

Early Birds vs. the Full Flock: Representativeness of Probability Samples Across the Field Period

Megan A. Hendrich¹
& Randall K. Thomas²

¹ Ipsos Public Affairs

² AccuSurvey Consulting

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Study Background

People who respond earlier to a survey invitation can differ from those who respond later (e.g., Fricker & Tourangeau, 2010):

- **For example, we often find that older, female, urban, and White respondents are more likely to respond earlier in a field period.**
- **Though younger, male, rural, Black, and Hispanic respondents respond in lower proportions early on, these harder-to-reach groups tend to increase participation with more time in field.**

However, researchers often want to collect data as quickly as possible, especially when the topic is a quick-turnaround political issue or when leading up to an election.

Study Purpose

In collaboration with the New York Times, we collected data from two samples leading up to the 2022 midterm election in Wisconsin:

- **ABS sample primarily using a mail-back survey**
- **Ipsos KnowledgePanel, which is one of the most well-established probability-based online panels in the U.S.**

Using this data, we investigated how the sample composition of early responders differs from the overall sample:

- **We were interested in the representativeness and error of the sample overall and at different points during the field period.**

Method

Study Design: ABS Fielding Details

Sample: Wisconsin residents (age 18+) using address-based sample (ABS)

Field period: 9/9/2022 to 11/7/2022

Recruitment: 4 invitation and reminder mailings

Mode: Mail-back paper survey (93%) or online survey (7%)

Replicate	Replicate Size	First Mailing Date	First Return Date	Completes	Response Rate
1	610	9/9/2022	9/12/2022	171	28.0%
2	2,745	9/19/2022	9/23/2022	699	25.5%
3	2,745	9/23/2022	9/28/2022	740	27.0%
Total	6,100	--	--	1,610	26.4%

Study Design: KnowledgePanel Fielding Details

Sample: Wisconsin residents (age 18+) using KnowledgePanel (KP)

Field period: 9/30/2022 to 11/7/2022

Recruitment: Email invitation and up to 2 reminder emails

Mode: Online survey

Replicate	Replicate Size	Invitation Date	Completes	Cooperation Rate
1	134	9/30/2022	86	64.2%
2	316	10/3/2022	217	68.7%
3	476	10/6/2022	323	67.9%
4	448	10/14/2022	320	71.4%
Total	1,374	--	946	68.9%

Study Design: Analysis

Two early responder samples:

1. First 50% of each replicate

- **ABS \approx 7 days**
- **KnowledgePanel \approx 2 days**

2. First 75% of each replicate

- **ABS \approx 17 days**
- **KnowledgePanel \approx 4 days**

Post-stratification weighting for each sample using demographic values for Wisconsin:

- **Age by Gender**
- **Race-ethnicity**
- **Education**
- **Income**
- **Region of State**

Study Design: Analysis

Demographic balance:

- **Unweighted sample composition vs. demographic weighting targets**
- **Weighting efficiency (summary indication of representativeness)**

Error for 15 non-demographic items via average absolute deviation:

- **Calculated absolute difference between each benchmark and the weighted estimate from each sample**
- **Averaged across the absolute differences for each benchmark to obtain the average absolute deviation for each sample**

Study Design: Benchmark Items

Wisconsin Benchmark Items (15 items)	
General Items	People vaccinated with at least 1 COVID-19 dose
	Own their own home
	Born in state of residence
	Currently married
	Works full time
	Valid U.S. passport
	Valid fishing license
	At least 1 child under 18 in household
	Valid hunting license
	Has a motorcycle
	Valid concealed carry license
	Veteran
Political Items	Currently registered to vote in Wisconsin
	Vote for WI Senator for 2022 – Republican
	Vote for WI Governor for 2022 – Republican

Results

Results: Error from Age-Sex Targets

People age 18-44, especially men, were underrepresented in both samples, whereas those age 60+ were overrepresented. Most groups got slightly closer to benchmarks with more time in field.

