

A nighttime photograph of the Australian National University campus in Canberra. The central focus is the iconic tower, illuminated with warm yellow lights, standing prominently against a dark blue twilight sky. A modern bridge with a series of lights along its railing spans across a body of water in the foreground. The lights from the tower and bridge are reflected in the calm water. The overall scene is serene and well-lit, capturing the architectural beauty of the university at dusk.

**Stata: A key strategic statistical tool of choice in major
impact evaluations of socioeconomic programs**

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Stata – a key strategic statistical tool-of-choice in impact evaluations

This presentation:

- Explains **program impact evaluations (PiEs), evaluation designs and program-logic.**
- Discusses **strategic thinking** behind PiEs, particularly the art and importance of **choosing appropriate data tools.**
- Explains why **Stata** is internationally a **highly regarded, state-of-the-art, strategic tool** used in impact program evaluations.

Stata – a key strategic statistical tool-of-choice in impact evaluations

Aims of PiEs?

- To provide accurate and timely, quantitative evidence to governments on **whether or not, a national program has worked**; *Why, how, when and where?*
- To identify **any unintended consequences**
- To identify **areas for improvement**

Stata – a key strategic statistical tool-of-choice in impact evaluations

Why are PiEs important in evidence-based policy advice?

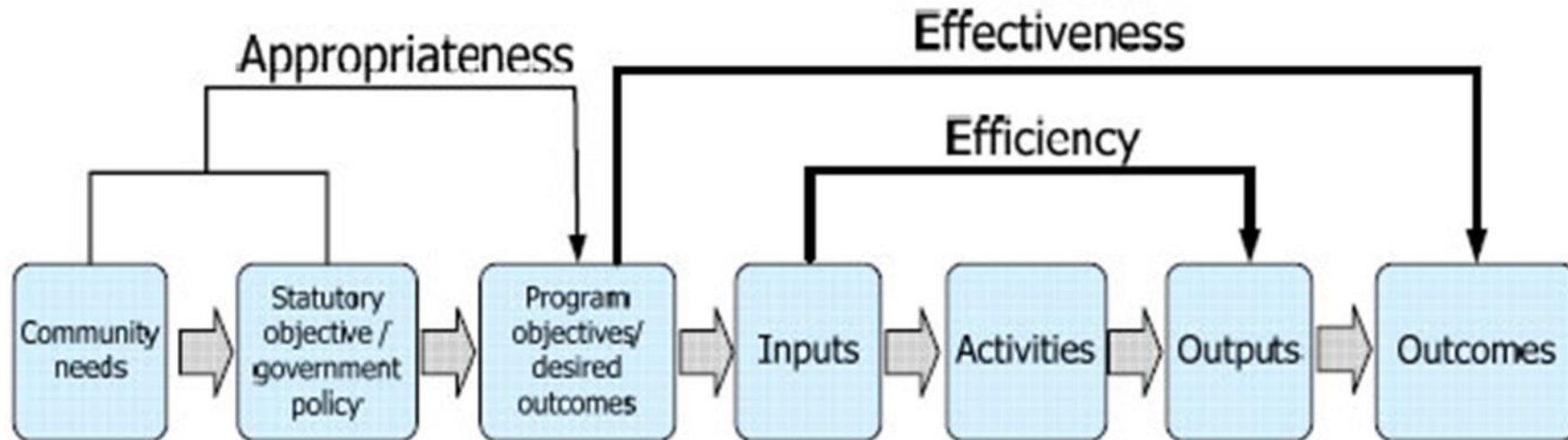
Good government – withstand parliamentary and media scrutiny:

- **Accountability** for millions of tax-payer dollars spent on programs
- **Transparent** government decisions
- **Improve and fund** future national programs

Stata – a key strategic statistical tool-of-choice in impact evaluations

How are PiEs conducted?

- Evaluation frame to assess program appropriateness, effectiveness and efficiency – this is the **evaluation program logic**.



Stata – a key strategic statistical tool-of-choice in impact evaluations

Good framework for PiEs?

- Clear **statement of the public policy problem** the program addressed
- Correct **experimental designs** to collect credible evidence
- Credible and appropriate **data sources** - administrative and survey
- Carefully tailored robust **statistical methods**
- Correct **statistical tools** to collect data, assess the evidence and report

Collect, evaluate and report quality evidence

Stata – a key strategic statistical tool-of-choice in impact evaluations

Key strategic evaluation questions?

- **Accountability** – evaluation is accountable to stakeholders
- **Propriety** – evaluation is ethical
- **Utility** – evaluation meets information needs of stakeholders
- **Feasibility** – evaluation is viable and pragmatic
- **Accuracy / Quality** – evaluation findings are considered correct

Stata – a key strategic statistical tool-of-choice in impact evaluations

Why are evaluation designs very important?

- Ultimately, quality of government policies rests on **quality of the evidence** produced from impact programs evaluations.
- **PiEs demonstrate** if policy has made a quantifiable difference, in terms of **cause and effect**.
- **Greatest difficulty** is in generating **controls / counterfactual**:
 - Natural experiments are **unethical**;
 - Controlling **internal validity issues**: Confounders; Selection bias; Program contamination, Spill-overs and Impact heterogeneity
- Evaluation **designs are star-rated** GOLD, SILVER and BRONCE.

Stata – a key strategic statistical tool-of-choice in impact evaluations

How is Stata used to turn data into evidence?

- **Data Planning:** Develop PiEs design, research questions & analysis
- **Data Collection:** Survey instruments & Panel data;
- **Data Management:** Extraction Transform, Load (ETL)
- **Data Analyses:** Broad suite of statistical procedures; Visualisations; Maps;
- **Data Reporting:** LaTeX; Publication-ready graphic & tables; Automation
- **Data and Code Sharing and Publishing/Reporting:** PDF; ado-files...etc

