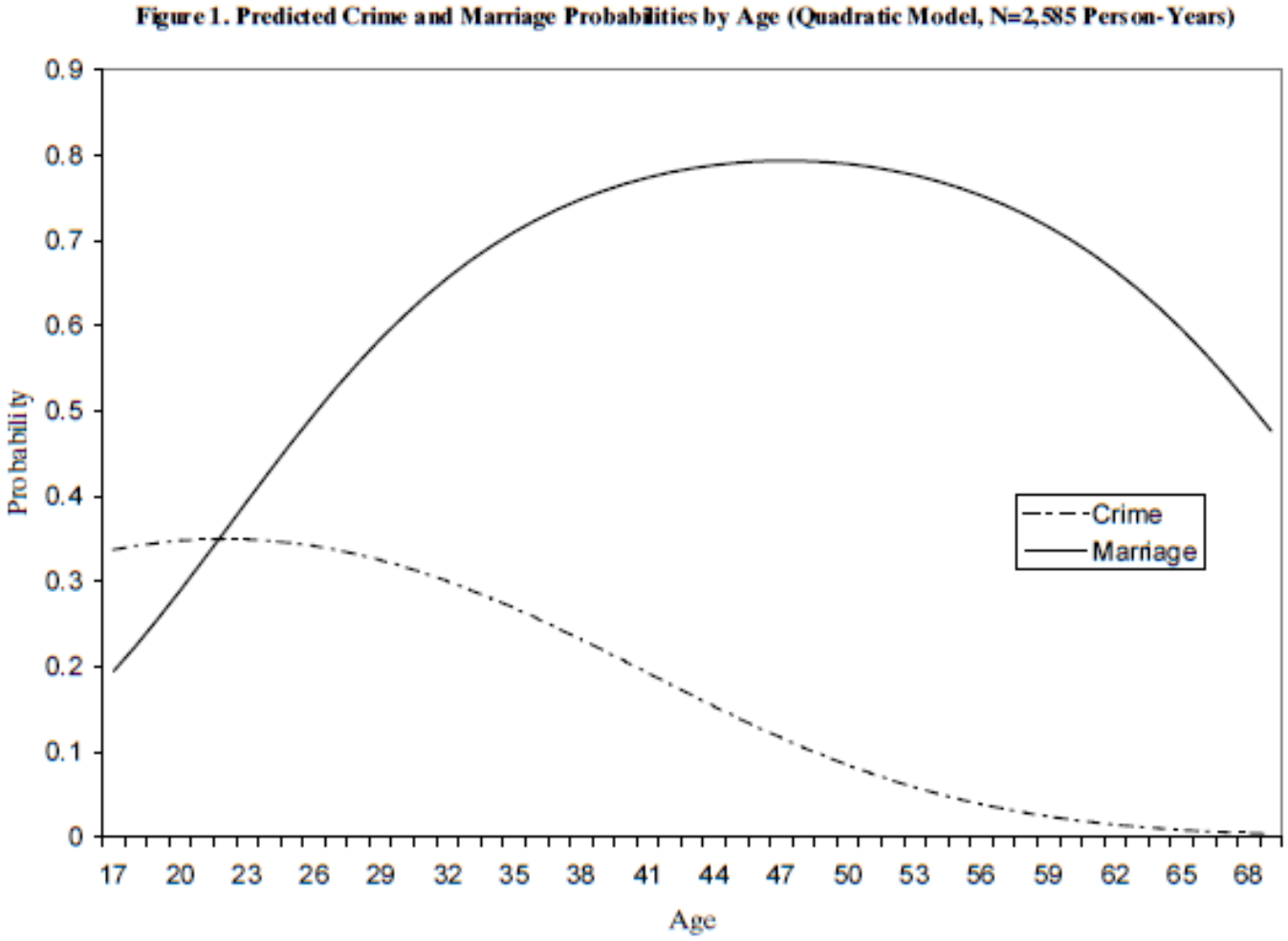
Although marriage is associated with a plethora of adult outcomes, its causal status remains controversial in the absence of experimental evidence. We address this problem by introducing a counterfactual life-course approach that applies inverse probability of treatment weighting (IPTW) to yearly longitudinal data on marriage, crime, and shared covariates in a sample of 500 high-risk boys followed prospectively from adolescence to age 32. The data consist of criminal histories and death records for all 500 men plus personal interviews, using a life-history calendar, with a stratified subsample of 52 men followed to age 70. These data are linked to an extensive battery of individual and family background measures gathered from childhood to age 17—before entry into marriage. Applying IPTW to multiple specifications that also incorporate extensive time-varying covariates in adulthood, being married is associated with an average reduction of approximately 35 percent in the odds of crime compared to nonmarried states for the same man. These results are robust, supporting the inference that states of marriage causally inhibit crime over the life course.