Age-Sex	Benchmark	ABS Difference			KP Difference		
		50%	75%	All	50%	75%	All
Male 18-44	21.6	-13.6	-13.1	-12.2	-14.2	-13.0	-13.5
Male 45-59	12.5	-1.8	-2.2	-2.1	+0.3	-0.6	-1.5
Male 60+	14.8	+15.4	+12.8	+9.9	+12.9	+10.0	+8.4
Female 18-44	21.5	-6.2	-5.5	-4.7	-7.7	-6.5	-4.9
Female 45-59	13.0	-2.6	-1.1	-0.4	+1.0	+1.6	+1.6
Female 60+	16.6	+8.9	+9.1	+9.4	+7.7	+8.6	+9.9

Results: Error from Income Targets

People with higher incomes were underrepresented in the ABS sample, while KnowledgePanel was closer to benchmarks. More time in field did not improve the estimates, though the differences were smaller than for age-sex.

Income	Benchmark	ABS Difference			KP Difference		
		50%	75%	All	50%	75%	All
Under \$49,999	29.6	+8.0	+8.2	+7.9	+2.5	+1.7	+2.4
\$50,000-\$99,999	34.8	-0.3	-0.8	+0.4	-2.9	-1.1	-1.0
\$100,000-\$149,999	20.5	-4.1	-3.6	-3.7	+0.1	+1.1	+0.4
\$150,000 and over	15.1	-3.6	-3.8	-4.5	+0.2	-1.7	-1.9

Results: Error from Education Targets

People with a high school education or less were underrepresented in both samples, and those with a Bachelor's or higher were more overrepresented in KnowledgePanel. More time in field led to worse estimates for most groups.

Education	Benchmark	ABS Difference			KP Difference		
		50%	75%	All	50%	75%	All
High school or less	37.8	-10.8	-11.0	-11.9	-13.8	-15.6	-15.1
Some college	32.6	+6.8	+6.4	+6.8	+1.2	+3.2	+3.7
Bachelor's or higher	29.6	+4.0	+4.7	+5.1	+12.5	+12.4	+11.4

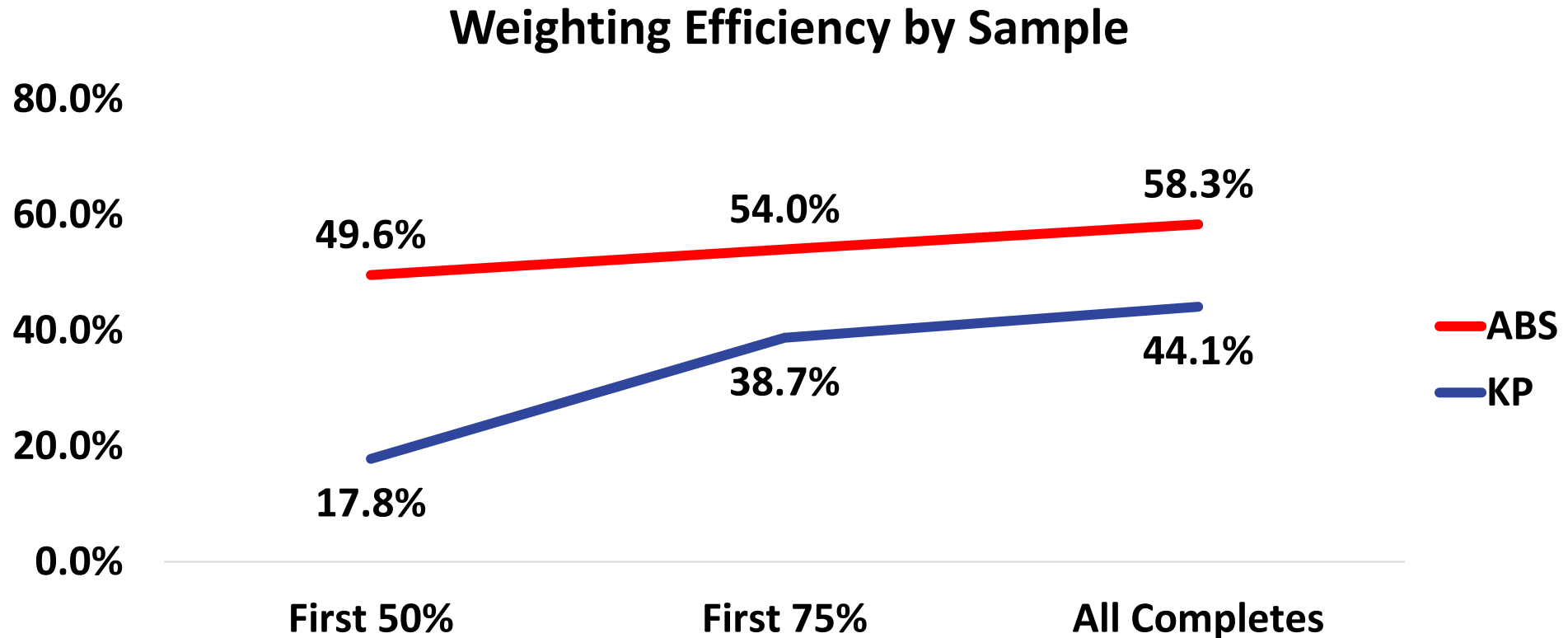
Results: Error from Race-ethnicity Targets