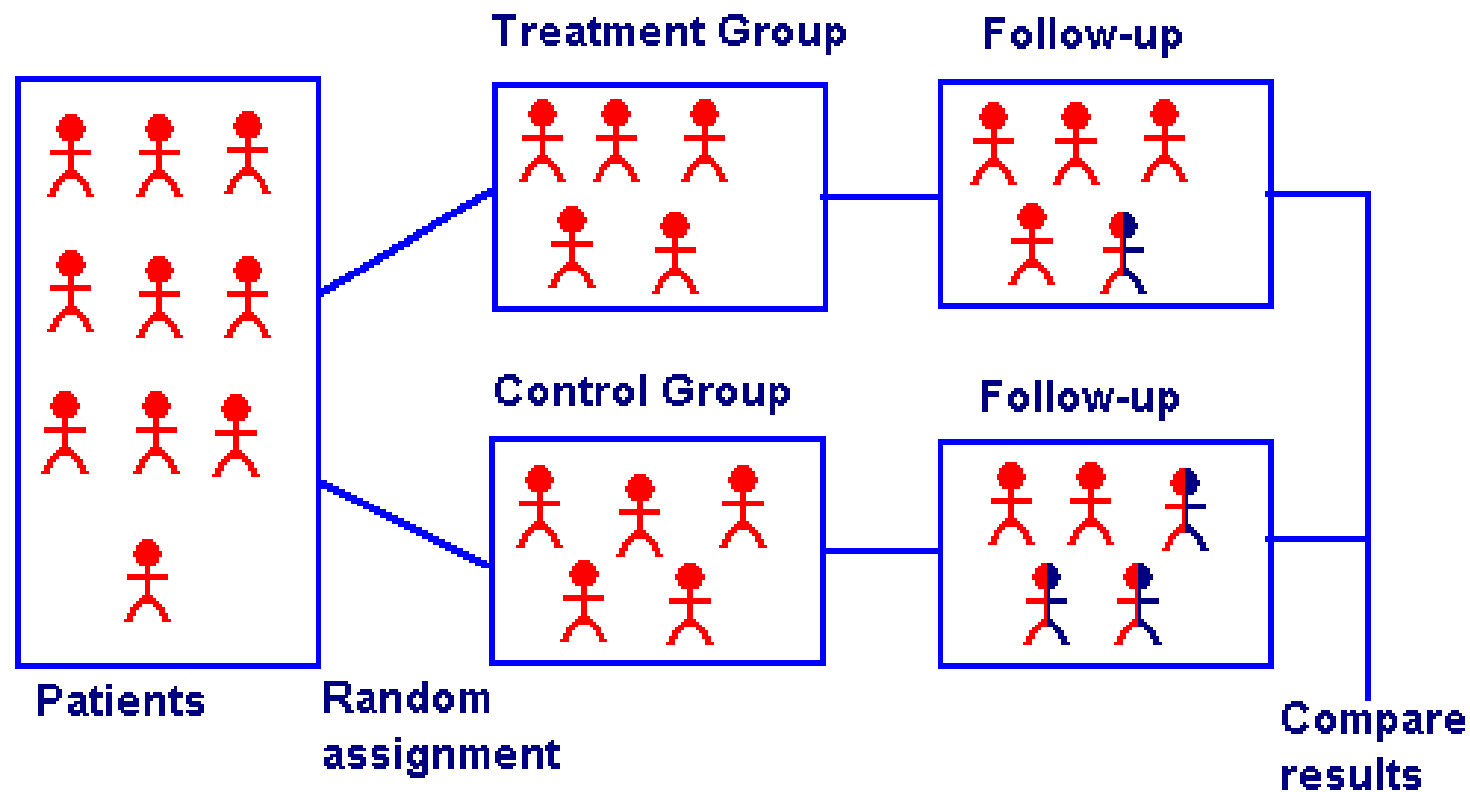
Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata – when efficient, timely, comprehensive and accurate evidence matters

- ✓ Handles **very large and complex datasets** from many socio-economic sectors and in real-time;
- ✓ Provides **robust, rigorous and reliable statistics and data visualisations** in impact program evaluations: **Counterfactual bias controls**:
 - **GOLD standard**: Randomised Controlled Trials (RCT)
 - **SILVER standard**: Difference in Difference; Regression Discontinuity; Propensity Score Matching; Instrument Variables, Bandwidth Matching; Quantile Regression and Data Envelopment Analysis.
 - **BRONCE standard**: Qualitative comparisons – with or no controls

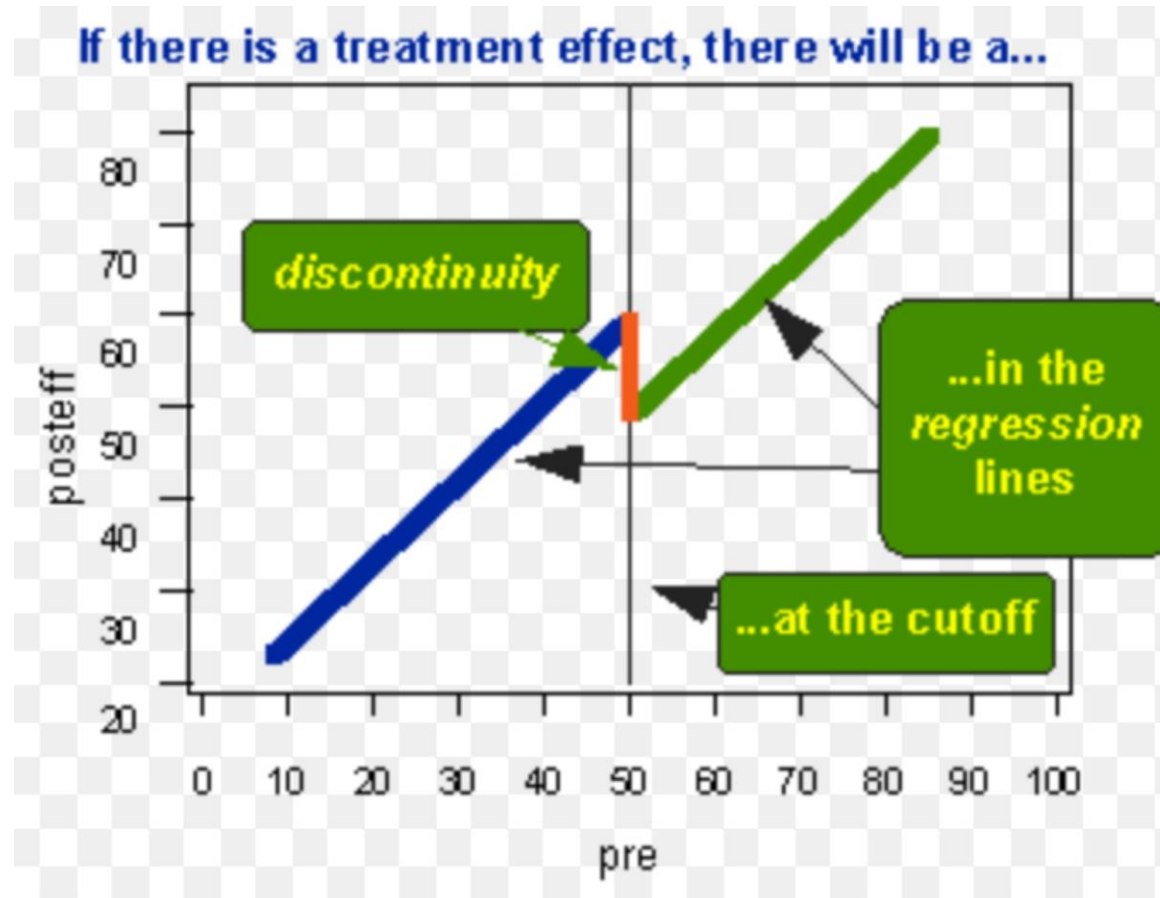
Stata – a key strategic statistical tool-of-choice in impact evaluations

Randomised Control Trials (RCT)



