Using Web Paradata to Evaluate Pre-Listed NAPCS Product Lines in the 2017 Economic Census

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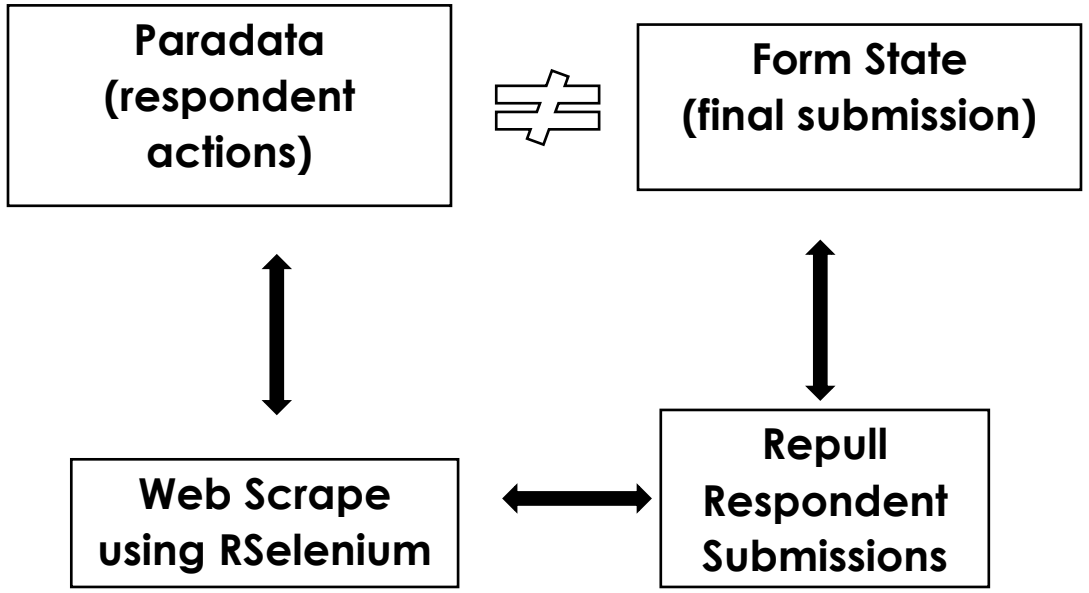
United States® Census 2020

Economic Census

- Official measure of Nation's economy and businesses, taken every 5 years (previous: 2017, next: 2022)
- Nearly 4 million businesses, all U.S. locations and industries
- **2017 Economic Census**: new electronic instrument for online reporting
- Paradata: data on respondent actions (page views, clicks, time spent, etc).

1. Leveraging the Paradata

- **Problem:** Paradata is inaccurate due to instrument design and structure of product lines
- **Solution:** merge paradata with submission data and define rules to "correct" the paradata
- Scaled to 30+ NAICS industries



2. 2-Screen Design Effectiveness

Item 22a (Truncated Example):
Respondents select product lines

Description	Select	Product Code
1. Retail sales of automotive parts, supplies, and accessories (Report parts installed in repair for automobiles and light-duty trucks on line 6, wholesale sales of tires and tubes on line 2, wholesale sales of other new and rebuilt automotive parts and supplies [excluding automotive bodies and chemicals] on line 4, and wholesale sales of other used automotive parts and supplies [excluding automotive bodies] on line 5.)	☑	5001950000
a. Retail sales of automotive lubricants, including oils, greases, etc.	☑	5001950003
b. Retail sales of new automobile and light-duty truck tires and tubes	☐	5001950006
c. Retail sales of new medium- and heavy-duty truck tires, including industrial, off-the-road, and farm tractor tires	☑	5001950009
2. Wholesale sales of tires and tubes	☑	4004150000
3. Wholesale sales of automotive chemicals, including polishes and cleaners, fuel and oil additives, and antifreeze	☑	4004225000

Item 22b (Truncated Example):
Respondents enter values for selected product lines

