Another Dose of Customer Truth Serum: Measuring Self-Reported Free Ridership Rates Across Multiple Years

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ABSTRACT

Capturing free ridership rates through self-reported customer surveys is one of the most challenging aspects of attribution research. Impact evaluations depend heavily on customers accurately recalling rebates and the role of contractors in their energy-efficiency purchasing decisions. However, do customers truly remember these experiences accurately, and is there a way to assess their responses over time?

Three impact evaluations compared customer responses at two critical points: at the initial rebate application and during the customer survey conducted six months to a year after installation. This analysis was performed for three separate program cycles. This multi-year approach identified that while most customers provided consistent responses, a group of program participants switched their responses from the initial rebate application to the customer survey. Comparing the initial rebate application results to the follow-up customer survey findings during both program periods identified several emerging trends:

- Most customers responded consistently to both question sets, suggesting that customers answered these questions truthfully.
- However, a growing number of participants provided contradictory answers, suggesting that customers' recollections or motivations for purchasing energy-efficient equipment fluctuate, which makes these estimates unreliable.

Given the impact of free ridership rates on calculating net program savings, this paper presents another approach to broaden our understanding of customer intentions and consistently track free ridership rates throughout the program cycle.

Introduction

Determining the accuracy of customer survey responses is one of the most confounding areas of attribution research. Impact evaluations rely heavily on customers accurately recalling the influence that rebates and contractors had on their energy efficiency purchasing decisions. However, are customers accurately recalling these experiences, and is there a way to measure these responses over time to improve accuracy? This paper highlights the challenges of accurately documenting program participant responses over time. It compares participant responses to free ridership questions at two points: the initial rebate application and answers to follow-up questions conducted months after the product installation.

Spire Inc. is a natural gas company serving more than 1.7 million customers across multiple states, including approximately 1.2 million customers in Missouri.

Spire program staff hired the Johnson Consulting Group team to complete process and impact evaluations of its Residential Water Heating and Space Heating Program in 2017, 2020 and 2024. This program offers customer rebates on the purchase of high-efficiency gas furnaces, water heaters, and programmable thermostats.

The results cited in this paper are from three independent program evaluations conducted for Spire's operating companies in Missouri: MOE (Missouri East, also known as Laclede) and MOW (Missouri West, also known as Missouri Gas Energy/MGE).

Methodology

The evaluation team employed two approaches to measure free ridership, thereby determining the Net-to-Gross Ratio (NGR) for its residential program.

Initially, the program evaluation team planned to assess Net-to-Gross (NTG) by incorporating a complex set of questions in the participant customer surveys. This approach, commonly referred to as the Illinois TRM Algorithm (IL), poses participants multiple questions about the factors that influenced their purchasing decision. The following figure illustrates the question logic used for this question set.