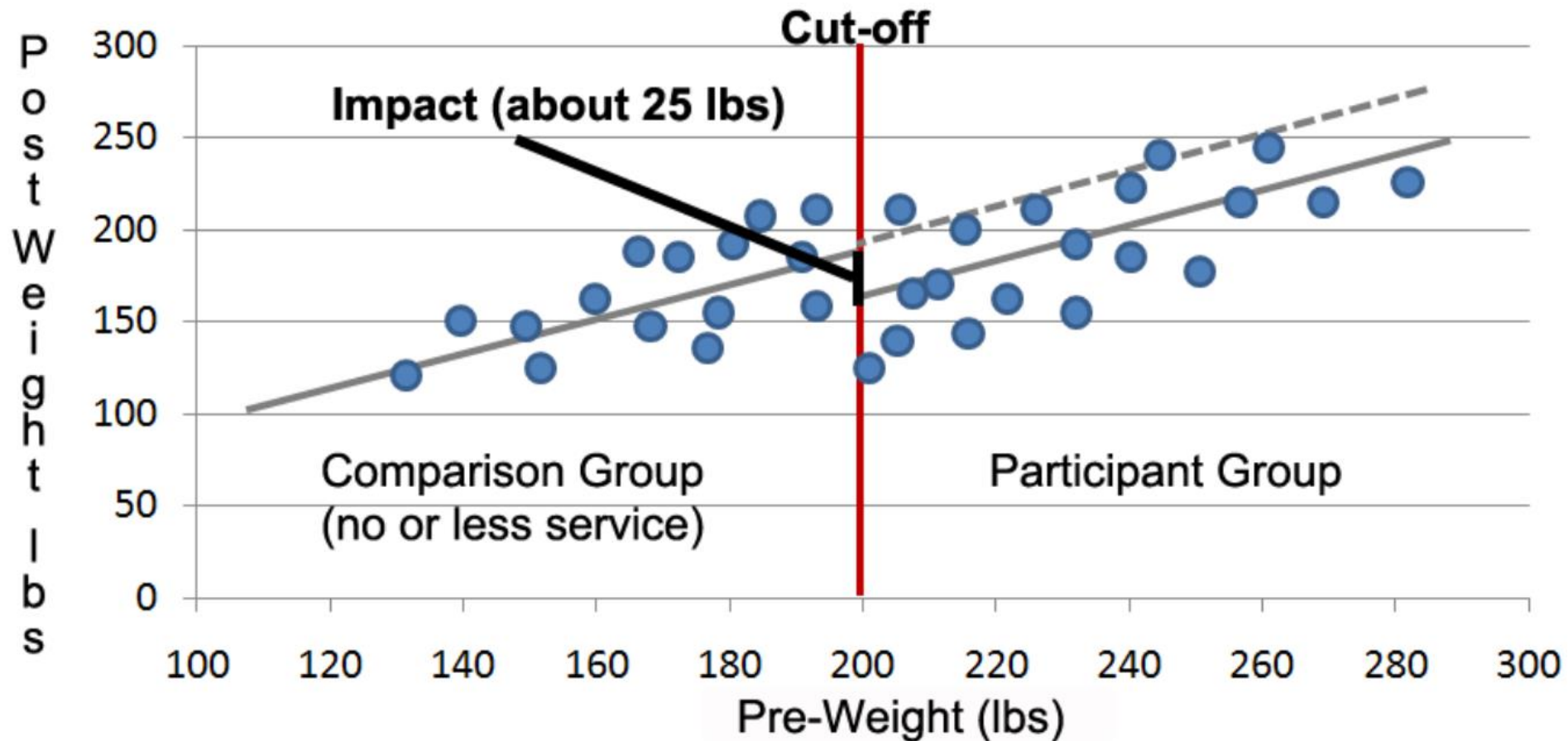
Stata – a key strategic statistical tool-of-choice in impact evaluations

Regression Discontinuity Design (RDD)



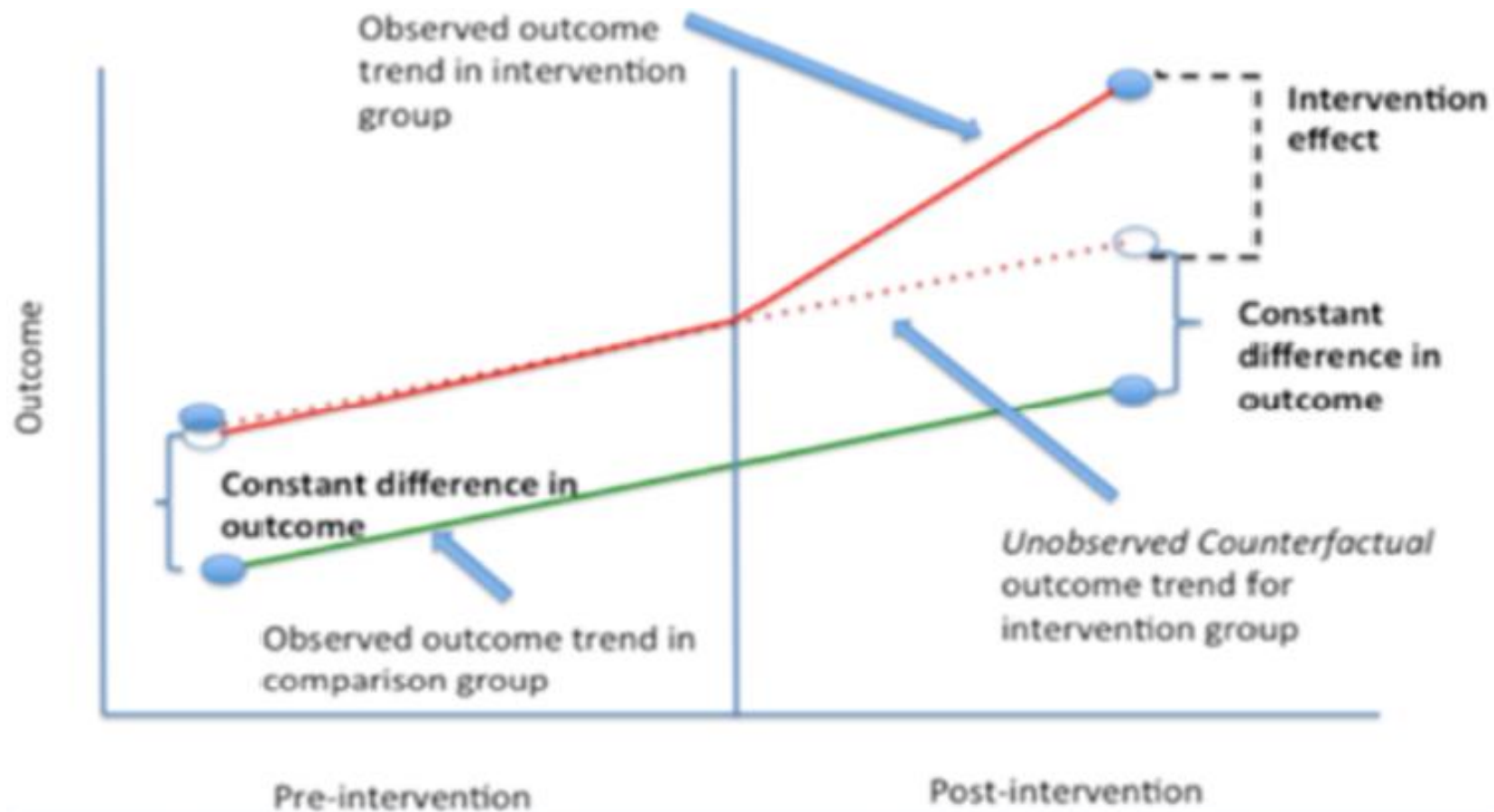
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Regression Discontinuity Design (RDD)



