Improved Research Access to Census Bureau Linked Administrative Data via Public-use Products

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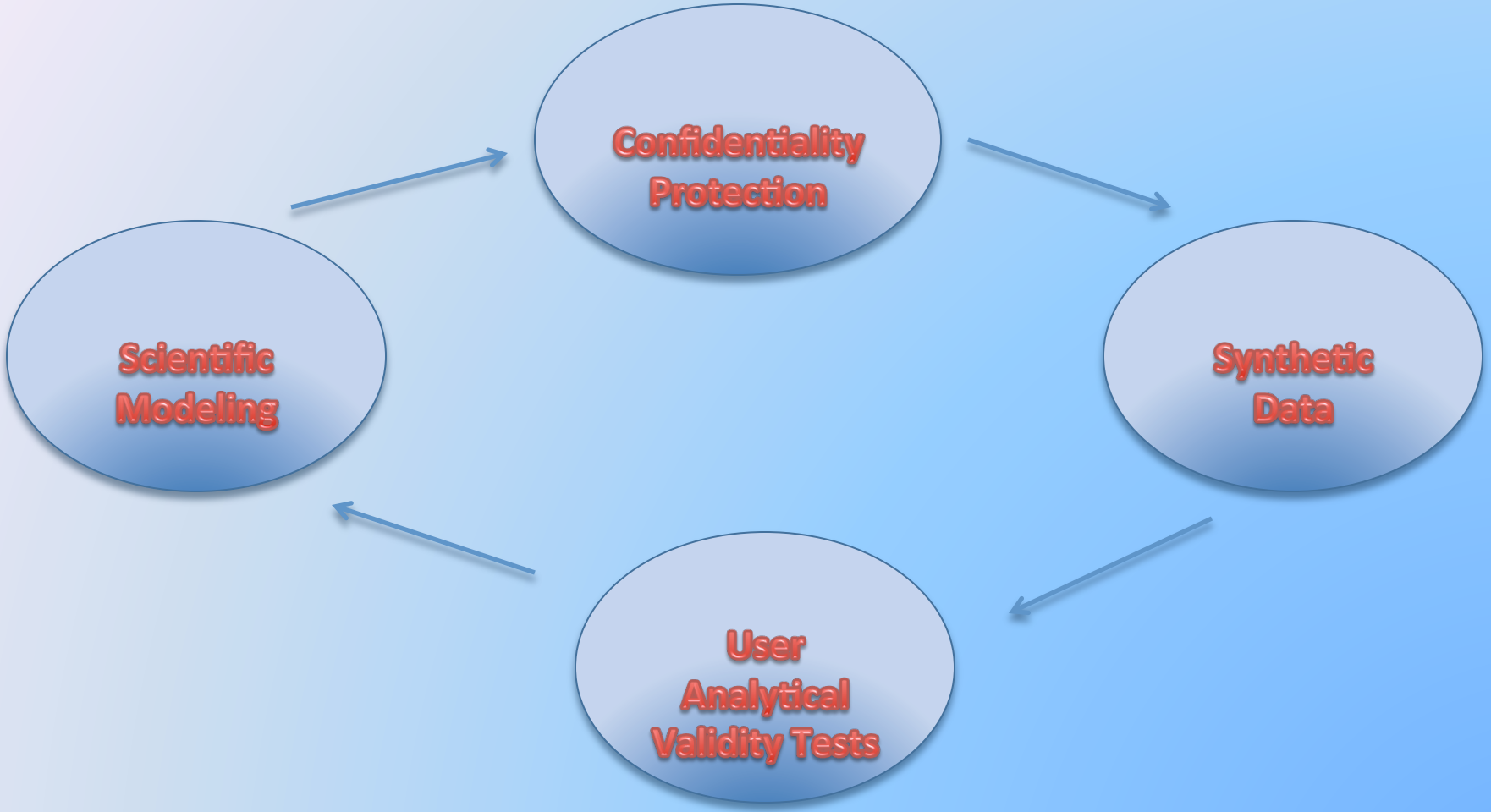
Outline

- Why you should consider using synthetic data-*seriously*
- SIPP synthetic data
- LBD synthetic data
- OnTheMap/LODES data
- The Quarterly Workforce Indicators (not synthetic, but used a related technique)

Why Use Synthetic Data

- Most simple analyses give answers that are useful
- Most complex designs do not
- But, the Census Bureau developers have a feedback loop that allows you to get results from the underlying confidential data
- Whole process takes weeks, not years
- New releases of the synthetic data reflect the features discovered by the users