Both sample sources had higher proportions of non-Hispanic White respondents, though more time in field helped bring the composition more in line with benchmarks for most groups.

Race-ethnicity	Benchmark	ABS Difference			KP Difference		
		50%	75%	All	50%	75%	All
Non-Hispanic White, Other, or 2+ races	88.8	+4.9	+4.2	+3.4	+6.5	+7.0	+5.2
Non-Hispanic Black or African American	5.5	-2.5	-2.1	-1.8	-3.2	-3.9	-3.2
Hispanic	5.7	-2.4	-2.1	-1.6	-3.4	-3.0	-2.0

Results: Weighting Efficiency

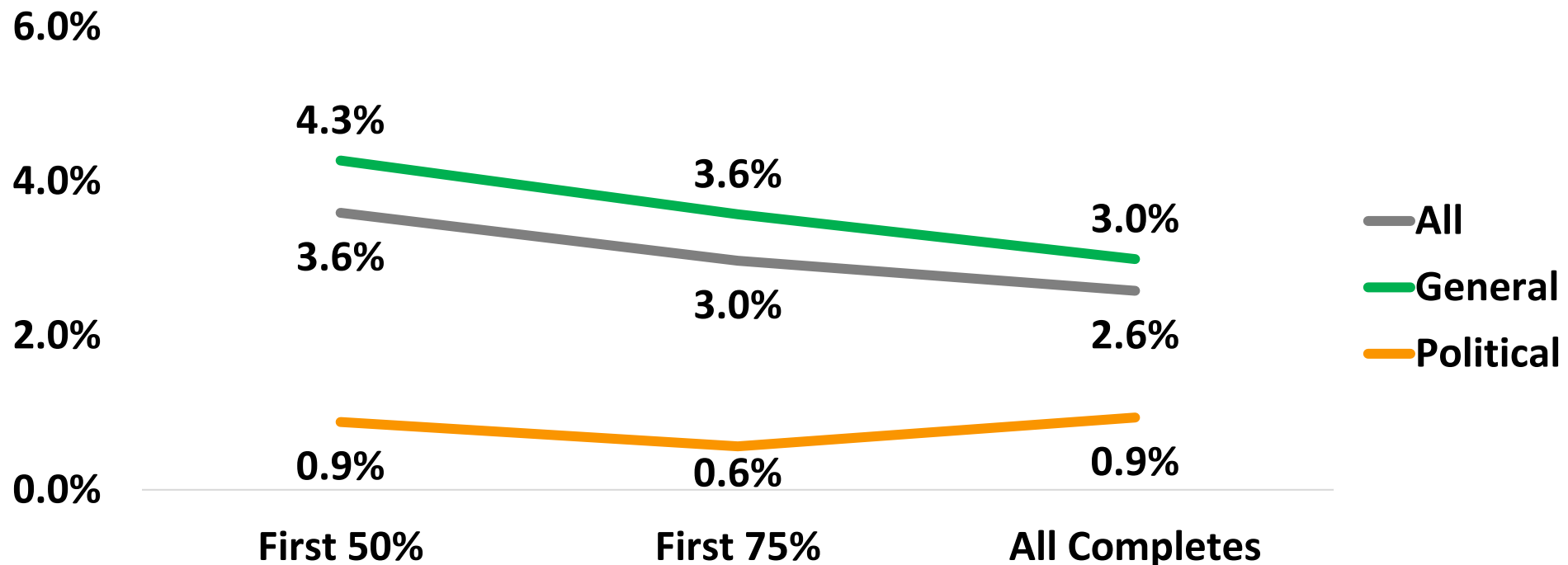
A summary measure of demographic imbalance can be obtained by looking at the weighting efficiency for each sample. The full sample had the highest weighting efficiency for both ABS and KnowledgePanel.



