

Small Area Modeling for the American Community Survey

By
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Basic Introduction

- ACS will publish estimates down to the tract level, just like the decennial census
- Many issues involved with estimating for these small areas
- We will focus on one issue where ACS and census differ – residence rules

Outline

1. Background about the ACS – sampling & estimation
2. Residence rule differences
3. Effects of different estimators
4. Future research

ACS – Brief Background

- Continuous nationwide monthly survey, will replace decennial census sample in 2010
- Will publish single-year, three-year average, or five-year average estimates, based on an area's population
- ACS test conducted in 36 counties in 1999, 2000, and 2001

ACS Sampling & Estimation

- Systematic sample of housing units (GQ's excluded)
- In test, base rate of 1%, 3% or 5%, varying locally based on size of governmental units and tracts
- 3-year test rates approximate 5-year (average) sample

ACS Sampling & Estimation

- For nonrespondents to mail and CATI, 1-in-3 subsample for CAPI
- 2-in-3 subsample for nonmailables
- Several steps of nonresponse and other weighting adjustments

ACS Sampling & Estimation

- First set of housing controls (HPF1)
 - Sum of current HU weights adjusted to match independent county total
 - Independent housing unit (and population) estimates from the Population Estimates Program

ACS Sampling & Estimation

- Population controls (PPSF)
 - Persons start with HU's weight
 - Placed in county-based poststrata by age, sex, race, and Hispanic; collapsing as necessary
 - Weights adjusted so collapsed poststrata totals match independent estimates

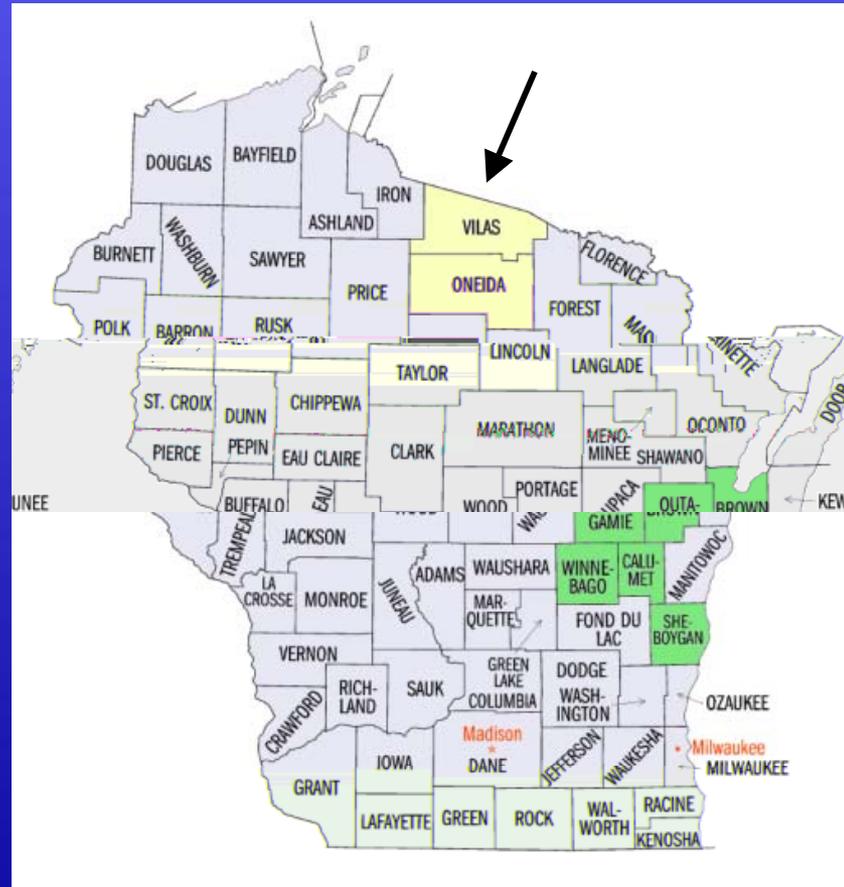
ACS Sampling & Estimation

- Second set of housing controls (HPF2)
 - HU has weight of “principal person” after population controls; vacants unchanged
 - Adjust weights again so county total again matches independent estimate

Oneida and Vilas Counties, WI

- Oneida County and Vilas County, Wisconsin, are neighboring counties included in the ACS Test
- Included, in part, because of the large number of seasonally vacant units

Oneida and Vilas Counties, WI



Different Residence Rules

- Census residence rule: was this your usual place of residence on April 1?