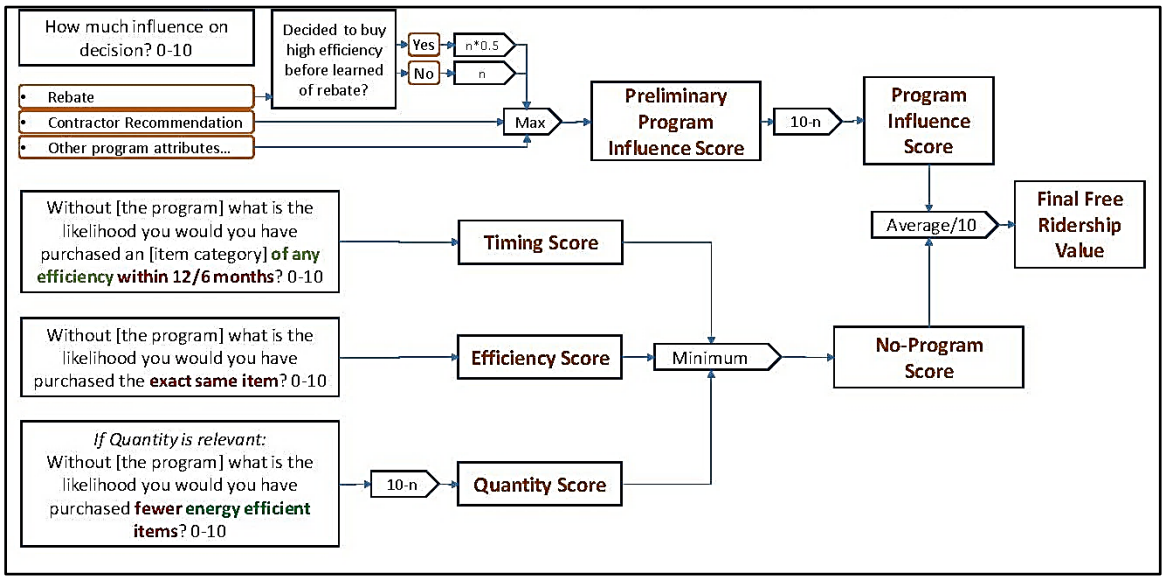

Figure 1: Free Ridership calculation methodology. *Source:* Illinois TRM Version 6, Volume 4, Figure 4-6, p. 70

Table 1 summarizes the free ridership rates for each program evaluation, using this algorithm. However, these free ridership rates were substantially higher than the initial program planning assumptions had anticipated.

Table 1: Free Ridership rate using IL TRM algorithm

Traditional Approach	2017	2020	2024
Survey Responses- Unadjusted- Rebate Influence Question Only	44%	45%	64%

However, this approach had two significant shortcomings:

- It appeared to overstate program free-ridership through a complicated algorithm that weighted different components that may influence participant purchase decisions.
- It did not have a mechanism to include additional free ridership data captured in the rebate application from program participants.

The overall goal of any program evaluation is to gather data from multiple sources; however, the NTG algorithm from Illinois draws *exclusively* from participant survey data collected several months after the measure has been purchased and installed. Industry best practices have long recognized the need to move to a "fast feedback" survey, in which NTG data are collected shortly after program participation.

Spire program staff developed an approach that gathers NTG data at the time of the participant's actual decision-making through its rebate application. The team added two questions designed to assess free ridership in its standard rebate application. The application also includes other questions, such as the source of awareness, to provide real-time feedback regarding the effectiveness of various marketing and outreach tactics.

Initially, the evaluation team used the NTG algorithm to conduct free ridership analysis. However, the overall response rates to this question battery were low and declined further as the participant answered subsequent questions.

To explore these discrepancies, we conducted a subsequent analysis that compared the *participant survey responses* with *answers from the rebate application* to assess the rebate's influence. The analysis revealed that free ridership ranged from 23 to 64 percent across these evaluations (Johnson 2017, p. 2; Appendix C, 2025, p. 2)

Given the high level of uncertainty associated with this response rate for the free ridership questions, the program manager provided the evaluation team with the complete set of rebate applications for each evaluation period. This program database included capturing the initial responses to the simple question from the rebate application: *Did the rebate influence your decision?*

Table 2 summarizes the response rate for this question from the program application. As this table shows, the number of responses to the rebate applications was significantly higher than the number of respondents who completed the follow-up surveys. Notably, the number of survey respondents for each program cycle was as follows: n = 71 (2017), n = 73 (2020), and n = 72 (2024), respectively.

Table 2: Summary of responses regarding rebate influence on program applications

	2017 Results			
Rebate Influenced Decision?	MOE	MOW	Total	Response Rate
Yes	3,897	2,945	6,842	40%
No	1,665	1,640	3,305	19%
Blank	5,573	1,238	6,811	40%
Total	11,135	5,823	16,958	100%
	2020 Results			
Yes	1,284	4,227	5,511	23%
No	561	2,462	2,923	12%
Blank	15,391	477	15,868	65%
Total	17,236	7,136	23,372	100%
	2024 Results			
Yes	17, 129	8,523	25,652	73%
No	5,505	2,889	8,094	24%
Blank	829	382	1,211	3%
Total	23,163	11,794	34,957	100%

The trend of “Yes” responses is summarized in Figure 2.

