

# The Role of Longitudinal Surveys in Chilean and Global Society

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# A Question of Change: A1

- Where and when: Michigan, 1984-1986
- Problem
  - Recession and early recovery
  - High profile closure of major steel mills
  - Quarterly aggregate ES-202 employment data show little change in net employment in steel manufacturing at the reporting level of Michigan counties.

# Question of Change: A2

- Design and Method
  - Micro-level ES-202 data for firms
  - Constructed longitudinal file at the firm level (with births, deaths, splits, mergers) for 28 quarters
  - Analyzed changes in monthly employment at the firm level

# Question of Change: A3

- Result
  - Large steel mills had in fact closed
  - Stability in steel manufacturing employment was in fact correct
  - Small, modern “micro-mills” and specialty steel producers had emerged in post-recession offsetting job losses at large facilities.

# Question of Change: B1

- Welfare dependency in the US
- Problem:
  - Do social support programs for single mothers create a permanent “welfare class”?
  - What are the factors that determine the length of time individuals depend on various sources of social support.

# Question of Change: B2

- Design and Method
  - Panel Study of Income Dynamics
  - Annual data on individuals and families across generations for 1968-2009
  - Analysis of trend in individual social support receipt over time

# Question of Change: B3

- Results
  - Most spells of individual social support are short and carry individuals through periods of short term income interruption
  - Identification of factors (e.g. child care, transport, mental health, physical disability) that prolong spells of individual dependency

# Question of Change: C

- Pensions and Social Protection in Chile
- **Encuesta Protección Social (EPS) 2002-2009**
  - Work, Pensions, Retirement Planning
- Contribution to data-driven reforms and adjustments to social protection system.



# Changes of Interest

- Temporal dynamics
- Life course dynamics
- Structured change

# Global Focus on Longitudinal Studies

- Income Dynamics
- Retirement Planning, Pensions
- Education and Adolescent Development
- Household Finance: Assets, Liabilities
- Firms and Business Change
- Early Childhood Development
- Health, Environmental Exposures

# Longitudinal Studies in Chile

(A sampling, not a census)

- **Encuesta Protección Social (EPS) 2002-2009**
  - Work, Pensions, Retirement Planning
- **Encuesta Financiera de Hogares (EFH)**
  - Household Finance: Assets, Liabilities
- **Encuesta Longitudinal a Empresas and Encuesta de Microempresas Informales**
  - Formal Sector, self-employed and the informal sector

# Longitudinal Studies in Chile

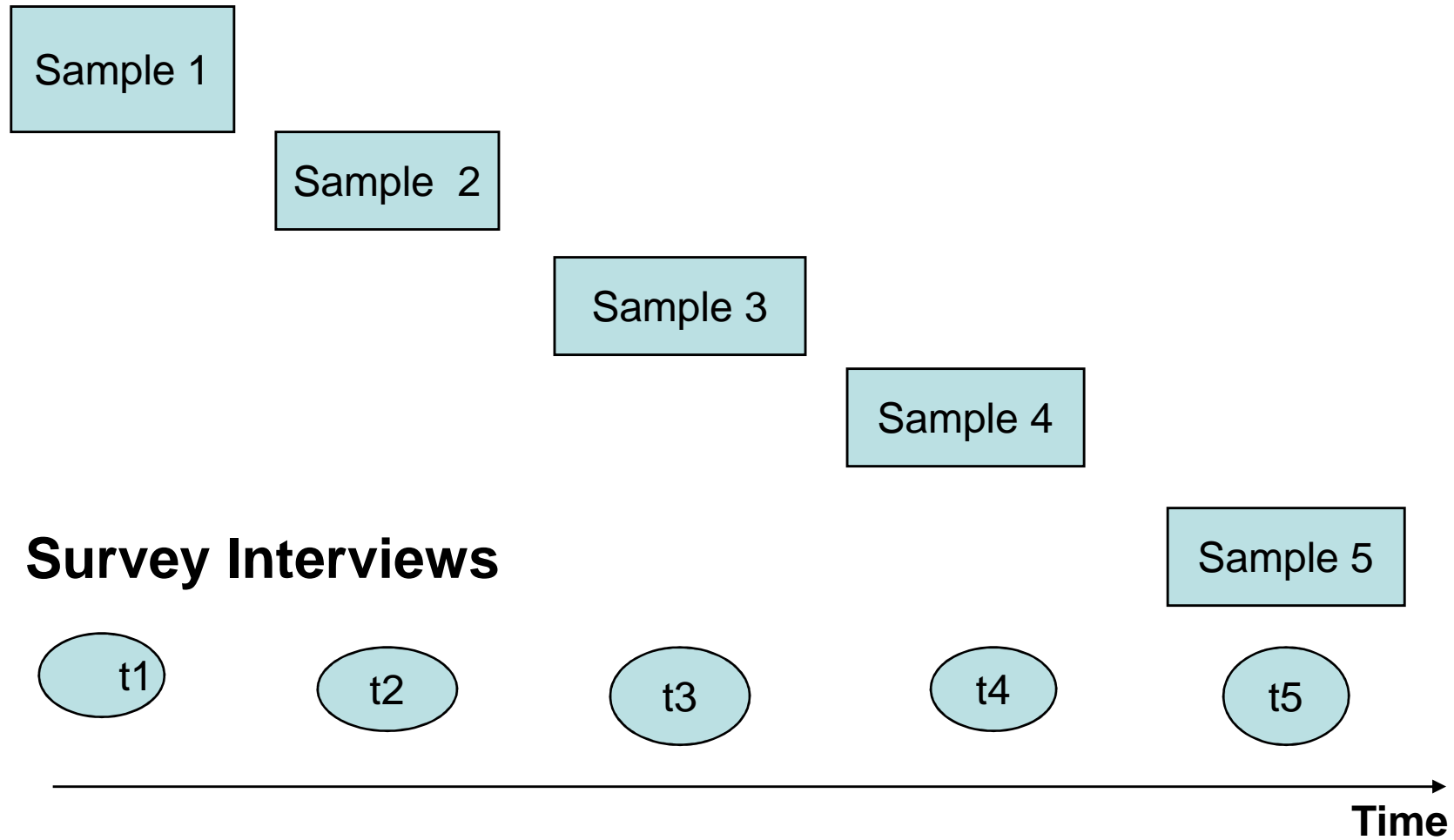
## (A sampling, not a census)