Feedback Loop



SURVEY OF INCOME AND PROGRAM PARTICIPATION (SIPP) SYNTHETIC DATA

Genesis of the Synthetic SIPP

- Developed originally by a portion of the SIPP user community primarily interested in national retirement and disability programs
- SIPP augmented with
  - earnings histories from the IRS data maintained at SSA (W-2)
  - benefit data from SSA's master beneficiary records.
- Feasibility assessment (confidentiality!) of adding SIPP variables to earnings/benefit data in a public-use file (PUF)
  - set of variables that could be added without compromising the confidentiality protection of the existing SIPP public use files was VERY limited
- Alternative methods explored

Basic Methodology

- Experiment using synthetic data (Rubin, 1993; Little, 1993)
- Partially synthetic data with multiple imputation of missing items (Reiter, 2004)
- Partially synthetic data:
  - Some variables are actual responses
  - Other variables are replaced by values sampled from the posterior predictive distribution for that record, conditional on all of the confidential data

Brief History of the Synthetic SIPP

- 2003-2005: Creation, but no release, of three versions of the "SIPP/SSA/IRS-PUF" (SSB)
- 2006: Release to limited public access of SSB V4.2
  - Access to general public only at Cornell-hosted Virtual RDC (SSB server: restricted-access setup)
  - Promise of evaluation of Virtual RDC-run programs on internal Gold Standard
  - Ongoing SSA evaluation
  - Ongoing evaluation at Census Bureau (including RDCs)
- 2010: Release of SSB V5 at Census and on the VirtualRDC (Synthetic Data Server, SDS)
  - Codebook: http://www.census.gov/sipp/SSB_Codebook.pdf
  - Restructured to vastly improve analytical validity of SIPP variables
- 2013: Release of SSB V5.1 at Census and on the Cornell VirtualRDC (SDS)
  - Documentation in preparation (meta-data in CED^{2}AR)
  - First user-initiated variables

Basic Structure of the SSB V4

- SIPP
  - Core set of 125 SIPP variables in a standardized extract of SIPP panels 1990-1993 and 1996
  - All missing data items (except for structurally missing) are marked for imputation
- IRS
  - Maintained at SSA, but derived from IRS records
  - Master summary earnings records (SER)
  - Master detailed earnings records (DER)

Basic Structure of the SSB V4 (II)

- SSA
  - Master Beneficiary Record (MBR)
- Census
  - Numident: administrative birth and death dates
- All files combined using verified SSNs

=> “Gold Standard”

Basic Structure of SSB V5

- Panels: 1990, 1991, 1992, 1993, 1996, 2001, and 2004 (this variable is now in the SSB)
- Couple-level linkage: the first person to whom the SIPP respondent was married during the time period covered by the SIPP panel
- SIPP variables only appear in years appropriate for the panel indicated by the PANEL variable (biggest change from V4.2)

SIPP Synthetic Beta V5.1

- Available (really soon) through the Cornell Virtual RDC
- Includes 7 SIPP panels
  - 1990, 1991, 1992, 1993, 1996, 2001, 2004
- Administrative earnings history was edited to remove some erroneous reports prior to synthesis
- Adds many new SIPP variables that vary across months of the panel years: (user-requested variables: feedback loop!)
  - Weeks with job, weeks with pay
  - Usual hours worked
  - Survey-reported earnings
  - Total personal income
  - Health insurance coverage, any
  - Health insurance coverage, employer-provided
- Includes state of residence recorded in first SIPP interview

SIPP Synthetic Beta V6.0

- Expected Release: May 2014
- Added 1984 and 2008 panels
- Extend administrative earnings history through 2011
- Include children (under age 15)
- Include more SIPP and administrative disability variables
- Include a few characteristics of employers

Ongoing Research

- Developing job-level Gold Standard File as companion to person-level file. Contains earnings by employer from 1978-2011.
- Developing link between parents and children in the Gold Standard File. (See also Gottschalk and Stinson, SOLE 2013 Friday 8AM, Beacon H)
- Research on how to synthesize these links to protect confidentiality so these data could be released.