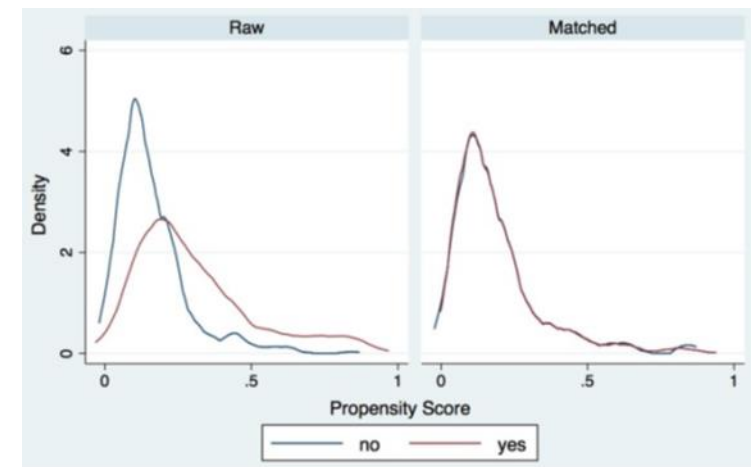
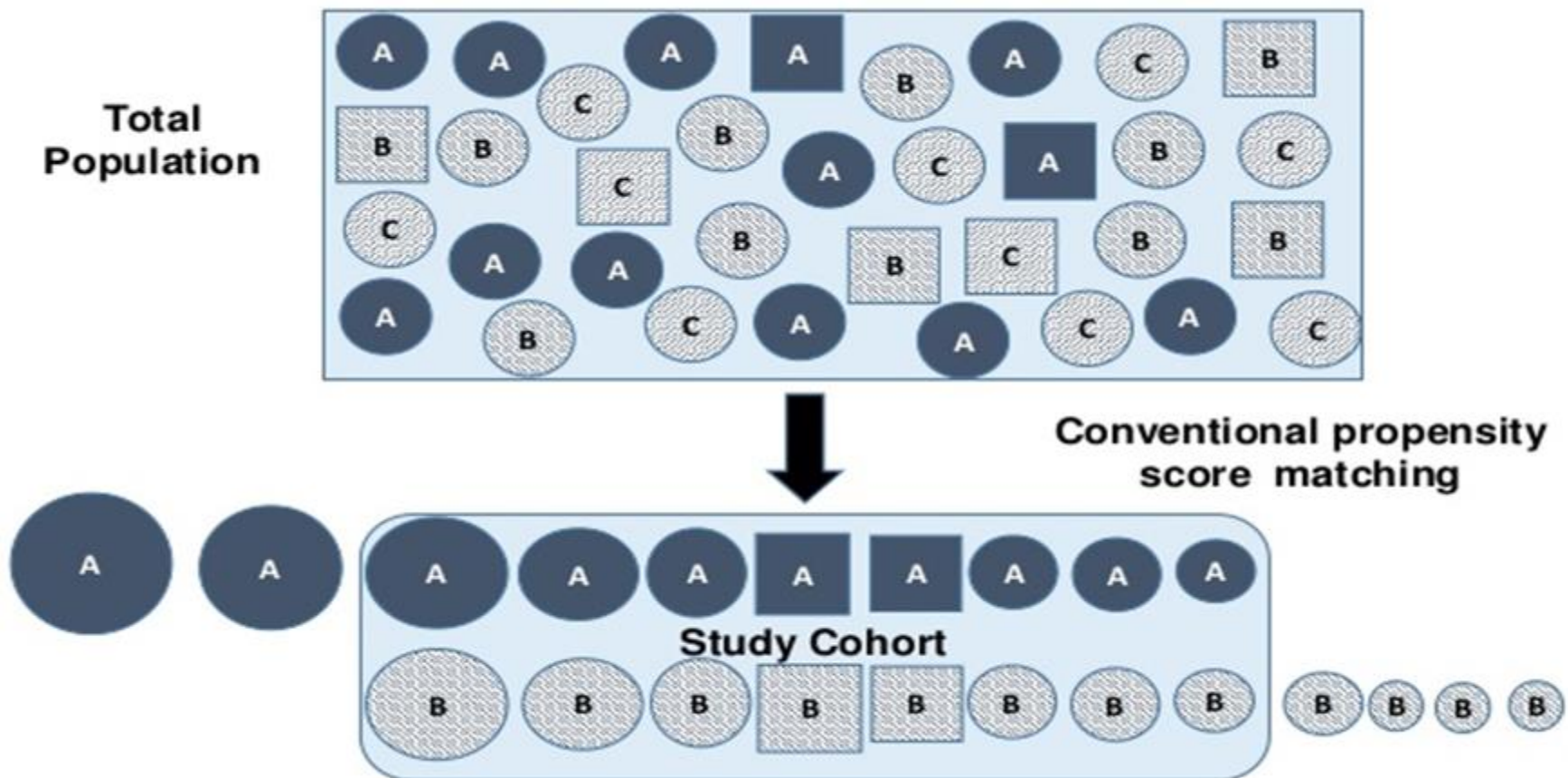
Stata – a key strategic statistical tool-of-choice in impact evaluations

Difference in Difference (DiD)



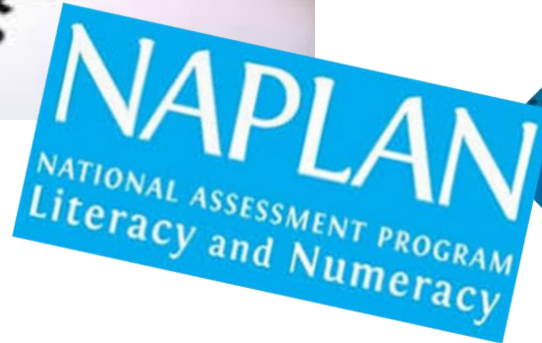
Stata – a key strategic statistical tool-of-choice in impact evaluations

Propensity Score Matching (PSM)