- **Encuesta Longitudinal Docente**
  - Teachers 2005, 2009
- **Early Childhood Development (ELPI)**
  - Early childhood
- **Encuesta Longitudinal de Estudiantes (ELE)**
  - Planning stage
  - Longitudinal study of secondary school students

# Three Longitudinal Designs

- Repeated Cross-section Sample
- Pure Panel
- Rotating Panel Sample Design

# Repeated Cross-Section Design



# Repeated Cross-Section: Advantages

- Lowest respondent burden
- Pool sample across waves - “cumulate”.
- Standard probability sample each wave
- No tracing of respondents needed

## Repeated Cross-Section: Disadvantages

- No “micro-level” longitudinal data for analysis
- Only net change can be estimated
- No precision gain for estimating change.  
( $P = \text{Panel Overlap} = 0$ )



# What is a Panel Survey?

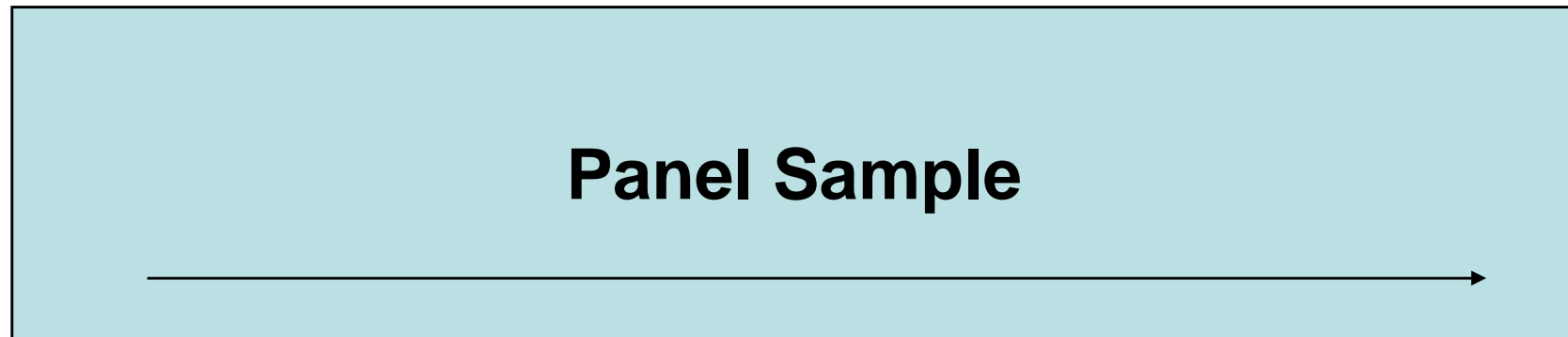
- Start: Representative (probability) sample of the population is selected using standard procedures
- Sample members are interviewed at the baseline
- Sample members become part of the “panel”
  - They are followed over time
  - Periodically reinterviewed

# Why Conduct a Panel Survey?

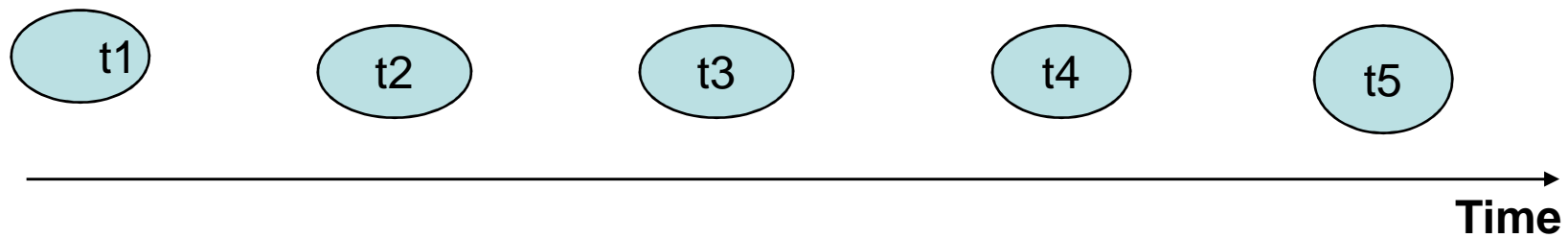
- Study “micro-level” changes in the population over time
  - gross change (+/-)
  - Improved measures of net change
- Standard survey – A single picture in time
- Panel – A “movie” of societal change.