* We thank the Russell Sage Foundation (Grant # 85-01-23) for funding support and the following colleagues for advice: Chris Winship, Felix Elwert, David Harding, Steve Raudenbush, Guanglei Hong, Jamie Robins, and the reviewers of *Criminology*. Direct all correspondence to Robert J. Sampson, Department of Sociology, Harvard University, William James Hall, 33 Kirkland St., Cambridge, MA 02138 USA; e-mail: rsampson@wjh.harvard.edu.

Using Panel Data - Marriage and Crime

- Does marriage reduce crime?
  - issues of selection and confounding
- Longitudinal data available on “high-risk” men
  - within-individual analysis of role of marriage
- Do states of marriage causally inhibit crime?
  - Yes – average 35% reduction compared to non-married

Sampson et al.



Avendano

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Short report

Correlation or causation? Income inequality and infant mortality in fixed effects models in the period 1960–2008 in 34 OECD countries

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ABSTRACT

Income inequality is strongly associated with infant mortality across countries, but whether this association is causal has not been established. In their commentary in this issue of *Social Science & Medicine*, Regidor et al. (2012) argue that this association has disappeared in recent years, and question the premise of a causal link. This paper empirically tests the impact of income inequality on infant mortality in a fixed effects model that exploits the evolution of income inequality over a 38-year period, controlling for all time-invariant differences across countries. Data came from the Standardized World Income Inequality Database, containing yearly estimates for the period 1960–2008 in 34 countries member of the Organization for Economic Co-operation and Development (OECD), linked to infant mortality data from the OECD Health database. Infant mortality was modelled as a function of income inequality in a country and year fixed effects model, incorporating controls for changing economic and labour conditions. In a model without country fixed effects, a one-point increase in the Gini coefficient was associated with a 7% increase in the infant mortality rate (Rate ratio[RR] = 1.07, 95% Confidence Interval [CI] 1.04, 1.09). Controlling for differences across countries in a country fixed effects model, however, income inequality was no longer associated with infant mortality (RR = 1.00, 0.98, 1.01). Similar results were obtained when using lagged values of income inequality for up to 15 years, and in models that controlled for changing labour and economic conditions. Findings suggest that in the short-run, changes in income inequality are not associated with changes in infant mortality. A possible interpretation of the discrepancy between cross-country correlations and fixed effects models is that social policies that reduce infant mortality cluster in countries with low income inequality, but their effects do not operate via income. Findings highlight the need to examine the impact of more specific social policies on infant mortality.

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Introduction

During the last decades, a wide array of studies has examined the association between income inequality and health in high-income countries. The rationale behind these studies is that income inequality, independently of individual income, is associated with population health, so that more equal societies have better health and lower mortality (Hales, Howden-Chapman, Salmond, Woodward, & Mackenbach, 1999; Kaplan, Pamuk, Lynch, Cohen, & Balfour, 1996; Lynch et al., 2001; Navarro et al., 2003; Wilkinson & Pickett, 2011). Although income inequality is indeed consistently correlated with overall mortality across countries, whether this association is causal has been brought into question by a series of studies showing that in many instances, the association does not consistently hold when controlling for potential confounders (Mellor & Milyo, 2001). There is disagreement, however, on the right choice of confounders and methodological approaches, as this often determines the direction and strength of the association (Glymour, 2008; Kawachi & Blakely, 2001; Mellor & Milyo, 2001; Zimmerman, 2008).

