Generating Useful Test Data for Complex Linked Employer-Employee Datasets

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Access to sensitive micro data

- Data Anonymization is not feasible for all kinds of micro data (e.g. firm data)
 - anonymization methods are hard to implement
 - severe loss of information/analysis potential
- Access is provided
 - 1 on-site in “safe harbors”
 - 2 remote execution of statistical programs
 - 3 remote access

Access to sensitive micro data

- Access modes 1 and 2 are costly
 - time spent at RDCs
 - number of jobs sent to RDCs
- Costs can be reduced by good preparation of program codes
 - ahead of on-site use
 - ahead of remote job submissions
 - preferably in the researcher's office

Goals of test data

- Test data (dummy data, structural data files,...)
 - allow to write code
 - allow to check program syntax
 - any place: in researcher's office, on the train (anonymized)
 - easy to create

Test data vs. usual anonymization

Test data vs. usual anonymization

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Requirements of useful test data

- Include all variables found the original data
- All values
- Keep key elements of the data structure
 - panel data: entries, exits
 - multilevel:
 - o Households, parents, children
 - o Regions, residents, movers
 - o LEE-data: employers and employees

How to do it

- Restricted value swapping
- Complemented by
 - random sample
 - top/bottom coding or rounding
 - check of string variables

Restricted value swapping

Original data

ID	size	region
1	23	east
2	2	east
3	13	west
4	400	west
5	11	west

Swapped data

ID	size	region
1	13	west
2	2	east
3	400	west
4	11	east
5	23	west

Restricted value swapping

- Most datasets can be seen as one single matrix (wide format)
 - one subject per row
 - variables (and years) in columns

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- Swap values between subjects within the same pattern
=> keep structure and some consistency (eg. over time)

Restricted value swapping

- Swap values within subjects with the same pattern
=> keep structure and some consistency (eg. over time)
- if possible: also between similar observations

Restricted value swapping

- Keep additional structure by grouping variables
e.g. V1: variables on employee structure

Restricted value swapping

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Steps

- 1 Identify patterns
- 2 Group similar observations within patterns
- 3 Drop all observations in small groups
- 4 Group related variables
- 5 Mark variables in need of additional measures
(e.g. rounding)
- 6 Run swapping routines

Specifics of LEE-Data

- How to keep the EE-matches?
 - How to allow for movers?
- 1 Select sample of firms
 - 2 Select all employees of these firms
 - 3 Apply RVS to employer and employee data separately
 - 4 Change the bipartite graph
 - o i.e.: who works for which firm in which year
 - o is altered by swapping firm ids among individuals with equal observation patterns

Implementations

- IAB Establishment Panel: firm panel with 16 waves
- Sample of Integrated Labour Market Biographies (SIAB): register data on 2 mill. individuals, spell format
- Linked Employer-Employee Data from the IAB (LIAB)
- ...
- LEE ALLBUS 2008 Establishment Data (ALLBUS-BB)
- Employment Relationships and Social Exchange (BEATA)
- SFB580-B2 Establishment Panel

Pros and Cons

- Advantages
 - partially automated, easy to implement
 - degree of anonymization can be adjusted
 - tested procedure
- Limitations
 - inconsistent variables: e.g. date of birth later than interview
 - => if these are key variables manual corrections necessary
 - selection of observations might result in loss of sparse values
 - not every program checked with test data will work

Credits

- Developed and applied
 - Research Data Centre of the Institute for Employment Research (FDZ-IAB), Nuremberg (Dana Müller, Matthias Dorner)
 - Data Service Center for Business and Organizational Data (DSZ-BO), Bielefeld
- Refined within BLUE-ETS project, 7th Framework EU project by Jörg Drechsler
=> programs (Stata) will be available at
<http://www.blue-ets.istat.it/> (deliverables WP 7.1)