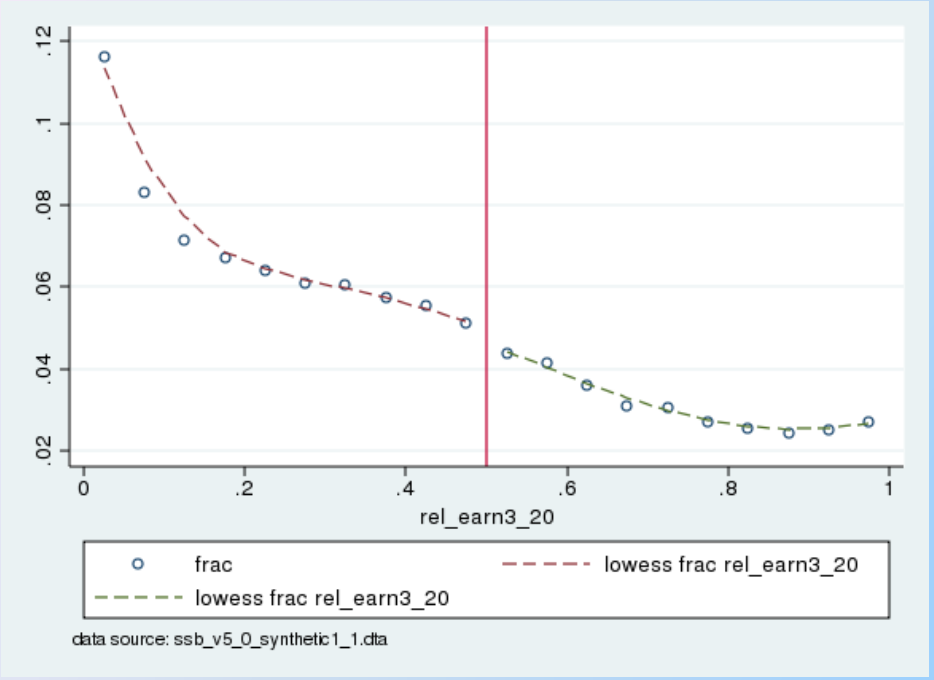
External Researcher Validation

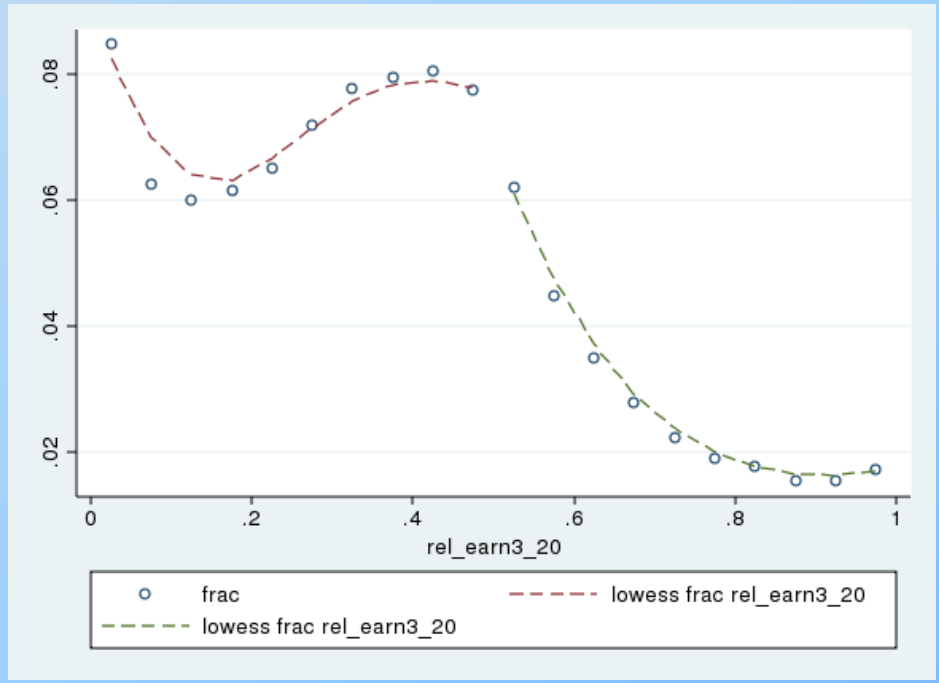
- Version 4
  - 12 projects
  - 1 was submitted for validation
- Version 5
  - 31 projects
  - 6 were submitted for validation

Validation Details

- Henriques, Alice (2102) "How does Social Security claiming respond to incentives? Considering husbands' and wives' benefits separately"
- Armour, Philip (2012) "The role of information in disability insurance take-up: An analysis of the Social Security statement phase-in"
- Bertrand, Marianne, Emir Kamenica and Jessica Pan (2013) "Gender identity and relative income within households"