A noticeable exception is the association between income inequality and infant mortality. As suggested by Regidor et al. (2012) commentary in this issue of *Social Science & Medicine*, analyses based on data for the last decades of the 1970's and 1980's show a consistent association of income inequality and mortality, presumably as a result of welfare policies that promote income

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Fixed Effects – Inequality and Mortality

- Income inequality related to infant mortality
  - Strong ecological association income inequality with infant mortality across countries - but is it causal?
- Fixed effects controls variation across countries
  - Approach relies on changes in inequality within countries over time – 34 OECD countries over 38 years, Gini and IMR.
- Gini changes not associated with IMR changes
  - Possible that social policies reducing IMR cluster in relatively egalitarian countries, but their effects are not via income.

Strully et al.

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http://asr.sagepub.com
SAGE

Effects of Prenatal Poverty on Infant Health: State Earned Income Tax Credits and Birth Weight

Kate W. Strully,[a] David H. Rehkopf,[b] and Ziming Xuan[c]

Abstract

This study estimates the effects of prenatal poverty on birth weight using changes in state Earned Income Tax Credits (EITC) as a natural experiment. We seek to answer two questions about poverty and child wellbeing. First, are there associations between prenatal poverty and lower birth weights even after factoring out unmeasured potential confounders? Because birth weight predicts a range of outcomes across the life course, lower birth weights that result from poverty may have lasting consequences for children's life chances. Second, how have recent expansions of a work-based welfare program (i.e., the EITC) affected maternal and infant health? In recent decades, U.S. poverty relief has become increasingly tied to earnings and labor markets, but the consequences for children's wellbeing remain controversial. We find that state EITCs increase birth weights and reduce maternal smoking. However, results related to AFDC/TANF and varying EITC effects across maternal ages raise cautionary messages.

Keywords

infant health, poverty, Earned Income Tax Credit

In life course models of stratification, early-life environment is crucially important. Exposure to poverty and negative environments during critical stages of early life can negatively affect children's future developmental trajectories (e.g., cognitive and physical development), which may have lasting negative effects on educational attainment and adult earnings (Duncan and Brooks-Gunn 1997; Wagmiller et al. 2006). According to recent research, prenatal poverty and birth weight are important variables in life course processes of stratification (Conley, Strully, and Bennett 2003; Cramer 1995). As a measure of health at the start of life, birth weight is a general indicator of a baby's in-utero environment and development, and maternal poverty during the prenatal period is a robust predictor of lower birth weights (Bennett 1997). Low birth weight can in turn predict a range of negative

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Natural Experiment – Welfare and Health

- Do work/income incentives affect infant health?
  - It is hypothesised that work/income schemes will raise incomes and employment for unmarried mothers with high school or less, and in turn improve infant health.
- Using a “natural experiment” design
  - Variation between US states in introduction of income/work incentives to estimate effects prenatal poverty/infant health.
- Labour market, incomes, birth weight, smoking
  - Schemes increased employment 19%, incomes 32%, increased infant birth weight, slightly reduced smoking