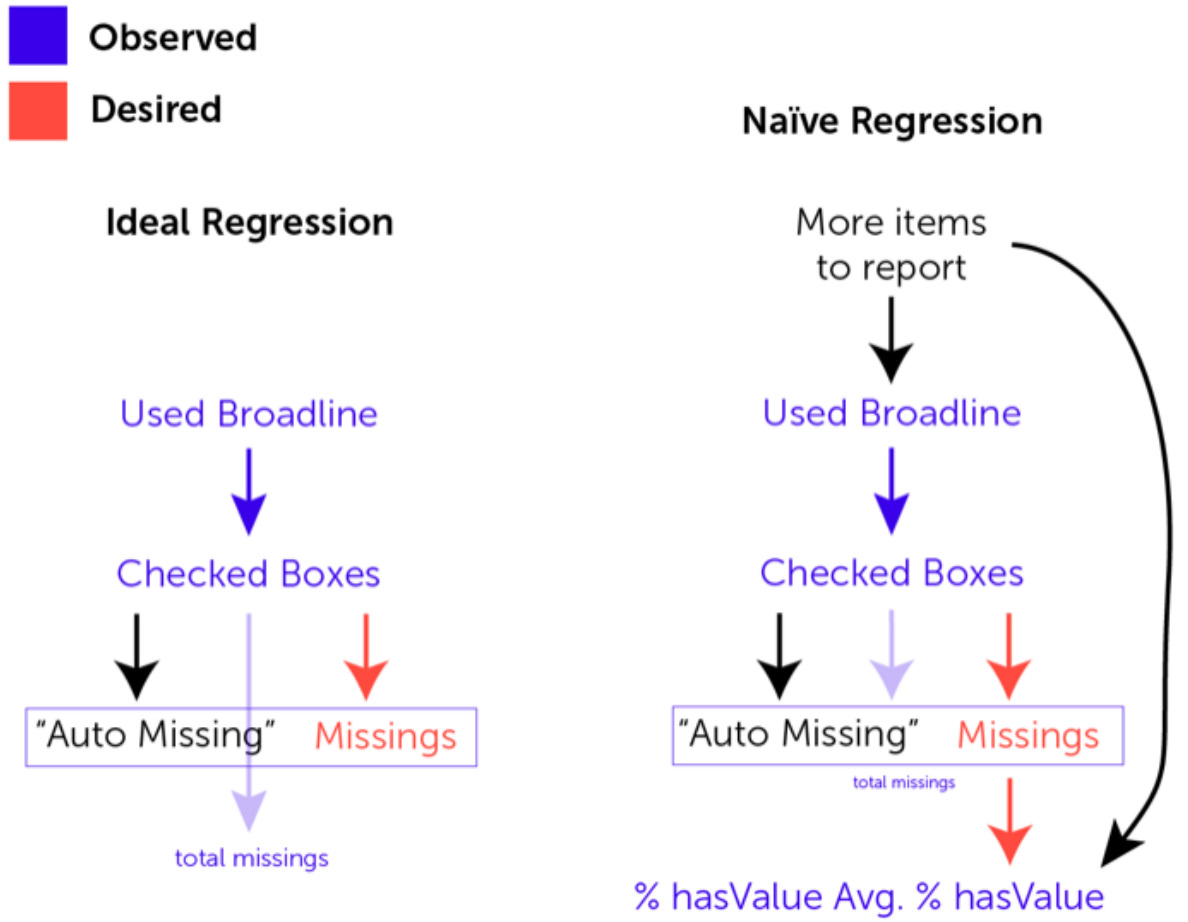
Description	Value	Product Code
1. Retail sales of automotive parts, supplies, and accessories (Report parts installed in repair for automobiles and light-duty trucks on line 6, wholesale sales of tires and tubes on line 2, wholesale sales of other new and rebuilt automotive parts and supplies [excluding automotive bodies and chemicals] on line 4, and wholesale sales of other used automotive parts and supplies [excluding automotive bodies] on line 5.)		
a. Retail sales of automotive lubricants, including oils, greases, etc.	$,000.00	5001950003
c. Retail sales of new medium- and heavy-duty truck tires, including industrial, off-the-road, and farm tractor tires	$,000.00	5001950009
Subtotal	$,000.00	5001950000
2. Wholesale sales of tires and tubes	$,000.00	4004150000
3. Wholesale sales of automotive chemicals, including polishes and cleaners, fuel and oil additives, and antifreeze	$,000.00	4004225000

2. 2-Screen Design Effectiveness

- **Respondent burden:**
  - Is the design hard to understand or use?
- **Quality of responses:**
  - Are respondents giving as much detail as possible?
  - Do the product lines account for the full amount of revenue?
- **Unexpected respondent behavior:**
  - Does the design cause respondents to backtrack to change their answers?