From Bertrand *et al.*





Timeline: SDS application November 2012, gold standard results January 2013

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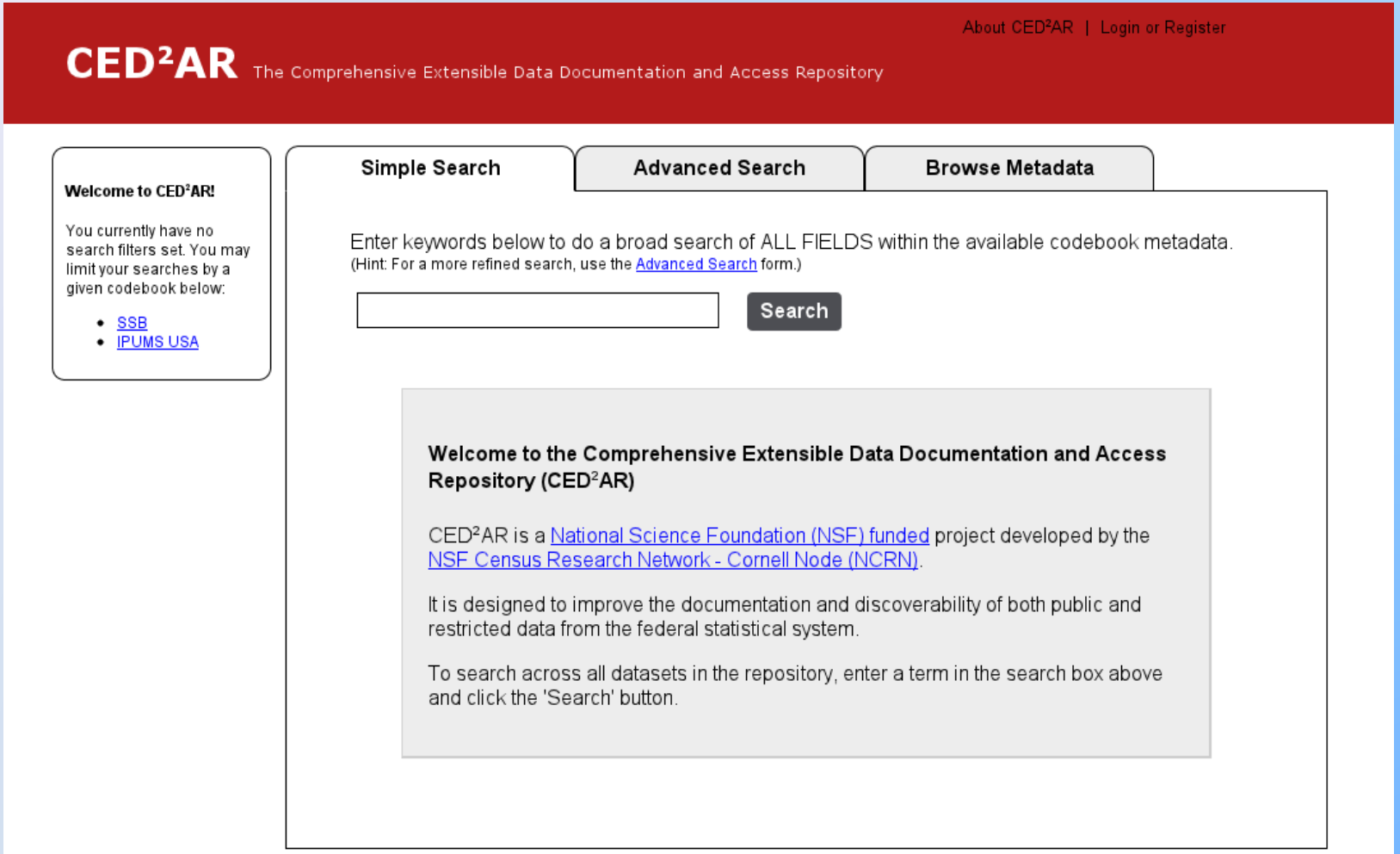
