Researching Administrative Records Usage in the Nonresponse Followup Operation of the 2020 Census

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OUR CHALLENGE

- 2010 Census – 50 million Nonresponse Folllowup (NRFU) Operation addresses to visit
- Approximately 15 million vacant units, 5 million non-existent units in 2010 – can we resolve without visiting the address?
- Not able to obtain all person characteristics for NRFU in-person interviews of occupied units
- Cost $2 billion

OUR GOALS

- Reduce cost of the NRFU operation while maintaining data quality
- Instead of in-person contact attempts, use administrative records (AR) to resolve cases
- Identify vacant and occupied units using AR - remove these cases from the field workload

OUR SOLUTION

1. **Universe Creation:** Build person- and housing unit- level datasets - See Fig. 1
2. **Model Development:** Build models to predict 2010 NRFU responses using AR data
3. **Model Application:** Apply results to current vintage AR data to identify AR Vacant and AR Occupied units

FIGURE 1
(Hypothetical Data Example)

Person-Level Dataset

Unit ID	Person ID	On IRS 1040	On IRS 1099	On Medicare	Age	Sex
100	1001	X	X		32	F
100	1002	X			5	M
200	2001	X		X	68	M

Housing Unit-Level Dataset

Unit ID	Any IRS1040	Any IRS 1099	Any Medicare	HH Count	HH Composition
100	X	X		2	1 Adult, 1 Child
200	X		X	2	1 Adult, 0 Child

AR VACANT – HOW DO WE DETERMINE VACANT UNITS?

1. Universe Creation

- Data: 2010 Census NRFU addresses
- NRFU addresses combined with AR information from those addresses

2. Model Development

- Multinomial logistic regression model
- Dependent variable: 2010 Census status (1: occupied, 2: vacant, 3: delete)

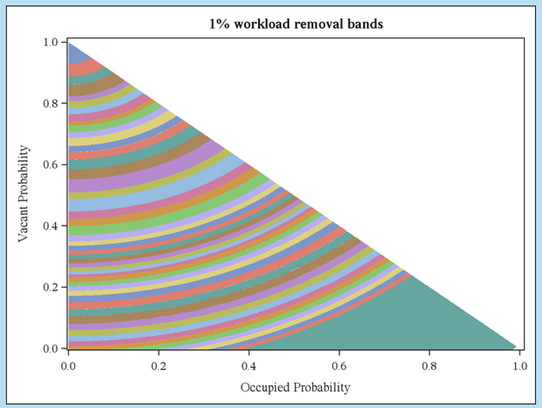
3. Model Application - Which units to identify as AR Vacant?

- Use Euclidean distance function to select cases with high vacant probability (near 1) and low occupied probability (near 0)

$$d_{vac} = \sqrt{(1-\widehat{P_{vac}})^2 + (0-\widehat{P_{occ}})^2}$$

- Given a specified threshold for the distance, all cases below that threshold are identified as AR Vacant
- The distance function can be visualized as successive bands of cases emanating from the point (0,1) - See Fig. 2
- Each successive band represents an additional 1% of the NRFU workload.

FIGURE 2



AR OCCUPIED – HOW DO WE DETERMINE OCCUPIED UNITS?

1. Universe Creation

Person-Place model

- Data: Person-place combinations across AR sources for 2010 Census NRFU addresses

HH Composition model

- Data: 2010 Census NRFU addresses
- NRFU address combined with AR information from those address

2. Model Development

Person-Place: Binomial logistic regression model

- Dependent variable: 2010 Census status (1: AR person-place pair is observed in 2010 Census, 0: AR person-place pair is not observed in 2010 Census)

HH Composition: Multinomial logistic regression model

- Dependent variable: 2010 Census HH composition (0: not occupied, 1: 1 adult, 0 children, 2: 1 adult, 1+ children, 3: 2 adult, 0 children, 4: 2 adult, 1+ children, 5: 3 adult, 0 children, 6: 3 adult, 1+ children, 7: Other)

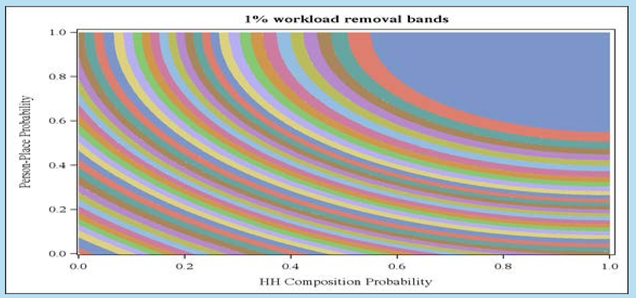
3. Model Application - Which units to identify as AR Occupied?

- Use Euclidean distance function to select cases with high person-place probability (near 1) and high HH composition probability (near 1)

$$d_{OCC} = \sqrt{(1-\widehat{P_{p\text{-}p}})^2 + (1-\widehat{P_{hhc}})^2}$$

- Given a specified threshold for the distance, all cases below that threshold are identified as AR Occupied
- The distance function can be visualized as successive bands of cases emanating from the point (1,1) - See Fig. 3
- Each successive band represents an additional 1% of the NRFU workload.

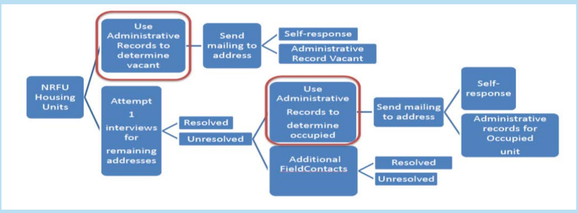
FIGURE 3



IMPLEMENTATION

- **Completed in 2016 Census Test currently ongoing**
- Remove AR Vacant units from NRFU workload at the beginning of NRFU operation - See Fig. 4
- Attempt one contact for all remaining NRFU addresses
- Remove AR Occupied units from NRFU workload if unresolved after first contact
- Send an additional postcard mailing to all AR Vacant and AR Occupied addresses

FIGURE 4



CONCLUSIONS

- Reduced workload via AR will **decrease** cost
- AR vacant or AR occupied misclassification could **decrease** data quality
- Within-household person coverage of AR may **increase** or **decrease** data quality
- Characteristic availability for AR will **increase** and **decrease** data quality

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