Outline

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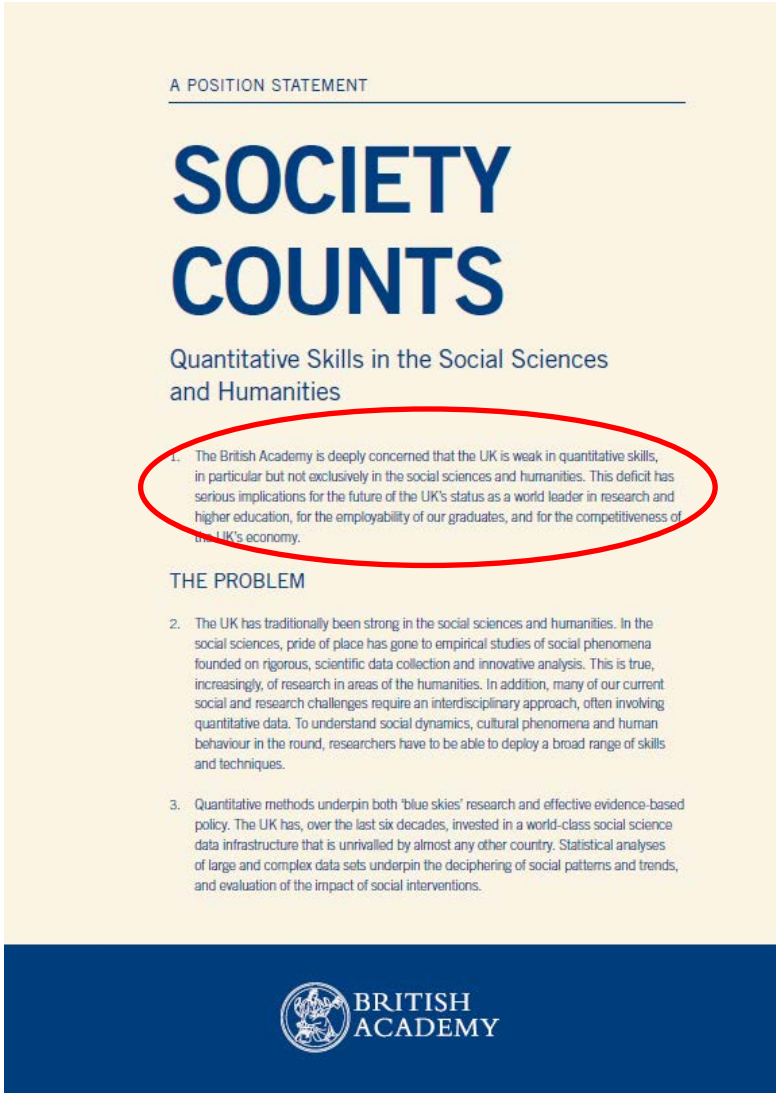
- Improving “our” methods
  - Inference by design
  - **Making it count**
  - Virtues of the virtual

The Problem – British Academy



A POSITION STATEMENT

SOCIETY COUNTS

Quantitative Skills in the Social Sciences and Humanities

1. The British Academy is deeply concerned that the UK is weak in quantitative skills, in particular but not exclusively in the social sciences and humanities. This deficit has serious implications for the future of the UK's status as a world leader in research and higher education, for the employability of our graduates, and for the competitiveness of the UK's economy.

THE PROBLEM

2. The UK has traditionally been strong in the social sciences and humanities. In the social sciences, pride of place has gone to empirical studies of social phenomena founded on rigorous, scientific data collection and innovative analysis. This is true, increasingly, of research in areas of the humanities. In addition, many of our current social and research challenges require an interdisciplinary approach, often involving quantitative data. To understand social dynamics, cultural phenomena and human behaviour in the round, researchers have to be able to deploy a broad range of skills and techniques.

3. Quantitative methods underpin both 'blue skies' research and effective evidence-based policy. The UK has, over the last six decades, invested in a world-class social science data infrastructure that is unrivalled by almost any other country. Statistical analyses of large and complex data sets underpin the deciphering of social patterns and trends, and evaluation of the impact of social interventions.