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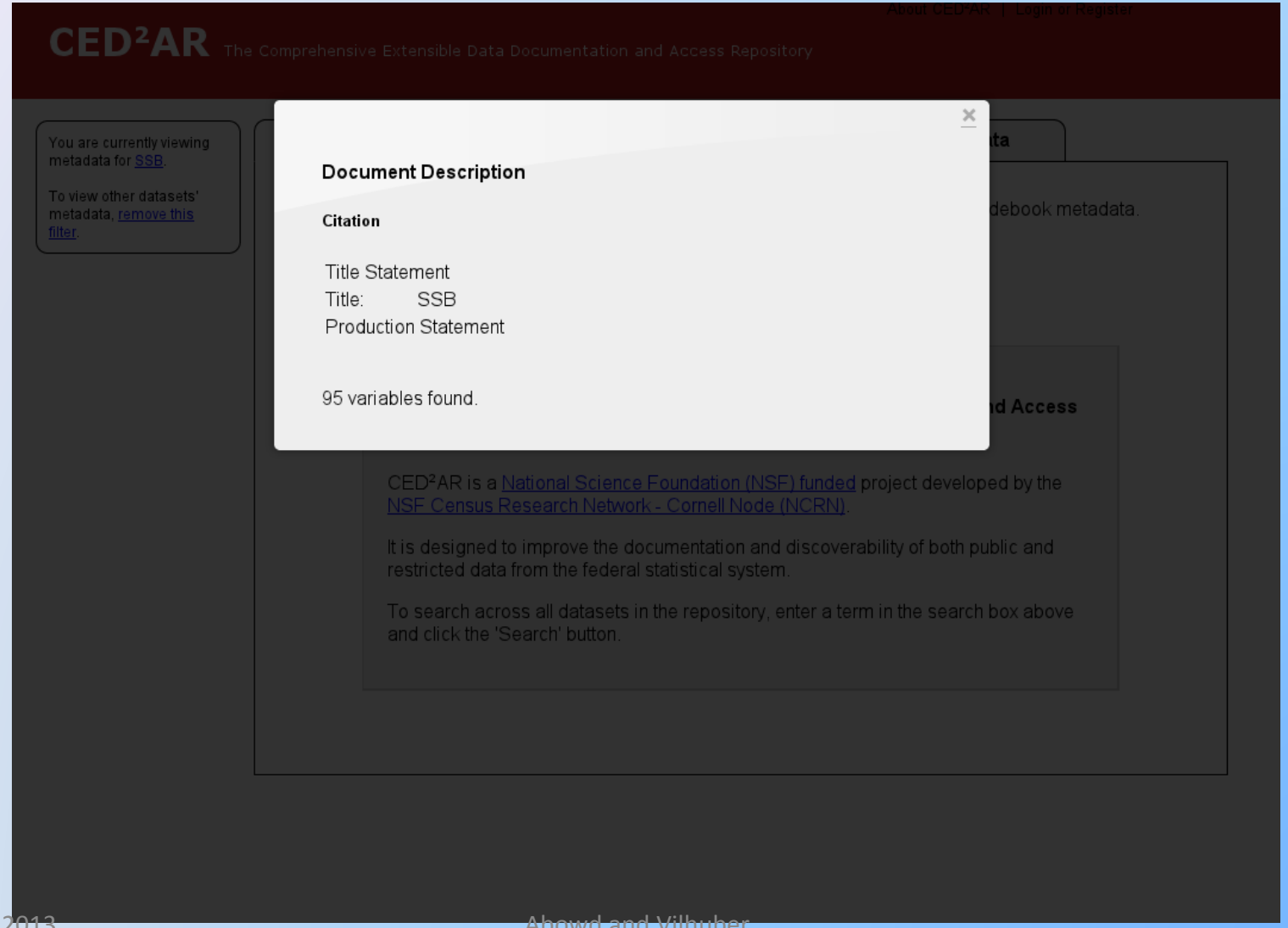
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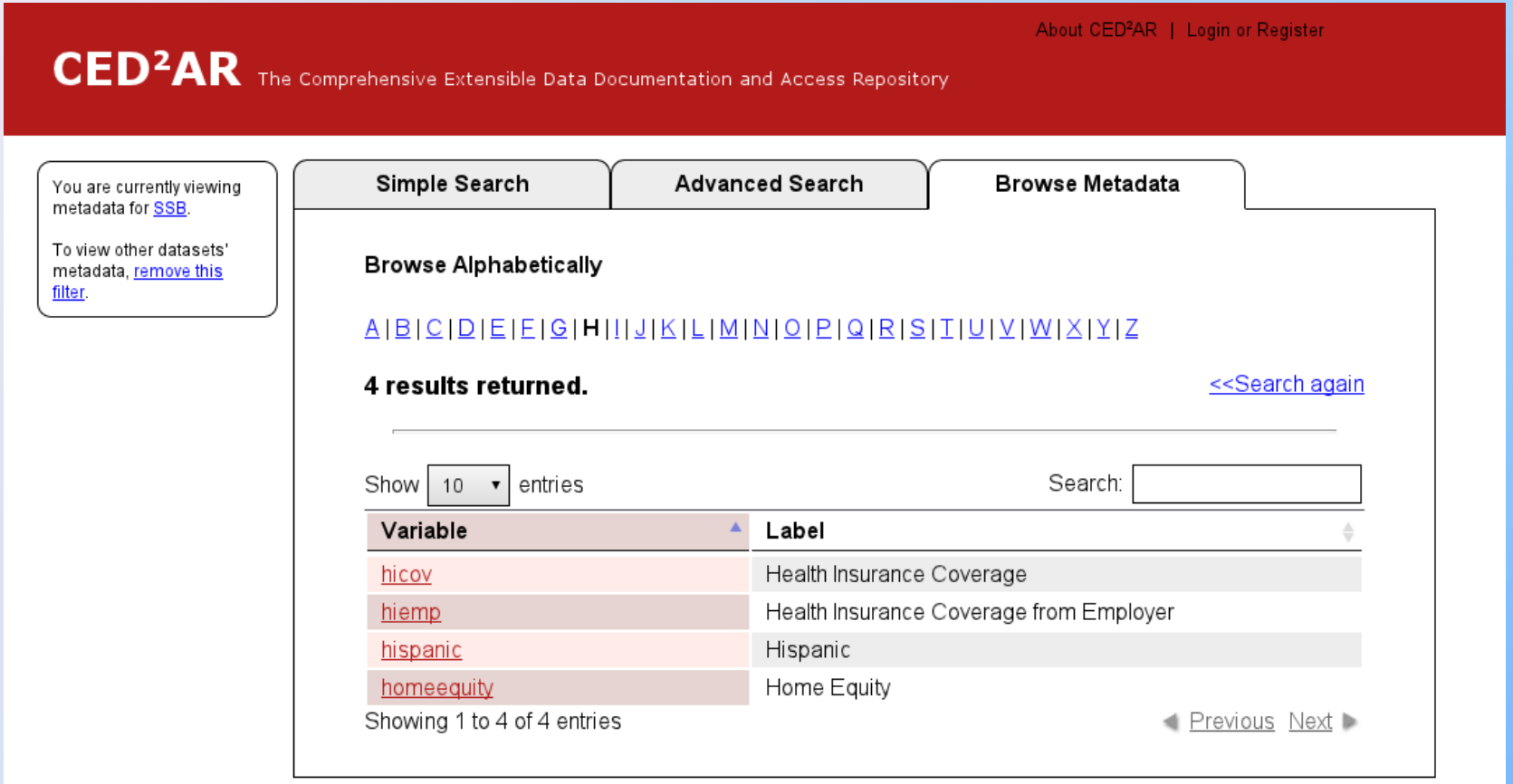
