

## Who does not respond to the Agricultural Resource Management Survey and does it matter?

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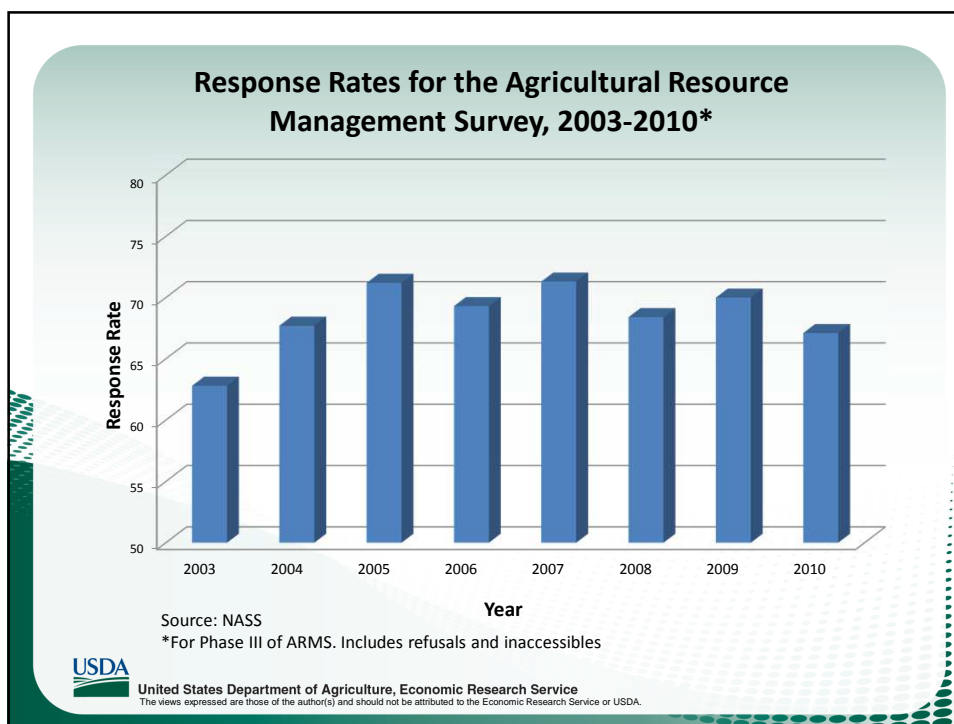
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## What is the Agricultural Resource Management Survey (ARMS)?

- The primary source of information on the financial condition, production practices, and resource use of America's farm businesses and the economic well-being of America's farm households.
- Nationally-representative, conducted annually
- Roughly 30,000 farms targeted each year
- Collects field-level, farm-level, and household-level data



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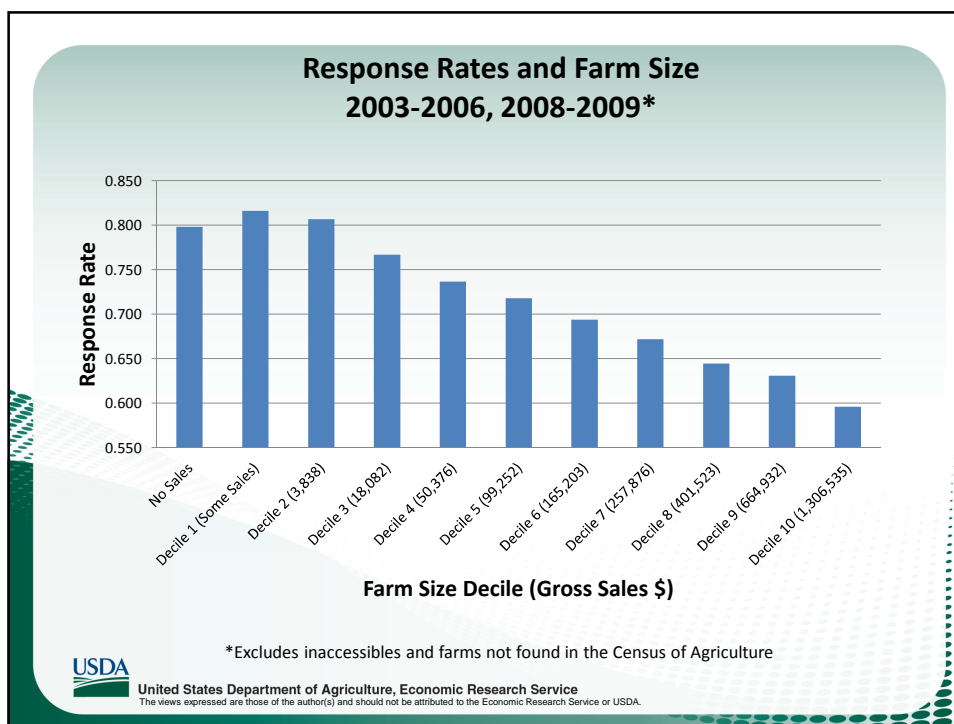


## The Consequence of Refusals

- If data are missing at random, refusals can be ignored
- If not, refusals could bias aggregate statistics and estimates of behavioral relationships (e.g. how direct payments affect crop choices and output)
- Korinek, Mistiaen, and Ravallion (2005) find that compliance with the Current Population Survey decreases with income
  - If ignored, would underestimate income inequality and mean income
  - Does compliance with ARMS exhibit a similar dependence?