“DO NOT INCLUDE ... people who live or stay at another place most of the time”

Different Residence Rules

- ACS residence rule: current residents (at time of interview)

“LIST everyone who is living or staying here for more than two months”

So What?

- Independent housing unit and population controls
 - Based on previous decennial census counts, with annual updates
 - In census years, census count is used

So What?

- In most places, not much effective difference between definitions
- BUT, where people spend several months in a vacation home – in ACS, not in census

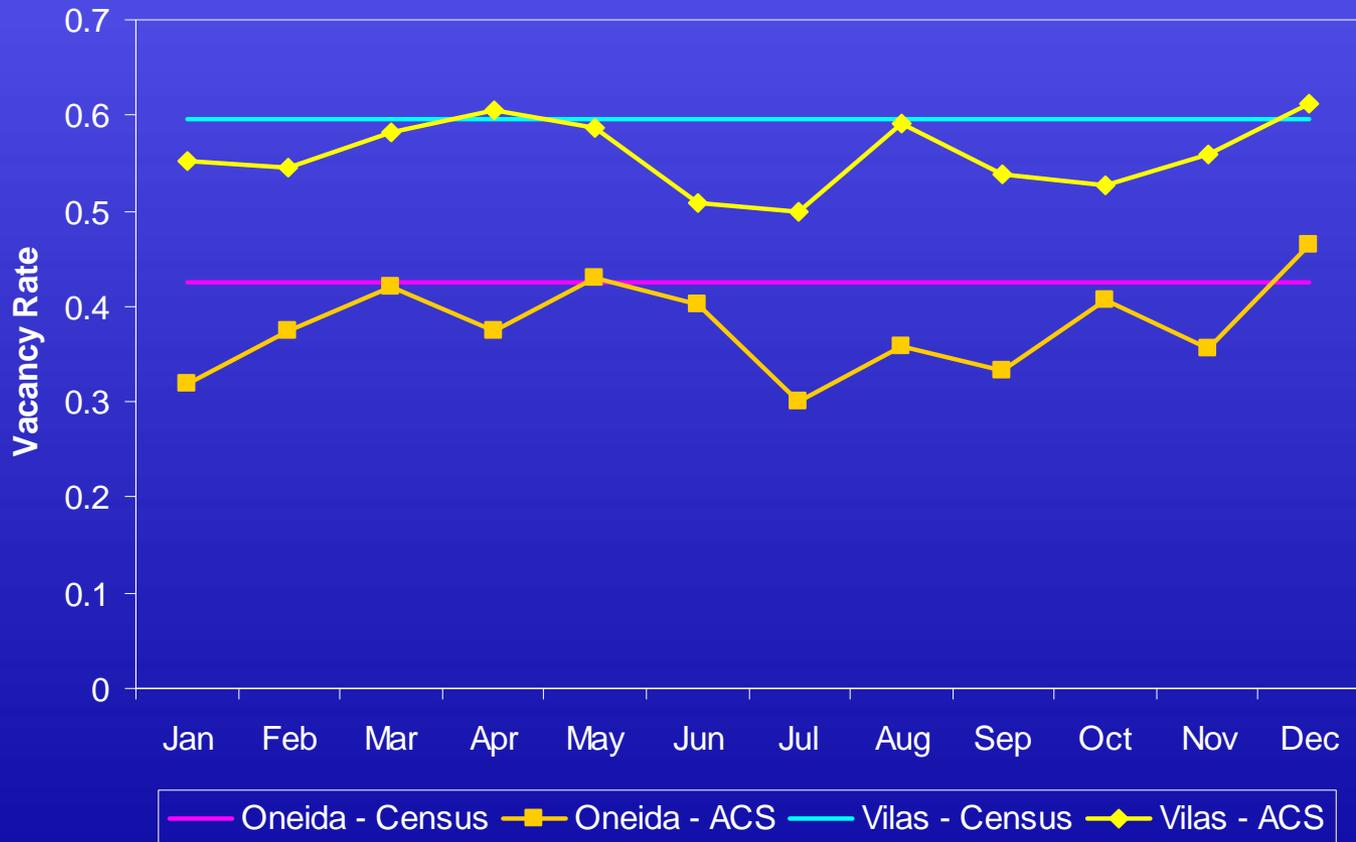
So What?