Stata – a key strategic statistical tool-of-choice in impact evaluations

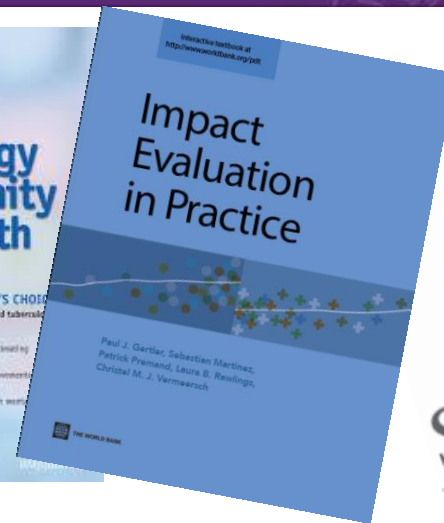
Australian Government impact program evaluations that used Stata



Stata in national socio-economic impact program evaluations

Stata – a key strategic statistical tool-of-choice in impact evaluations

Other International Government PiEs that used Stata



Stata in national socio-economic impact program evaluations

Stata – a key strategic statistical tool-of-choice in impact evaluations

A selection of published national PiEs using STATA

Author	Study Title	Country	Website
Australian Gov. DEEWR (2008)	Welfare to Work Evaluation Report	Australia	http://www.a4.org.au/sites/default/files/welfaretoworkevaluationreport.pdf
John Haisken-DeNew (2013)	A graphical user interface in stata for extracting data from the LSAC and LSIC	Australia	http://www.growingupinaustralia.gov.au/conf/2013/program.html
Moran et al. (2015)	Do Australian Catholic and Independent Primary Schools Produce Better Academic Outcomes than Government Schools?	Australia	http://ro.uow.edu.au/commwkpapers/340/
Rogers et al. (2015)	Choosing appropriate designs and methods for impact evaluation	Australia	https://industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/Impact-evaluation-report.pdf
Rogers et al. (2016)	Investigating the impact of NAPLAN on student, parent and teacher emotional distress in independent schools	Australia	https://link.springer.com/article/10.1007/s13384-016-0203-x
The Melbourne Institute (2017)	The Household, Income and Labour Dynamics in Australia Survey: Selected Findings from Waves 1 to 15	Australia	http://melbourneinstitute.unimelb.edu.au/_data/assets/pdf_file/0010/2437426/HILDA-SR-med-res.pdf
OECD (2004)	Evaluating Local Economic and Employment Development	OECD	http://www.oecd.org/leed-forum/publications/Evaluating%20Local%20Economic%20and%20Employment%20Development.pdf
Pu and Gibson (2016)	The effects of interaction between location of birth and location of study on immigrant workers' wages in Canada	Canada	https://www.stata.com/meeting/canada17/slides/Canada17_Pu_poster.pdf
World Bank (2011)	Impact evaluation in practice	Multiple	https://siteresources.worldbank.org/EXT/HDOFFICE/Resources/5485726-1295455628620/Impact_Evaluation_in_Practice.pdf
Rutkowski et al (2013)	Handbook of International Large-Scale Assessment - PIRLS	Multiple	http://courses.education.illinois.edu/EdPsy587/MLchapter_submit.pdf
Sun et al. (2017)	Evaluation of the performance of national health systems in 2004-2011: An analysis of 173 countries	173 countries	http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0173346
Grill et al. (2014)	Exploiting TIMSS and PIRLS combined data: multivariate multilevel modelling of student achievement	Italy	https://arxiv.org/pdf/1409.2642.pdf
Wolszczak-Derlacz and Parteka (2011)	Efficiency of European public higher education institutions: a two-stage multicountry approach	Europe	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3205260/
Galarraga et al. (2010)	Health insurance for the poor: impact on catastrophic and out-of-pocket health expenditures in Mexico	Mexico	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2888946/
Buddelmeyer & Skoufias (2005)	The Progres a oportunidades program of Mexico and its Impact Evaluation	Mexico	http://slideplayer.com/slide/11284334/ https://www.povertyactionlab.org/evaluation/impact-progres-a-health-mexico
Green et al. (2014)	Cost-Effectiveness of Collaborative Care for Depression in UK Primary Care: Economic Evaluation of a Randomised Controlled Trial (CADET)	UK	http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0104225
Sianesi (2016)	Policy evaluation methods	UK	https://www.ifs.org.uk/events/1292
Nunn & Qian (2014)	Food aid and civil conflict	USA & Multiple	https://scholar.harvard.edu/files/nunn/files/faidconf_20130806_final_0.pdf
Hawkins et al. (2014)	Evaluating the impact of the Baby-Friendly Hospital Initiative on breast-feeding rates: a multi-state analysis	USA	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4163534/
Inter-university Consortium for Political and Social Research (2009)	National Supported Work Evaluation Study, 1975-1979: Public Use Files (ICPSR 7865)	USA	http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/7865#cite
Patel et al. (2015)	Role-Modeling Cost-Conscious Care—A National Evaluation of Perceptions of Faculty at Teaching Hospitals in the United States	USA	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4539317/
Sahr (2010)	Stata makes a difference at the Health Policy Institute of Ohio	USA	https://www.stata.com/stata-news/statanews.25.3.pdf
Lance et al. (2014)	How Do We Know if a Program Made a Difference? A Guide to Statistical Methods for Program Impact Evaluation	USAID	https://www.measureevaluation.org/resources/publications/ms-14-87-en
Djebbari and Lopera (2011)	Impact evaluation using STATA	Bangladesh	https://www.pep-net.org/impact-evaluation-using-stata
Langbein and Felbinger (2014)	Public Program Evaluation: A Statistical Guide	NA	http://johannes.lecture.ub.ac.id/files/2012/05/MEI-3-2012-Public-Program-Evaluation--validity.pdf
Bell and Gianni (2015)	Theory and Practice using STATA	NA	https://www.stata.com/meeting/tstat/Brochure_SummerSchool_TStat2015_UK.pdf

Select national socio-economic impact program evaluations with Stata

Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata is a tool of choice for SMART Impact Program Evaluation

- **Specific** – strategic and specific target for improvement
- **Measurability** – quantifiable indicator of progress, especially of the counterfactual
- **Achievability** – state what results can realistically be achieved
- **Realistic** – attainability of standards
- **Time** – specify when the result(s) can be achieved
- **Budget** – within the allocated budget

Collect, evaluate and report quality evidence

Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata – Strategic PiEs Data Capabilities

- ✓ **Impact Evaluation Capabilities** – Self-contained, powerful data management, analysis, reporting & maps
 - *Meets ISO standards & US FDA regulator compliance requirements*
- ✓ **Intuitive & interactive user-interface** – Easy to learn, use and teach
- ✓ **Simple & consistent structure** – Easy to learn, use and teach
- ✓ **Expandability & maintainability** – Easy and efficient, in-program installation of updates; Java API expandability
- ✓ **Well-documented** – Examples for every procedure
- ✓ **Resources** – Stata: Journal, News, Press, Blog, Training and Video Tutorials
- ✓ **Community support** – Stata conference, Statalist, User comments
- ✓ **Portability** – Windows, Mac, Linux/Unix and configurations (standalone or networked)
- ✓ **Interoperability** – Works with other tools (e.g. SAS, R, Python, Tableau, MapInfo, Spotfire, RapidMiner)

Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata – Comprehensive program impact evaluations analytics

✓ Data Types

- Panel data
- Survey data

✓ Sophisticated Counterfactual Testing

- Experimental method (**Gold standard**)
 - Random Control Trials
- Quasi-Experimental methods (**Silver standard**)
 - Regression Discontinuity
 - Difference in Difference
 - Instrument Variables

✓ Unmatched Treatment effects/Causal inference estimators

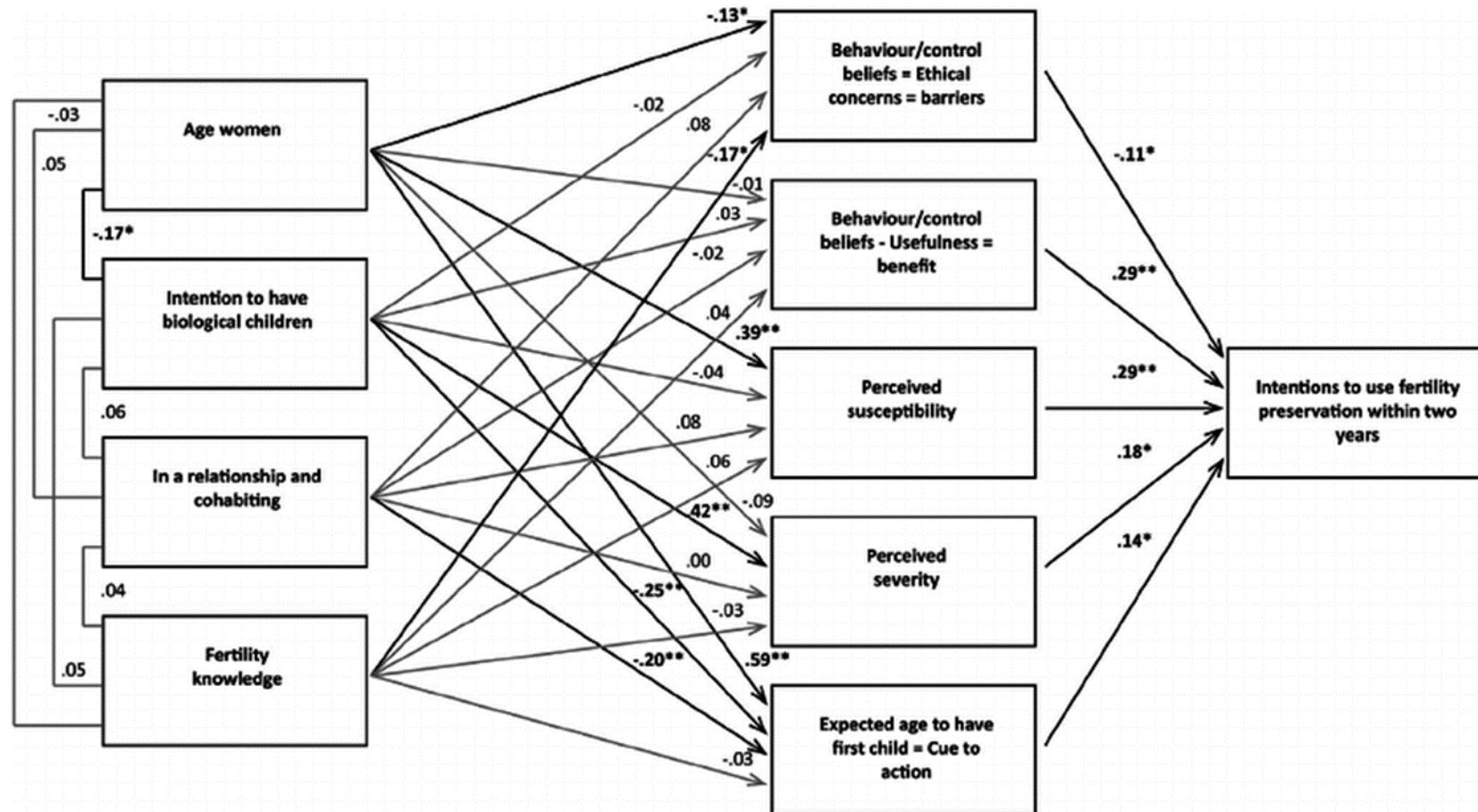
- Propensity-score matching
- Inverse-probability weights (IPW)
- Covariate matching
- Regression adjustment
- Weighted regression
- Augmented IPW (AIPW)
- IPW with regression adjustment
- Doubly robust methods
- eTregress
- Non-parametric synthetic controls

✓ Big Data, Machine Learning and Predictive models

- Parallel processing (e.g. *f-tools*)
- Classifications, Regressions and Clusters

STATA – a key strategic statistical tool-of-choice in impact evaluations

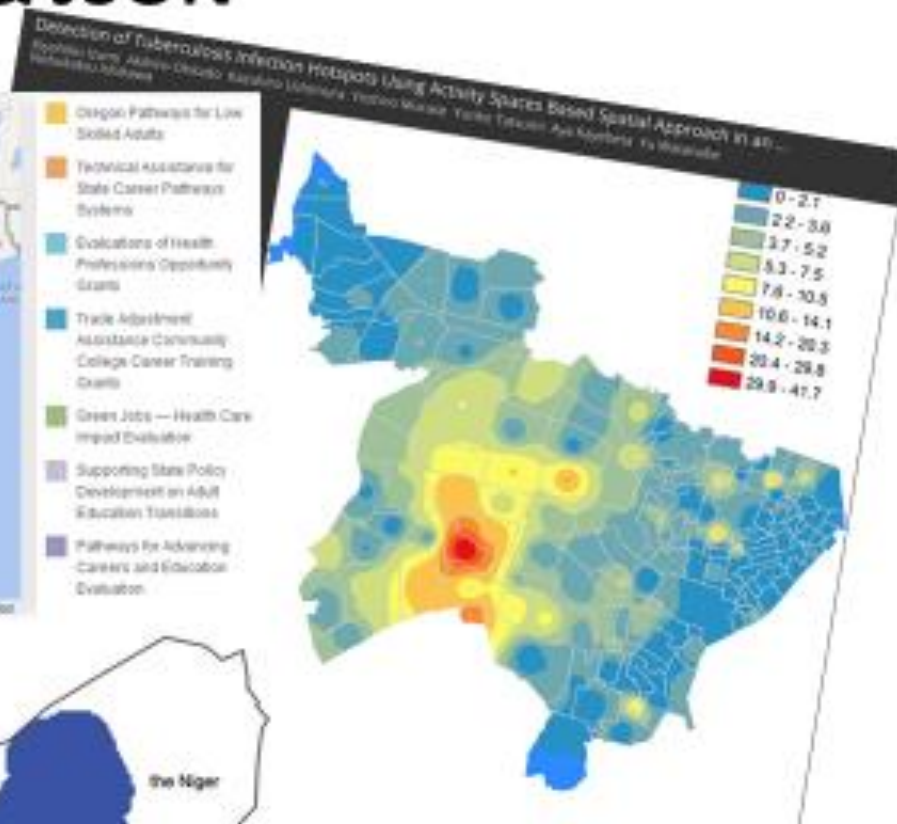
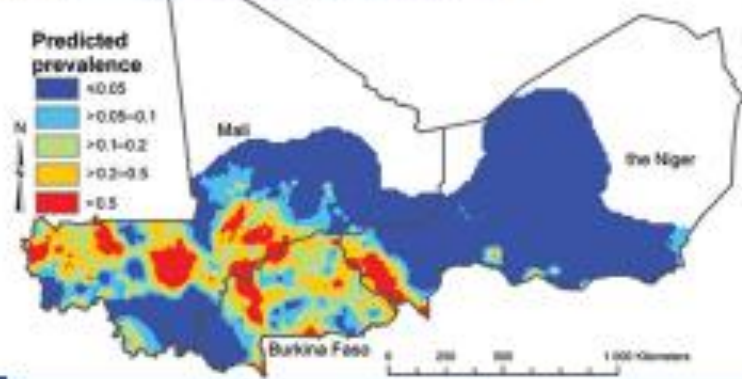
Stata – Structural Equation Modelling