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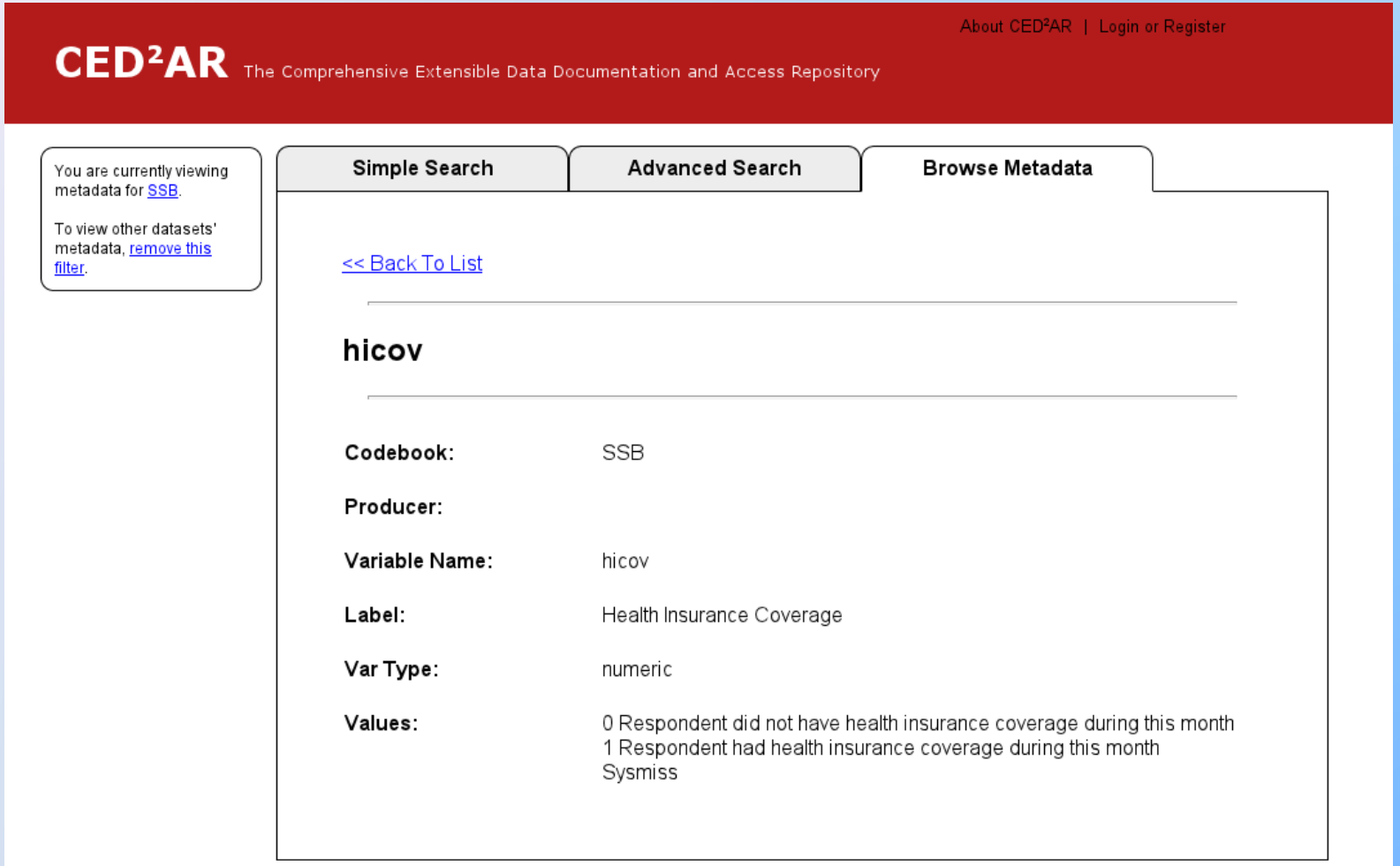
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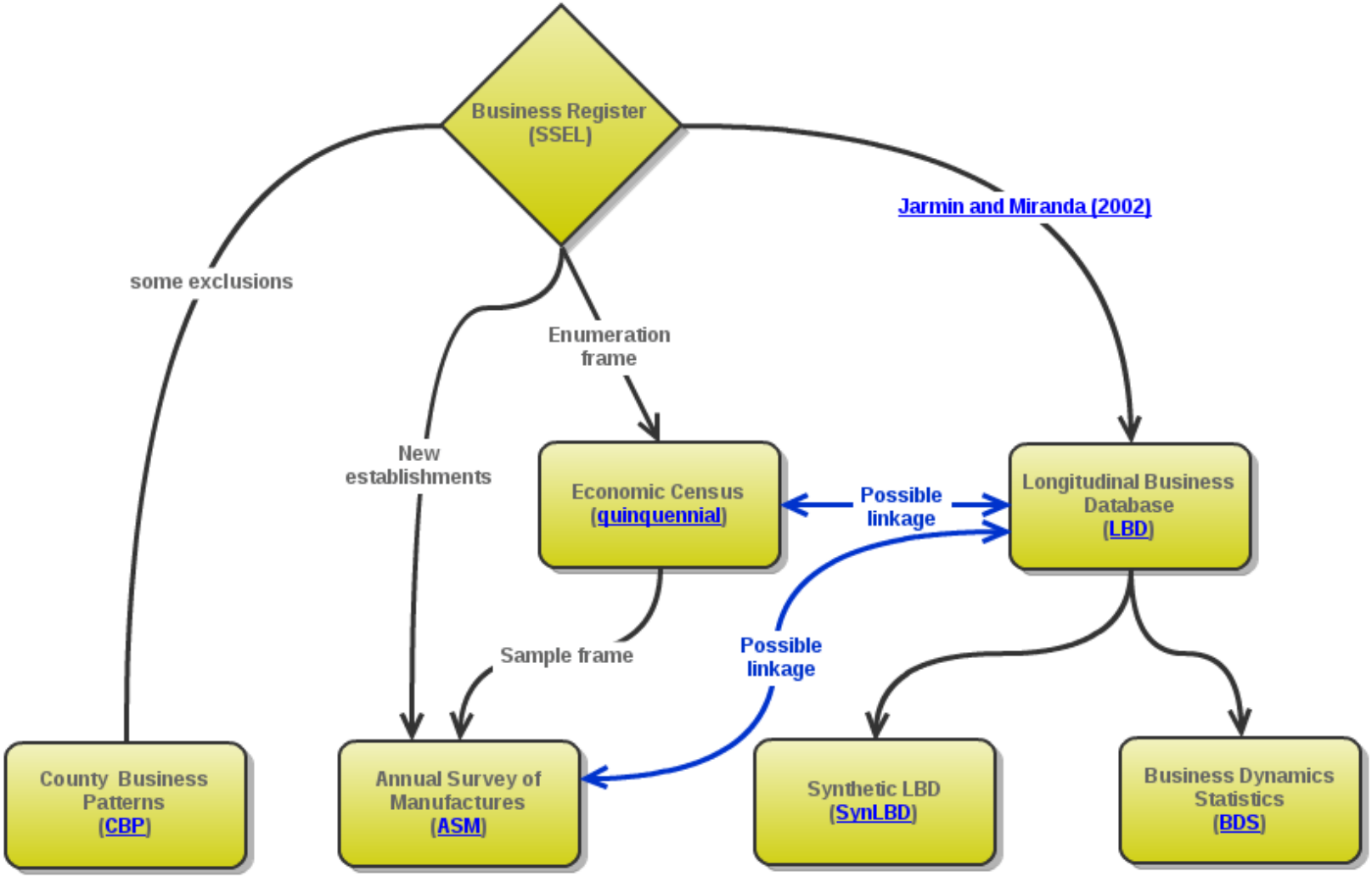
hicov
Codebook: SSB
Producer:
Variable Name: hicov
Label: Health Insurance Coverage
Var Type: numeric
Values: 0 Respondent did not have health insurance coverage during this month
1 Respondent had health insurance coverage during this month
Sysmiss

