Disruptions During Surveys of Energy Consumers

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Official Energy Statistics from the U.S. Government

Four major energy consumer surveys

- Conducted every 3 or 4 years
- 3 of the 4 require fieldwork
- In the field 2-3 months each time

Disruptions not uncommon

- Hurricanes (Katrina, Andrew, etc.)
- Earthquakes (Northridge)
- War (Gulf War I)
- Volcano (Mt. St. Helens eruption)

Disruption impacts vary

- Stage of the sample survey
  - Planning & design
  - Data collection
  - Processing (incl. imputation and weighting)
  - Analysis and dissemination
- Duration and extent of disruption

Goal of the surveys

- Relate energy consumption to characteristics of energy consumers

➔ Focus on physical entities rather than social/economic entities

  - Housing units (not households)
  - Commercial buildings (not businesses)

Survey design choices

- Estimates made for large geographic areas (national, regional, and Census division)
- Reference period is a calendar year
- Small sample sizes (5,000-6,000)

➔ Note structured to be sensitive to short-term or small area disruptions

Dealing with disruptions

- Nature and length of the disruption dictate the problem and possible solutions (given the survey design)
- Focus: preserve ability to produce valid estimates in spite of the disruption

Effect of disruptions on operations

- May affect unit nonresponse by changing the respondents' ability or willingness to participate
- May allow return to field *if* it is felt that being asked to participate would not traumatize potential respondents

Effects of disruptions on estimation

- May affect coverage or change the frame
  - Sampling units unreachable during *entire* field period
  - Previously listed, in-scope units destroyed
- Need to judge how to adjust

Example: launch of Gulf War I

- January 16, 1991
  - Operations vs. Iraqi forces began
  - Beginning-of-year data collection scheduled to start

  ➔ Respondents distracted by TV reports
- Survey suspended
- Resumed 3 months later

Example: Northridge Earthquake

- Earthquake struck during field interviewing
- Suspended interviewing
- Resumed one month later after inspecting amount of damage to housing units

Example: Hurricane Katrina

- Damage in some areas was so severe that they fell out of scope for the survey
- After inspecting affected areas, canceled further fieldwork

Post-Katrina estimation

- Two-PSU-per-stratum sample design
- Simple post-hoc adjustments where most or all of a PSU is affected
- Need to judge how and whether to adjust weights for disrupted PSUs

Post-Katrina estimation [cont.]

- Doubled the weight for a paired PSU to account for the “lost” PSU
- In less affected PSUs, nonresponse adjustments made at the household level

➔ Weighting adjustments may expand the effects further in a statistical sense than the disruption itself actually covered

Question #1

- How can periodic survey samples be designed to be more robust in the presence of disruptions, particularly when there is no expectation for producing small area estimates?

Question #2

- Given a two-PSU-per-stratum design, is there an optimal method for adjusting for partial (vs. total) nonresponse due to fieldwork disruptions, or do disruptions need to be handled on a case-by-case basis?