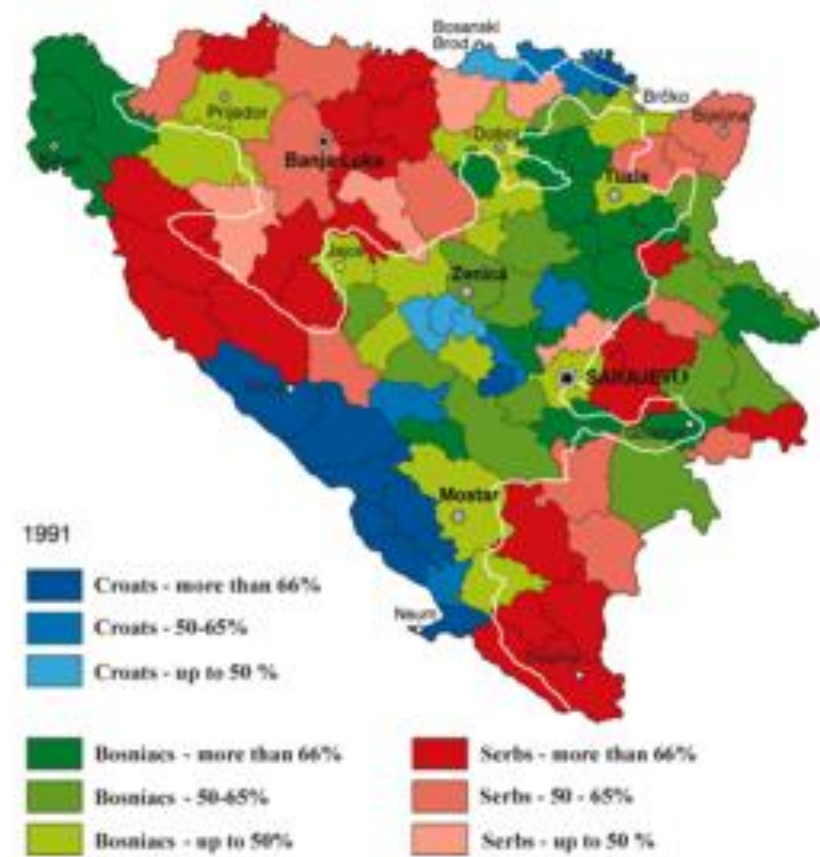
Confirmatory analysis

STATA – a key strategic statistical tool-of-choice in impact evaluations

Stata Maps – ArcGIS & JSON



Ethnic composition before the war in BiH (1991)



High quality choropleth / thematic maps

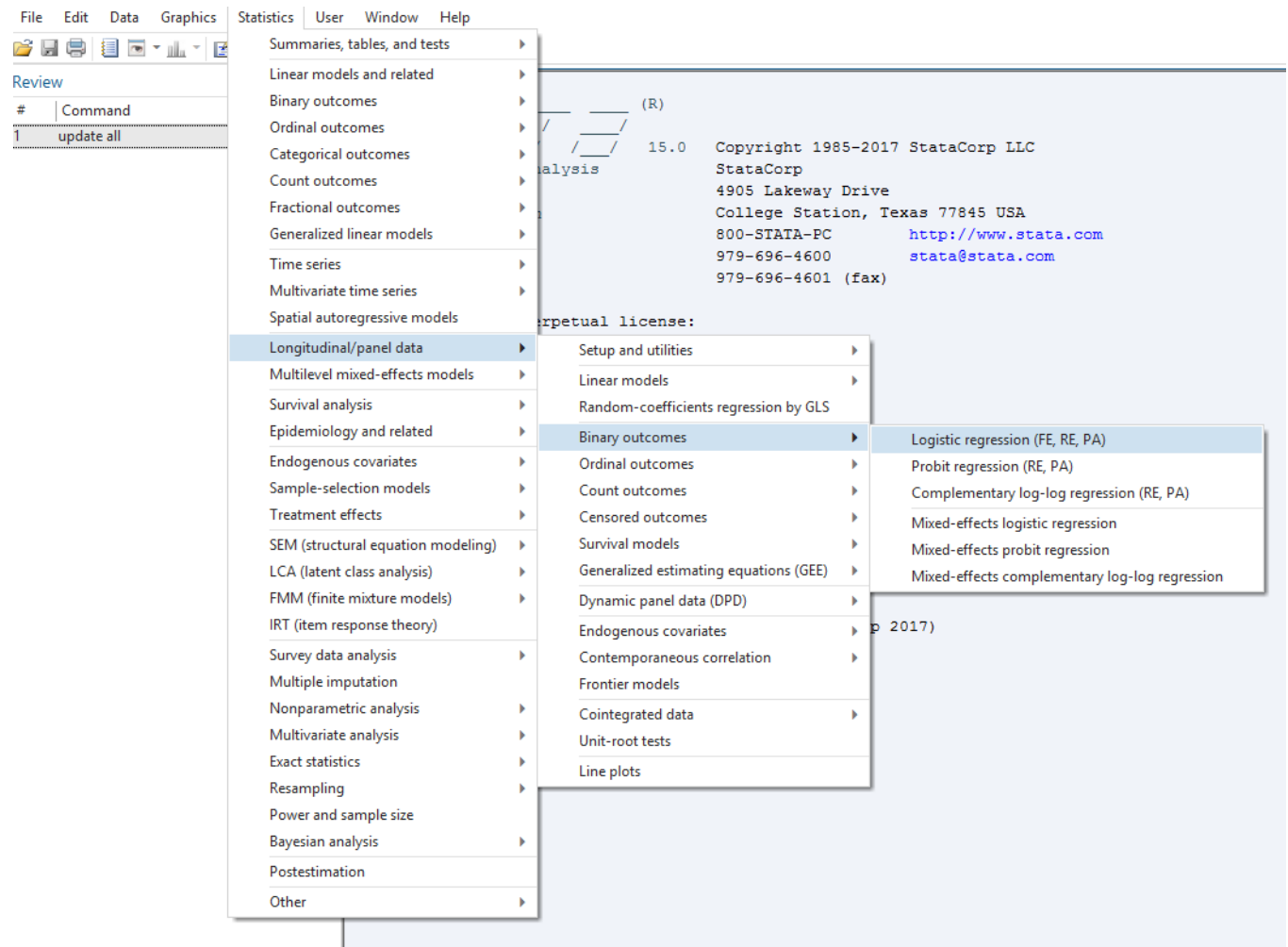
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STATA – a key strategic statistical tool-of-choice in impact evaluations