- ACS is counting people as residents that census isn't
- But we control back to census-based population counts
- This would cause an underestimation of the population in these counties, and could change the distribution of characteristics

So What?

- Additional issue of monthly variation
 - Census looks at April 1 only
 - ACS is a continuous survey
 - vacancy varies through the year

Vacancy Rates – Census & ACS



Weighting Methods

- We applied five different weighting methods to try to gain some insights about the problem
 1. Current ACS estimation methodology
 2. No population controls
 3. Neither population nor housing controls

Weighting Methods

- No controls means no residence rules problem
- But, controls do address legitimate coverage concerns

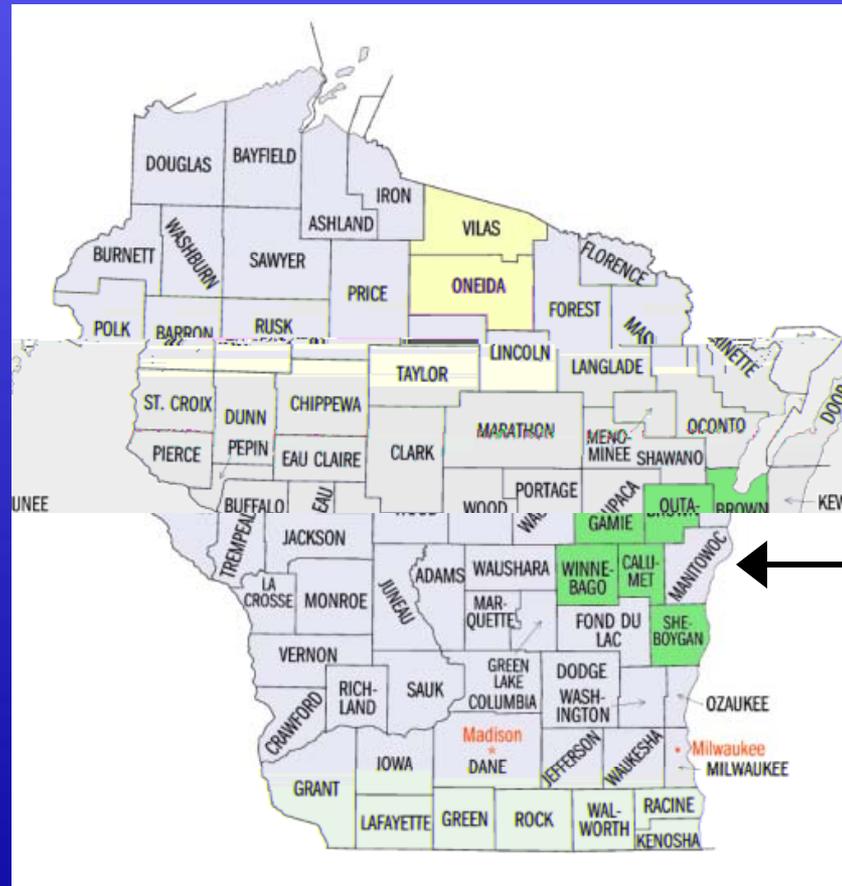
Weighting Methods

- Aggregate counties together before applying controls
- Helps to reduce coverage error at the small area level
- Shouldn't skew results because of residence rules issues, if other counties are less affected

Weighting Methods

- Combine Oneida & Vilas with Brown, Calumet, Outagamie, Sheboygan & Winnebago
4. Use combined controls for population, county controls for housing
 5. Use combined controls for housing and population

Weighting Methods



Weighting Methods

- Five additional counties were in 2000 and 2001 Supplementary Surveys
- National tests of ACS methodologies, but using a state-level sample design similar to CPS
- No data for these counties for 1999, so we combine just Oneida and Vilas