BRITISH ACADEMY

The Solution – “Nuffield Initiative”

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Improving social well-being through education, research and innovation

Nuffield Foundation » News » £15.5 million for quantitative methods training for social science undergraduates

News listing

£15.5 million for quantitative methods training for social science undergraduates

16 October 2012

The Nuffield Foundation, the Economic and Social Research Council (ESRC) and the Higher Education Funding Council for England (HEFCE) have launched a major new £15.5 million programme designed to promote a step-change in quantitative methods training for social science undergraduates in the UK.

£15.5 million will be invested over five years.

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Over a five-year period, up to 15 specialist centres will receive funding to provide quantitative skills training in social science disciplines. The aim is to produce a cohort of quantitatively-skilled social science graduates, as well as to embed long-term institutional change to provide more and better quantitative methods training in UK universities.

The programme is a strategic response to the critical shortage of quantitatively trained social scientists in the UK, which has led to employers across all sectors unable to recruit people with the skills to apply quantitative methods to evaluating evidence and analysing data. A summary of the evidence of this shortage is presented in a position statement published by the British Academy today (*Society Counts*), which is welcomed by the funders of this new programme.

See also

Further information about the Quantitative Methods Programme

In the media

Blog by Sharon Witherspoon on the Guardian HE network

***Cash for quantitative and qualitative change*, Times Higher Education, 18 October 2012**

***Quantitative easing*, Times Higher Education, 18 October 2012**

***Cash boost for quantitative social science skills training*, Research Fortnight Today, 18 October 2012**

The quantitative skills shortage

British Academy position statement *Society Counts*

Learned society and professional bodies statement on quantitative skills (PDF)

Printer-friendly version

Patterns in politics and society

Enriching Social Science Teaching with Empirical Data (ESSTED)

Teaching Politics with Quantitative Data

This half-day workshop explores how quantitative data can enhance the teaching of politics at undergraduate level.

Our team has created examples of curriculum innovation at the University of Manchester. The workshop highlights how using data supports active learning and helps students engage with theory whilst developing research and critical skills.

The main focus is on the use of representative survey data such as British Social Attitudes (BSA) to explore attitudes and behaviour. Activities as 'Making Students Part of the Dataset' offer engaging and accessible ways to explore topics in politics, including immigration, the welfare state and political participation.

The workshop also highlights useful online resources that make it easy for students and teachers to access social data for use in teaching or assessment and includes time for sharing ideas, techniques and experiences with other politics teachers and lecturers.

Dates

- 1st May 10:30-13:30 Humanities Bridgeford Street Building at the University of Manchester (Room 1.69) Click here to register through eventbrite
- 11th September NatCen Social Research, 35 Northampton Square, London EC1V 0AX Click here to register through Eventbrite

These morning workshops are followed by 'Enabling Students to Use Data in their Sociology and Politics Dissertations and Coursework'.

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Follow

Outline

- Improving “our” methods
  - Inference by design
  - Making it count
  - **Virtues of the virtual**

PRESENTED BY

UNIVERSITY OF MICHIGAN NETWORK ON INEQUALITY, COMPLEXITY & HEALTH

FEBRUARY 24-25, 2014

Natcher Conference Center

NIH Campus | Bethesda, MD

COMPLEX SYSTEMS, HEALTH DISPARITIES & POPULATION HEALTH: BUILDING BRIDGES

National Institutes of Health

Office of Behavioral and Social Sciences Research

Assessing policy counterfactuals with a simulation-based inquiry system.

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FACULTY OF ARTS
THE UNIVERSITY OF AUCKLAND

Whare Wānanga o Tāmaki Makaurau

Peter Davis and Colleagues
COMPASS Research Centre
University of Auckland
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MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

DISCLAIMER: *Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the author, not Statistics New Zealand.*

Presentation Outline

- **Assessing counterfactuals**
  - A simulation approach
- **A knowledge-based inquiry system**
  - Grounded in real data
  - Permitting counterfactual modelling
- **Social Determinants of Health**
  - Case study
- **Conclusion**