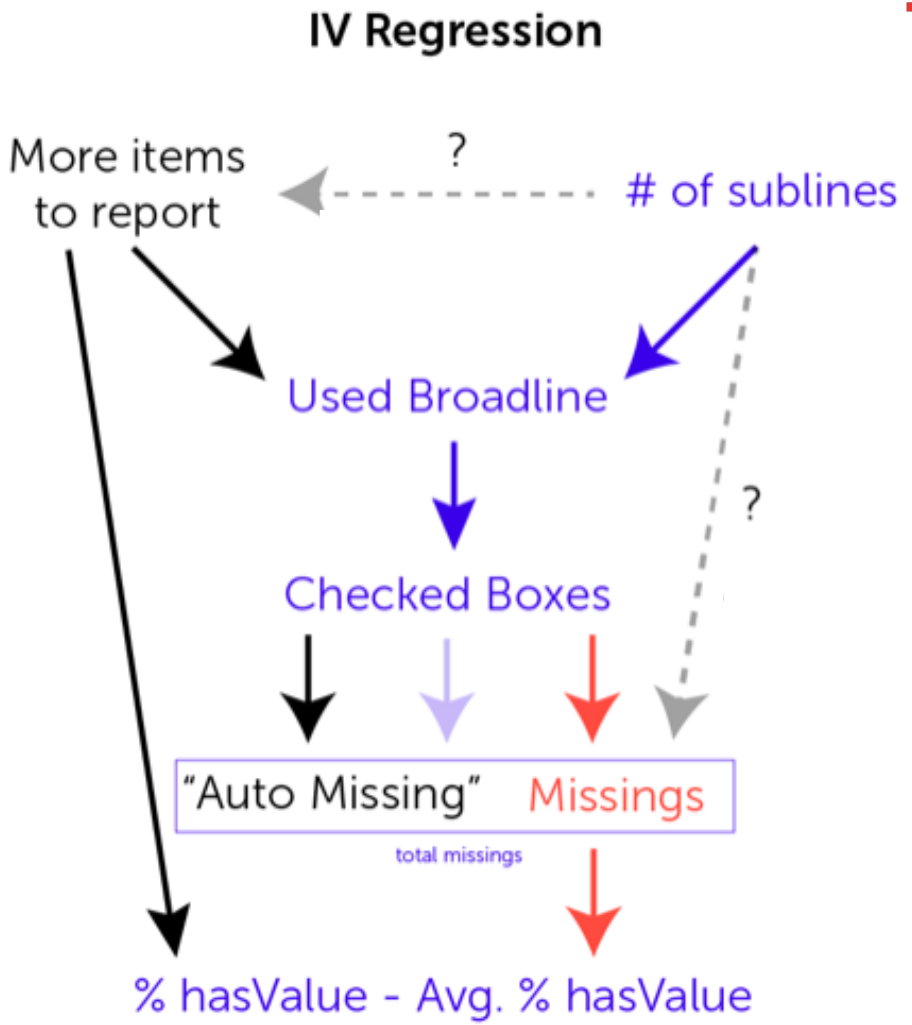
3. Broad-line Evaluation

- **Question**: what is the influence of broad lines on non-response?
- **Problem**: if a broad line was selected and its associated value line was left blank, we don't know if that decision was "purposeful" because the line was checked by the instrument.
- How do we know if we observe causal effects or selection bias?



3. Broad-line Evaluation

- **Solution**: IV.
- Since the expected broadline behavior can be associated with a random variable, we can use it to get a causal estimate of the influence of the broadline use on reported values.



4. Optimal Number of Product Lines

- **Question**: what is the optimal number of product lines to show by default?
- **Solution:** look at average completion rates among those that did not finish the form, and find where they stopped checking boxes.
- We can see the median last line, and consistency suggests that **order matters**, but we can't say *why* respondents behave this way (we don't directly observe attention)

5. Next Steps

- **Who:** analysts and user experience designers within ECON directorate
- **Impact:** recommendations for 2022 Economic Census instrument design
  - Reduce respondent burden
  - Improve quality of responses
  - Improve collection of NAPCS revenue data (report more product lines in more detail)
  - Improve quality and analysis methods of future paradata