Three-Year Averages

- We compared Census 2000 to single year estimates and 1999-2001 3-year averages

$$X_{3\text{Year}} = \frac{1}{3}(X_{1999} + X_{2000} + X_{2001})$$

$$\text{Ratio}_{3\text{Year}} = \frac{X_{1999} + X_{2000} + X_{2001}}{Y_{1999} + Y_{2000} + Y_{2001}}$$

$$SE_{3\text{Year}} = \frac{1}{3}\sqrt{SE(X_{1999})^2 + SE(X_{2000})^2 + SE(X_{2001})^2}$$

First HU Control Factor

| | Method | 1999 | 2000 | 2001 |
|--------|---------|------|------|------|
| Oneida | 1, 2, 4 | 1.32 | 1.00 | 1.06 |
| | 5 | 1.21 | 1.00 | 1.01 |
| Vilas | 1, 2, 4 | 1.09 | 1.11 | 1.10 |
| | 5 | 1.21 | 1.00 | 1.01 |

Average Person Control Factor

| | Method | 1999 | 2000 | 2001 |
|--------|--------|------|------|------|
| Oneida | 1 | 0.83 | 0.91 | 0.94 |
| | 4 | 0.80 | 1.02 | 1.02 |
| | 5 | 0.81 | 1.02 | 1.02 |
| Vilas | 1 | 0.76 | 0.79 | 0.87 |
| | 4 | 0.80 | 1.06 | 1.01 |
| | 5 | 0.80 | 1.07 | 1.00 |

Second HU Control Factor

| | Method | 1999 | 2000 | 2001 |
|--------|--------|------|------|------|
| Oneida | 1 | 1.14 | 1.09 | 1.07 |
| | 4 | 1.16 | 0.99 | 0.98 |
| | 5 | 1.13 | 1.02 | 0.98 |
| Vilas | 1 | 1.15 | 1.14 | 1.06 |
| | 4 | 1.12 | 0.99 | 1.00 |
| | 5 | 1.13 | 1.02 | 0.98 |

Total Pop & Housing Units

| | Method | HU | SE | Pop | SE |
|--------|--------|--------|-----|--------|-----|
| Oneida | Census | 26,627 | NA | 35,868 | NA |
| | 1 | 26,668 | 0 | 35,902 | 0 |
| | 2 | 26,668 | 0 | 40,402 | 932 |
| | 3 | 23,972 | 161 | 36,096 | 870 |
| | 4 | 26,668 | 0 | 38,066 | 870 |
| | 5 | 25,398 | 233 | 36,451 | 873 |
| Vilas | Census | 22,397 | NA | 20,745 | NA |
| | 1 | 22,436 | 0 | 20,810 | 0 |
| | 2 | 22,436 | 0 | 26,277 | 828 |
| | 3 | 20,366 | 139 | 23,853 | 763 |
| | 4 | 22,436 | 0 | 24,799 | 819 |
| | 5 | 21,964 | 174 | 23,951 | 812 |

Vacancy Rates

| | Method | VR | SE | SVR | SE |
|--------|--------|--------|-------|--------|-------|
| Oneida | Census | 42.42% | N/A | 39.17% | N/A |
| | 1 | 37.20% | 0.85% | 32.29% | 0.96% |
| | 2 | 34.01% | 1.22% | 29.55% | 1.17% |
| | 3 | 34.37% | 1.25% | 29.95% | 1.22% |
| | 4 | 35.25% | 1.21% | 30.55% | 1.19% |
| | 5 | 35.20% | 1.23% | 30.55% | 1.21% |
| Vilas | Census | 59.52% | N/A | 56.20% | N/A |
| | 1 | 55.72% | 0.73% | 50.64% | 0.95% |
| | 2 | 50.01% | 1.32% | 45.48% | 1.34% |
| | 3 | 50.02% | 1.34% | 45.50% | 1.37% |
| | 4 | 51.67% | 1.29% | 46.95% | 1.33% |
| | 5 | 51.84% | 1.27% | 46.99% | 1.34% |

Conclusions

- Controls do have significant impact on housing and pop counts
- Using aggregate level controls gives reasonable results
- Research is ongoing

Contact Information

- If you have any questions or comments:

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