Assessing counterfactuals

- **Counterfactual paradigm of causal reasoning**
  - If the putative causal factor had not been present, we would not have observed the recorded outcome.
    - Randomised Controlled Trials (RCTs)
    - Experimental and quasi-experimental methods
    - Observational designs and statistical analysis
  - **Simulation techniques**

Inquiry system

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- Knowledge-based inquiry system

1. A synthetic base file representative of the population
2. A number of real-world longitudinal studies
3. A technique for combining the data from 4 studies
4. A statistical model mimicking life-course biographies
5. A tool that helps interrogation of these biographies

Inquiry Tool

(due to Barry Milne)

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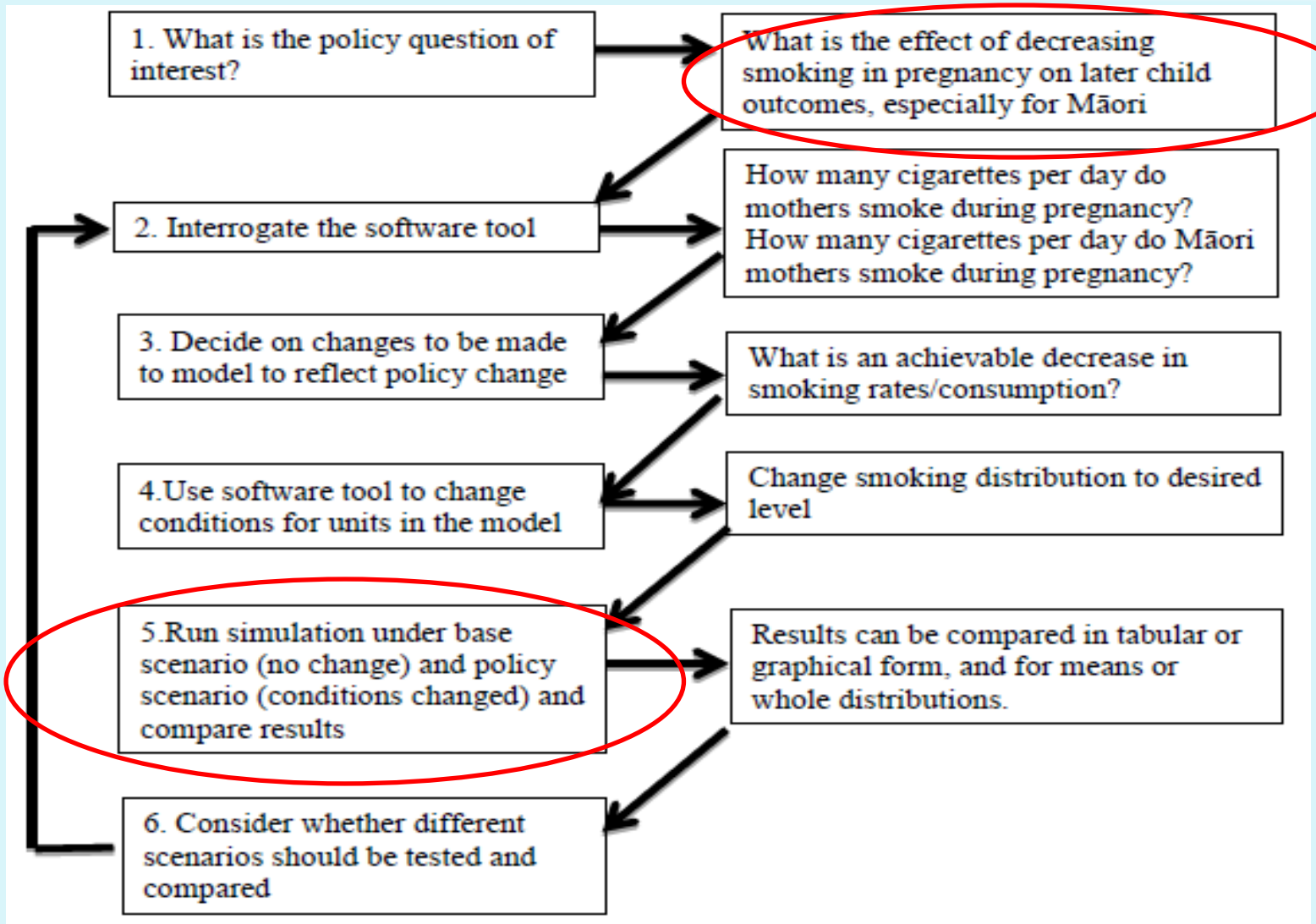