Results: Overall Error for ABS Sample

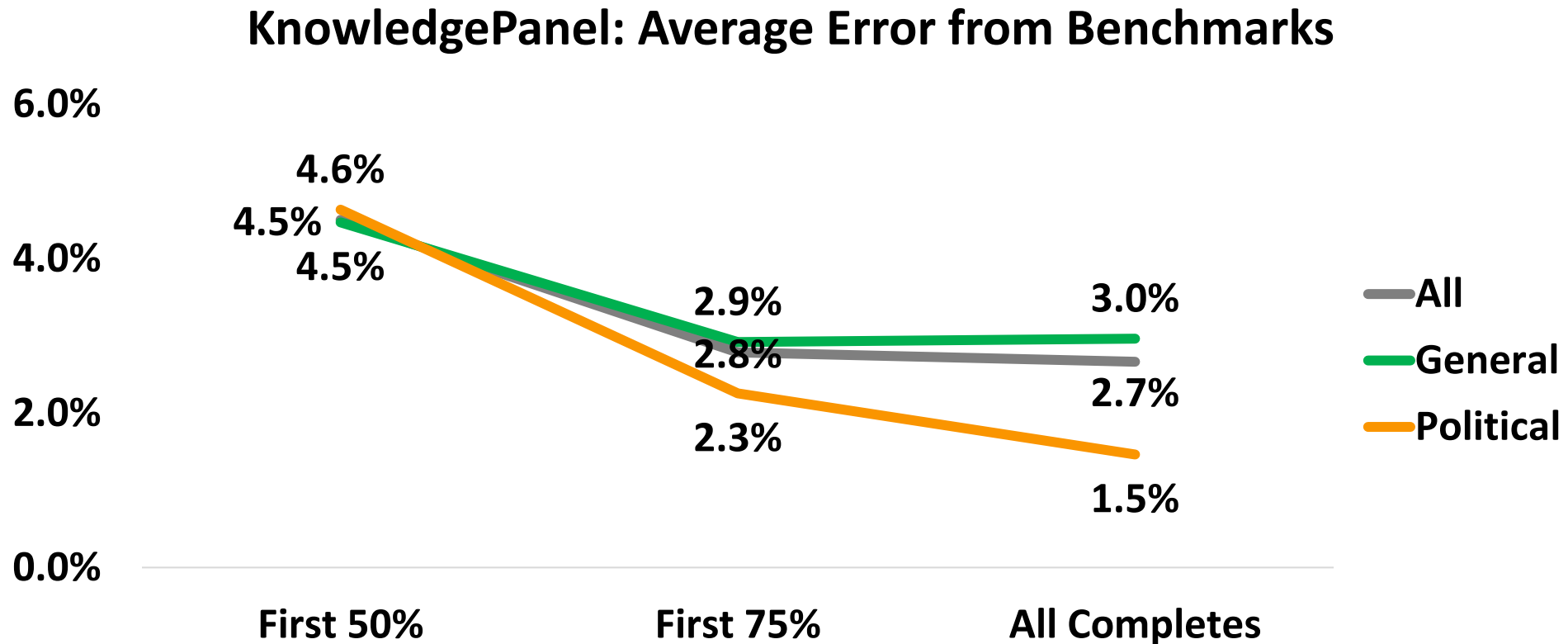
For ABS, there was a 30% decrease in average error for the general items with more time in field. This was after weighting each sample, suggesting that respondents who take longer to respond are different from early responders on more than just demographics.