Stata – Intuitive and interactive interface



Easy to use

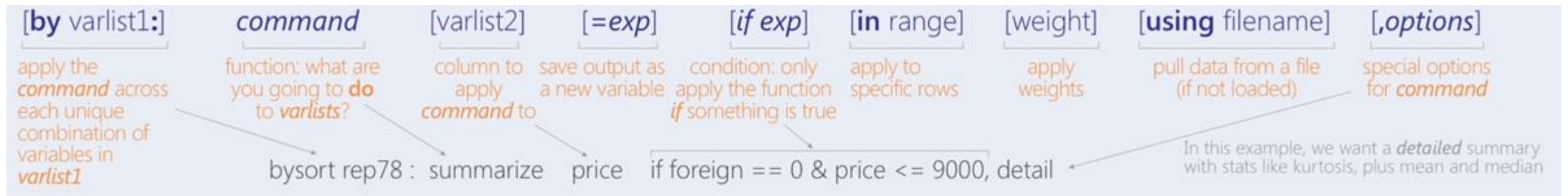
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STATA – a key strategic statistical tool-of-choice in impact evaluations

Stata – Simple and consistent syntax



Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata – Strategic PiEs Data Capabilities

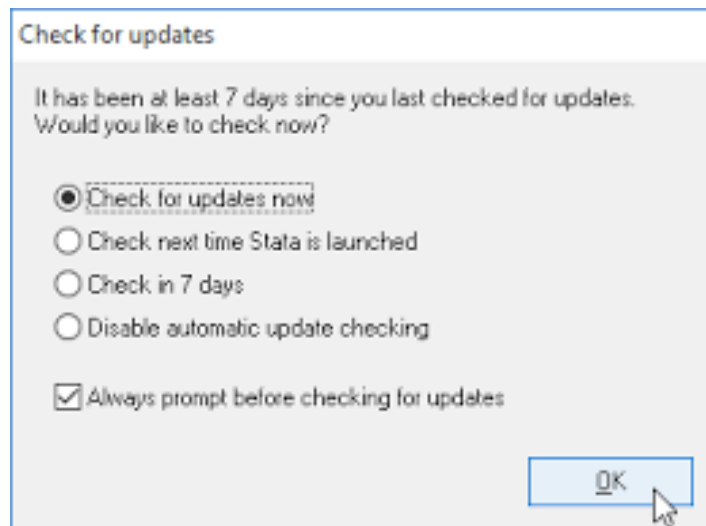
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Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata – easy to install – easy expandability , all within the program

```
. update all
(contacting http://www.stata.com)

Update status
  Last check for updates: 19 Sep 2017
  New update available:  none      (as of 19 Sep 2017)
  Current update level:  05 Sep 2017 (what's new)
```



Stata – a key strategic statistical tool-of-choice in impact evaluations

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STATA – a key strategic statistical tool-of-choice in impact evaluations

Stata – SMART Documentation and Report & Publishing

Stata user-manuals and references

- Printed; In-Program; On-line documents
- Help; *findit* command
- Cheat-sheets

Stata in-program publishing resources and automation facilities

- Publication ready graphics
- Ado files
- TabOut
- EstOut; EstTab
- PutPDF; PutDoc; dyndoc
- LaTeX
- StatWeave

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Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata Resources

The image is a collage of Stata resources. At the top left is the logo for 'THE STATA JOURNAL' with the tagline 'Promoting communications on statistics and Stata'. Below it is a grid of colorful abstract images. To the right is a screenshot of a YouTube video player with the title 'Real documentation' and a play button icon. Below the YouTube player is a screenshot of PDF documentation. In the center and right are several book covers for Stata-related titles, including 'An Introduction to Stata Programming', 'Data Analysis Using Stata', 'Maximum Likelihood', 'Applied Statistics Using Stata', 'A Gentle Introduction to Stata', 'A Visual Guide to Stata Graphics', 'Data Analysis Using Stata', 'Design & Analysis of Clinical Trials for Economic Evaluation & Reimbursement', 'Using Stata for Quantitative Analysis', and 'Microeconometrics Using Stata'. At the bottom right, there is a screenshot of the Stata software interface showing various windows like 'Data Processing', 'Data Analysis', and 'Data Visualization'. The text 'Print and E-resources' is written at the bottom of the collage.

Print and E-resources

Stata – a key strategic statistical tool-of-choice in impact evaluations

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STATA – a key strategic statistical tool-of-choice in impact evaluations

Stata - Interoperability



Data exchange with other tools of the trade

Stata – a key strategic statistical tool-of-choice in impact evaluations

Stata – Strategic PiEs Data Capabilities

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Stata – a key strategic statistical tool-of-choice in impact evaluations

Take home messages

Stata is a state-of-the-art, statistical tool-of-choice in SMART PiEs:

- ✓ **Trusted tool** with a long and proven international track record.
- ✓ **Powerfully comprehensive & efficient tool**: Big Data; Panel and Survey Data; Comprehensive Counterfactual Testing; Data Management, Visualisation, Mapping and Reporting.
- ✓ **Meets stringent data tool standards**: Usability, functionality, performance, reliability, portability and maintainability.
- ✓ **Facilitates timely, efficient, accurate and trusted evidence-based policy advice** based on rigorous impact evaluations of national socio-economic programs

Take home messages

Stata – a key strategic statistical tool-of-choice in impact evaluations

Acknowledgements

- ✓ I wish to acknowledge and thank the owners of materials in this presentation and respect their intellectual property rights.
- ✓ Thanks to anonymous colleagues for comments.

Stata – a key strategic statistical tool-of-choice in impact evaluations



SMART

Strategic

Trusted

Powerful

Comprehensive

THANK YOU