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## The Root of Bias

- Differences between respondents and refusals that affect the variable of interest
- Re-weighting may address bias of unconditional means
  - Calibrating to known targets related to the variable of interest can eliminate bias (Earp et al. 2008, 2010)
- But, when estimating behavioral relationships...
  - Farm Profitability =  $B * (\text{Experience}) + \text{error}$
  - Must assume that there is no correlation among variables omitted from the model (captured by error term) and *Experience*, *Farm Profitability*, and response propensities
  - **If there is, we have problem, with or without weighting**

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## Motivations for Refusals

- Prior research suggests “Would not take the time /too busy” is most common reason for refusing
- 2010 average time to complete the survey: 1 hour and 33 minutes
- Concerns about confidentiality (though unstated) likely provide further motivation



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## Key Questions

- How do respondents and refusals (and inaccessibles) compare?
- Does controlling for selection into the respondent category alter estimates from econometric models?



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## Data

- ARMS Years 2003-2006, 2008-2010
- Match 2003-2006 IDs to 2002 Census of Agriculture; 2008-2010 to the 2007 Census
- Using Census of Agriculture data, calculate key household and farm characteristics for respondents and nonrespondents



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## ARMS and Census Match Rates

Census Year	ARMS Year	Total N	Matched N	Match Rate (%)
2002	2003	30,490	25,046	82.1
	2004	31,138	26,256	84.3
	2005	33,567	27,220	81.1
	2006	33,052	26,407	79.9
2007	2008	33,309	31,670	95.1
	2009	31,863	25,848	81.1
	2010	33,896	27,027	79.7
Total		227,315	189,474	84.0

AND match rates were *relatively* similar between ARMS respondents, refusals, and inaccessible: **86.0, 81.6, and 74.3.**



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## Respondents, Inaccessibles, and Refusals

- Compare unweighted means across response status
  - farm/household variables (age, persons in household, off-farm work)
  - commodity specializations (based on percent of total sales, including production contracts)
  - Regions
- Farm can be respondent, refusal, or inaccessible (could not be located)
- If response status is randomly assigned, different groups should have similar means



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## Finding

- Inaccessible farms were similar to respondent farms
- But refusal farms are larger and the households are more dependent on farming than those in the respondent and inaccessible groups
  - Difference in means was statistically significant at the 1% level for 22 out of 35 variables



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## Key Differences

Variables	Mean - Respondents	Mean - Refusals	P Value	Percent Difference
<b>Household Characteristics</b>				
<i>Age</i>	55.0	53.8	0.000	2.3
<i>Persons in household</i>	2.85	2.916	0.003	2.3
<i>Worked off farm</i>	0.437	0.379	0.000	13.3
<i>Primary Occupation</i>	0.756	0.814	0.001	7.7
<i>Percent income from operation</i>	49.5	57.6	0.000	16.3
<b>Farm Characteristics</b>				
<i>Sole proprietorship farm</i>	0.755	0.717	0.003	5.0
<i>Hired manager</i>	0.056	0.067	0.001	19.3
<i>Corn yield</i>	123	128	0.000	4.8
<i>Uses production contracts</i>	0.102	0.078	0.025	23.7
<i>Production contract sales</i>	203,714	415,852	0.115	104.1
<i>Total sales</i>	518,934	902,327	0.016	73.9
<i>Land owned</i>	627	906	0.000	44.5
<i>Cropland harvested</i>	501	780	0.000	55.8



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## Does Respondent Burden Explain the Lower Response Rate of Larger Farms?

- Farms receiving longer versions of the survey had lower propensities to respond
- Larger farms took longer to fill out the survey
- Combined, longer response times explains about 20 percent of the difference in response propensities between the smallest and largest farms



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## Testing for Refusal Bias in Econometric Analysis

- Pick two econometric models from published papers
- Approximate the specification using Census of Agriculture variables
- Estimate models with an unbiased sample (respondent and refusal farms), creating bootstrapped confidence intervals for the parameters
- Finding: Nonresponse bias is minimal



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## Conclusions

- Operators of larger farms, more dependent on farming, are less likely to respond – these operators are likely the most sensitive to the length of the survey
  - Only partly explained by respondent burden
- In two econometric models, nonresponse bias was minimal
  - Though nonresponse bias can vary by application



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