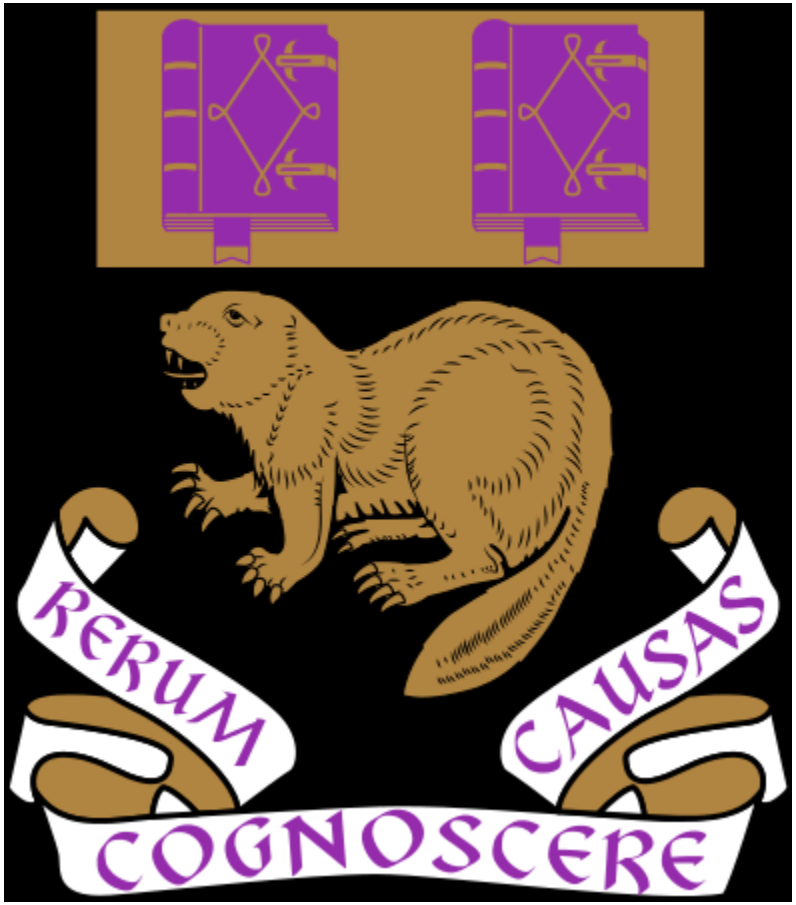
New Zealand

The University of Auckland

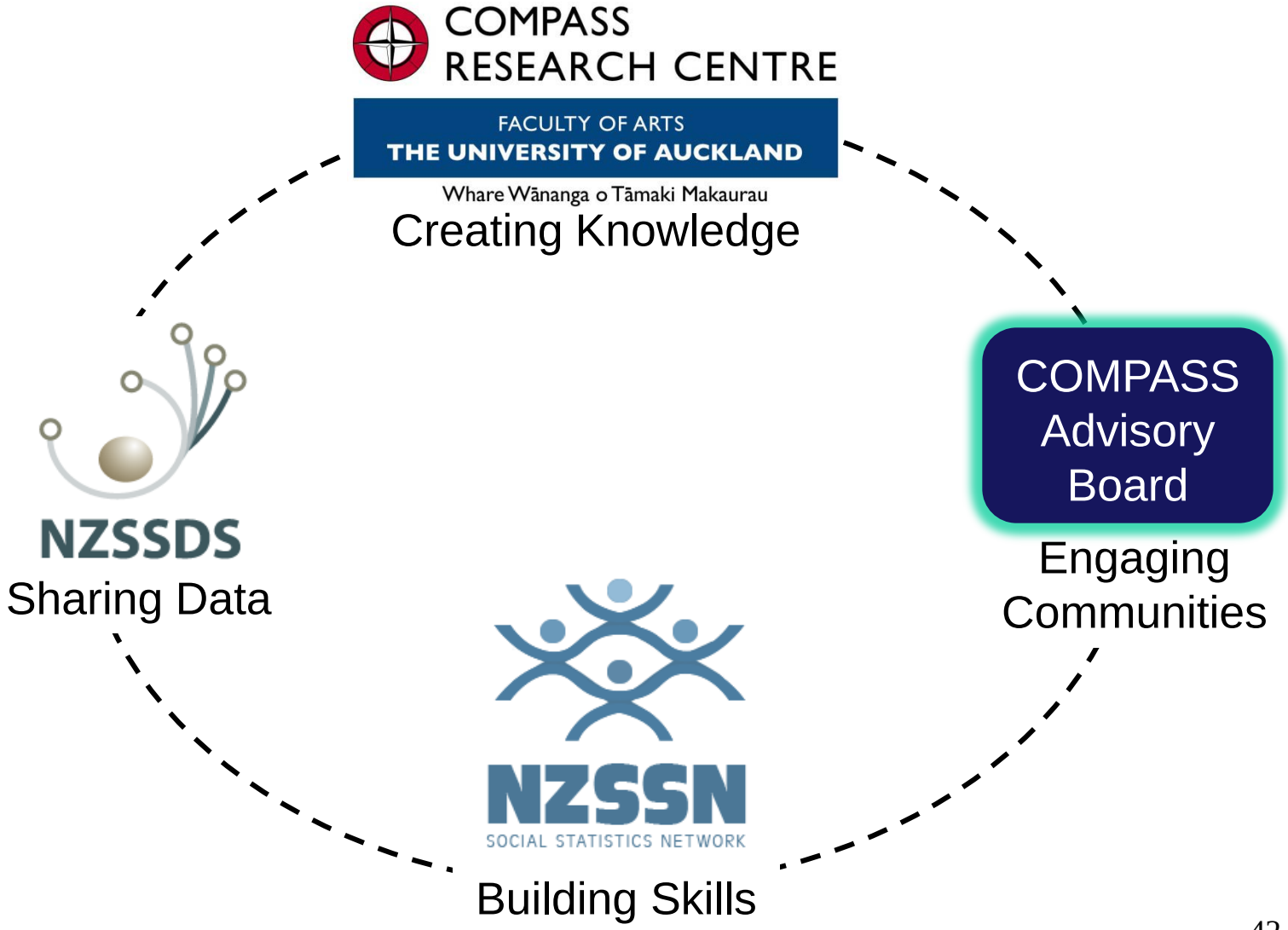
Outline

- The social sciences and public policy
- Making knowledge claims
- Improving our methods
  - Inference by design
  - Making it count
  - Virtues of the virtual
- Concluding thoughts
  - “Public” social science
  - Applied statistics

“To Know the Causes of Things”



Organisational model for "Public Practice of Professional Social Science"



Handbook – Implications?

1. **Traditional statistical theory**
   mainly about representation not causation (i.e. sampling)

2. **Statistical inference=>causal inference**
   random assignment and manipulation of treatment conditions

3. **Counterfactual/potential outcomes**
   conceptually bridges experimental/observational settings

4. **Forward causation only**
   cause-to-effect (e.g. impact of policy intervention)

5. **Econometrics**
   a parallel community of policy practice (e.g. to public health)

New Zealand

Advancing Public Policy.

An agenda for applied statistics and the social sciences

Charles Sturt University, 2014

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