# Pure Panel Design

**Population Sample**



**Survey Interviews**

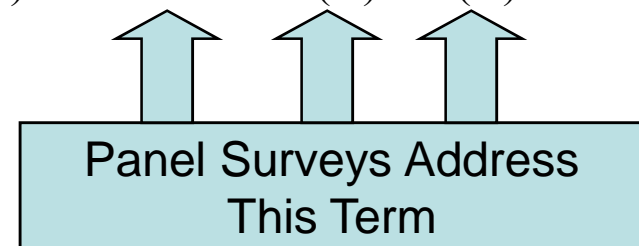


# Statistical Objective

Simplest = Measure Simple Change Time

$$\hat{\Delta}_{(t1,t2)} = (\bar{y}_{(t2)} - \bar{y}_{(t1)})$$

$$\text{var}(\hat{\Delta}_{(t1,t2)}) = \text{var}(\bar{y}_{(t1)}) + \text{var}(\bar{y}_{(t2)}) - 2\text{cov}(\bar{y}_{(t1)}, \bar{y}_{(t2)})$$



# Increased Precision for Panels

Panel designs reduce the variance of  $\hat{\Delta}_{t1,t2}$  by a factor of:

$$\text{variance reduction} = (1 - \rho_{y1,y2} \cdot P)$$

*where:*

$\rho_{y1,y2}$  = the correlation in y for time 1 and time 2,

*e.g.* the correlation over time in a worker's income ;

P = the proportion of the sample that is common at time 1 and 2.

# Statistical Analysis of Panel Data

- One wave
  - Cross-sectional, time  $T$
- Two waves
  - Gross change over time,  $T1$  vs.  $T2$
  - Net change over time
- Three or More Waves
  - Event history models (survival, time to event)
  - Growth curve models for multiple waves
  - Structural equation models (latent, factors)

# Pure Panel Design: Advantages

- “Micro-level” longitudinal data for analysis
- Gross and net change can be analyzed.  
Cross-sectional analysis is also possible.
- Large precision gain for estimating change  
( $P = \text{Panel Overlap} = 1.0$ ).
- Data collection costs are reduced
- Powerful statistical techniques apply

# Pure Panel Design: Disadvantages

- Tracking respondents over time
  - Movement, changes in units,
- Measurement error in recalling, dating events
- Nonresponse, panel attrition
- Added data management complexity
- Advanced uses increase statistical complexity
- Increased attention to disclosure risks, re-identification of the survey respondent



# Addendum: PSID and HRS

# Panel Study of Income Dynamics

- Started in 1968
- Units surveyed
  - Families and individuals
  - Approximately 7000 families with 20,000 persons
  - Supplemental sample of low income households
- As of 2009, 37 “Waves” of Data Collection
  - In 2009 we interviewed three to four generations of the original sample families

# Panel Study of Income Dynamics

- Types of data collected for families
  - Household composition
  - Household expenses (medical, food, etc.)
  - Participation in programs (food stamps, SSI, etc.)
- Types of data collected for persons
  - Labor force participation, unemployment
  - Occupation and industry, self-employment
  - Wages and salaries, non-wage income
  - Unemployment, benefits available and received

# Panel Study of Income Dynamics

- Data uses (examples)
  - Federal program evaluation, budget planning
    - Food stamp program (Dept. of Agriculture)
    - Women, Infants and Children (WIC)
    - Social programs for low income families with children (TANF)
    - Social Security (OASDI, SSI, Medicare)
  - Policy planning
    - Labor policy (unemployment, minimum wage)
    - Education policy (sector demand, job training needs)
    - Retirement (pensions, savings, other income sources)
    - Tax Policy ( impact of tax law changes)

# Health and Retirement Survey

- Started in 1992
- Units surveyed
  - Financial units: Married couples and single adults age 50 or older
  - Approximately 16,000 financial units with 22,000 persons
- As of 2010, 10 “Waves” of Data Collection

# Health and Retirement Survey

- Types of data collected for financial units
  - Income and assets
  - Family structure, social support from family
  - Participation in programs (Social Security, etc.)
- Types of data collected for persons
  - Labor force participation, unemployment
  - Job benefits
  - Health status and health care costs
  - Retirement benefits, plans, expectations

# Health and Retirement Survey

- Data uses (examples)
  - Program evaluation, budget planning
    - Social Security
    - Medicare (Basic and Supplemental)
    - Private pensions
    - Tax policy
  - Policy planning
    - Financial tools for retirement saving
    - Health care financing reform
    - Role of family in caring for older age persons
    - Health care services, disease prevention (e.g. diabetes, asthma)