ABS: Average Error from Benchmarks



Results: Overall Error for KnowledgePanel Sample

For KnowledgePanel, average error decreased by 33% for the general items and by 67% for the political items as the proportion of sample that completed the survey increased.



Discussion

Discussion and Conclusions

Shorter field periods reduce the accuracy of results:

- **Limiting a survey's time in field generally increases error for both weighting variables (affecting weighting efficiency and effective sample size) as well as for other substantive variables of interest.**
- **This is particularly evident for the non-demographic benchmark items, indicating that weighting alone is insufficient to correct for non-response bias.**

Based on these results, we recommend that researchers carefully weigh the trade-offs between faster data collection and more accurate data when choosing what is best for their study's purpose.

Thank you!

Megan A. Hendrich

Megan.Hendrich@ipsos.com



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Appendix: Additional Information

Study Design: Classification Issues

Classification for day of completion for those who completed the ABS and KnowledgePanel surveys online was relatively straightforward based on both the day and time of online survey entry (to the minute).

However, for those who returned a completed survey by mail, we took the day of receipt and subtracted 3 days to allow for the normal delay from mailing to receipt.

This led to a somewhat rougher classification of response for ABS (with far more mail-back completes) than for KnowledgePanel (with only online completes).

Study Design: Early Responder Sample Dates

Replicate	First Complete	50% Completes	75% Completes	100% Completes
ABS 1	09/12/2022	09/18/2022	09/30/2022	10/30/2022
ABS 2	09/20/2022	09/26/2022	10/04/2022	11/06/2022
ABS 3	09/25/2022	09/30/2022	10/10/2022	11/06/2022
KP 1	09/30/2022	10/01/2022	10/03/2022	10/29/2022
KP 2	10/03/2022	10/04/2022	10/06/2022	10/24/2022
KP 3	10/06/2022	10/07/2022	10/10/2022	11/05/2022
KP 4	10/14/2022	10/15/2022	10/17/2022	11/07/2022

Results: Error for Benchmark Items

Benchmark Items	Benchmark	ABS Difference			KP Difference		
		50%	75%	All	50%	75%	All
General Items							
People vaccinated with at least 1 COVID-19 dose	83.7	-8.6	-7.4	-6.6	-1.5	-6.5	-6.8
Own their own home	75.2	+2.5	+0.6	-1.6	-0.0	+1.6	+1.4
Born in state of residence	70.8	+0.2	+1.5	+0.7	+5.3	+4.8	+3.8
Currently married	52.8	+2.2	+0.5	+0.3	+11.0	+3.3	+2.5
Works full time	50.1	+7.1	+7.4	+6.1	+10.9	-2.0	+0.1
Valid U.S. passport	42.4	+9.0	+6.5	+7.0	+4.9	+3.6	+5.4
Valid fishing license	30.5	+0.2	+1.4	+0.1	+1.9	-2.2	-4.1
At least 1 child under 18 in household	27.6	+4.7	+2.1	+2.0	-3.7	-0.6	+1.7
Valid hunting license	13.9	+7.7	+8.6	+6.8	+5.6	-0.0	+0.1
Has a motorcycle	13.2	-2.2	-1.6	-2.1	-5.3	-5.2	-5.9
Valid concealed carry license	10.6	+3.5	+2.9	+1.0	+1.9	+3.2	+2.4
Veteran	6.6	+3.4	+2.4	+1.6	+1.7	+2.0	+1.5
Political Items							
Currently registered to vote in Wisconsin	81.7	-1.8	-1.1	-2.0	+4.7	+3.5	+3.5
Vote for WI Senator for 2022 – Republican	30.3	-0.4	-0.1	+0.1	-4.2	-1.4	+0.4
Vote for WI Governor for 2022 – Republican	28.7	-0.4	+0.6	+0.7	-5.0	-1.8	+0.4