CED²AR

- Part of the NSF-Census Research Network
- Funded through NSF Grant #1131848
- Soon live, watch http://www.ncrn.cornell.edu (Cornell node) or http://www.ncrn.info (Network)

SYNTHETIC LONGITUDINAL BUSINESS DATABASE

LBD Provenance



Longitudinal Business Database

- Economic census covering nearly all private non-farm business establishments with paid employees
  - Annual payroll and Mar 12 employment (1976-2011)
  - SIC/NAICS
  - Geography (down to county),
  - Entry year, Exit year
  - Firm structure
- Used for looking at business dynamics, job flows, market volatility, international comparisons
- Most widely-used Census Bureau data set in RDCs

Synthetic LBD

- Synthetic data set
  - Available outside the Census RDC on Cornell VirtualRDC Synthetic Data Server
  - Provides analytical validity for dynamic establishment-level employment and payroll
  - Reduces the number of requests for special tabulations from the LND
  - Aids users applying for RDC access
- Experiment in public-use business micro-data

Creation of the Synthetic LBD

- Version 2.0 described in Kinney et al (2012) and https://www.census.gov/ces/dataproducts/synlbd/index.html
- Partially synthetic data
  - Employment, payroll, birth and death date of establishments, multi-unit status
  - Suppressed county, SIC released
  - 1976-2000

External Validation Exercises

- 41 approved projects (includes provisional approvals)
- 3 have submitted results for validation (one of these did two rounds of validation)
- One timeline: application approved March 2011, validation results released September 2011
- 14 projects denied because data not available (typically wanted NAICS, geography, firm id)

Validation Exercise Details

- Professor: fixed-effects regressions of establishment-level employment growth interacted with unemployment rate, by age, sector, and single/multi (into 2nd round)
- Ph.D. student: turnover rates of establishments by industry, model with implications on concentration and exit/entry dynamics
- Ph.D. student: shape of the distribution of entering establishments at different points in time (into 3rd round)

Ongoing Development Efforts

- SynLBD 2.x (x>0)
  - Same methodology as 2.0
  - Adds additional years (through 2011)
  - Based on NAICS (using back-coding by Shawn Klimek and Teresa Fort)
  - Data created, working on disclosure avoidance documentation
- SynLBD 3.0
  - Ongoing work by Kinney, Reiter
  - Adds synthesis of firm links, geography, based on NAICS

Access to SynLBD

- See https://www.census.gov/ces/dataproducts/synlbd/index.html and http://www.vrdc.cornell.edu/sds/

OTHER CENSUS BUREAU SYNTHETIC DATA PRODUCTS

OnTheMap/LODES

- OnTheMap
  - Workplace and residence coded to census block
  - Data for 2002-2010 (2011 soon)
  - Residence address is synthetic
  - All queries explicitly logged (permitting analysis on underlying confidential data by Census staff)
- LODES
  - Public-use data in tabular format

Quarterly Workforce Indicators

- Local labor market time series on employment, earnings, hiring, separation, job creations, job destructions
- Simpler confidentiality protection system (noise infusion)
- Based on linked unemployment insurance and QCEW data
- Age, sex, race, ethnicity, education, ownership, NAICS, CBSA, firm size, firm age all available for all variables

Lots More Information

- Cornell University Information Science 7470 Understanding Social and Economic Data
- Partially sponsored by the NSF-Census Research Network
- All materials, exercises, lecture videos online