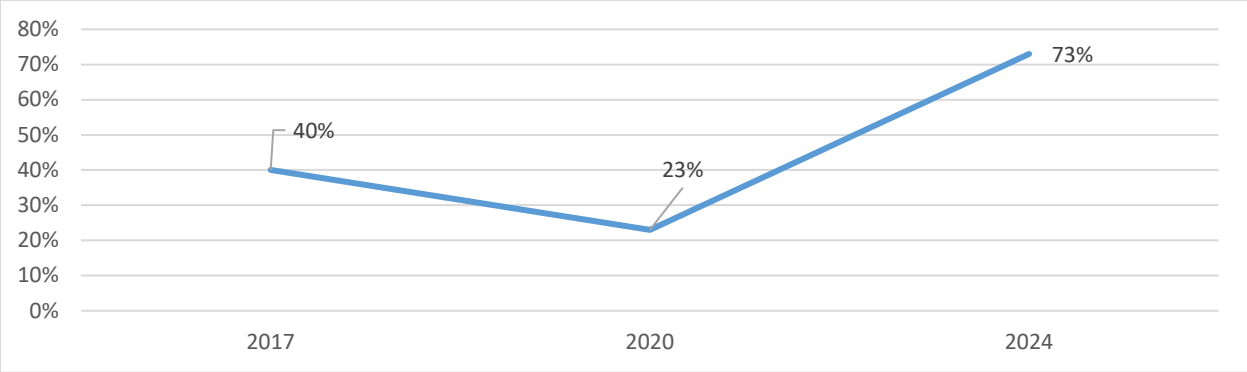

Figure 2: Comparison of "yes" responses across program evaluation years. *Source:* Free Ridership Memo, Appendix 2017, 2020, 2024

As Table 2 shows, the number of participants who left this question blank has declined significantly across the program evaluations. Due to a turnover in program database providers, not all rebate application data was captured in 2020. However, the sheer number of responses provides a clear indication that free ridership rates were relatively low, based on these responses alone (i.e., 19%, 12%, and 24%, respectively, of those participants who said that the rebate did not influence their purchase decision).

The following table compares the estimated free ridership based on the participants' answers on their rebate application, made at the time of program enrollment.

Table 3: Estimated free ridership rates from program applications

Free Ridership Rates from Rebate Application Responses	2017	2020	2024
Did the rebate influence your decision?	29%	15%	28%

Comparison of responses

To reconcile the discrepancies between the relatively high free ridership rates found in the survey (see Table 1) and the relatively low free ridership rates reported in the customer rebate applications (see Table 2), the evaluation team compared the participants' initial rebate responses with their answers on the follow-up customer survey.

Specifically, the team compared the respondents' answers to the following questions:

- Rebate application question: *"Did the rebate influence your decision?*"

- *FR2. How influential was the availability of the rebate from* [UTILITY] on your decision to install the **[MEASURE]** that you installed? Please use a scale from 1 to 10 where 1 means "not at all influential" and 10 means "very influential."

Table 4: Comparison of free ridership estimates from the rebate application and the customer survey

Source		Influence of Rebate (Score = 10)		
Spire Participant Survey	Did Rebate Influence Purchase Decision?	2017 (n=28)	2020 (n=33)	2024 (n=42)
	Yes	7	1	6
	No	*0*	*0*	*2*
	Blank	4	0	2
Spire Rebate Application Database		Influence of Rebate (Score =1)		
	Yes	3	8	16
	No	6	5	11
	Blank	6	3	0
Contradictory Findings		3	8	16
% of Contradictory Responses		***11%***	***24%***	***38%***

This analysis found that while most respondents provided consistent answers to both questions, a minority of customers provided contradictory answers.[1] First, there was a remarkable amount of consistency among participants who initially indicated they were free riders (i.e., "No") and respondents who also reported that the rebate had "no influence" on their purchase decision (i.e., scores of "1") across program years.

But several discrepancies also emerged, which are highlighted in bold and italicized in Table 4. Specifically, 27 respondents initially indicated that their rebate influenced their purchase decision on the rebate application, but subsequently rated the level of influence of the rebate on their decision as a "1". These contradictions affected free ridership rates.

[1] **Caveats:** It is important to note a few caveats with this analysis. First, these findings are qualitative due to small response rates for the survey free ridership questions, and the purpose of this analysis is to identify *actual free riders*. Furthermore, this analysis was conducted to *identify data trends* and to determine if the free ridership questions are being answered consistently from the rebate application to the follow-up survey questions. This approach focused on analyzing responses from individuals who were either "Low Influence" (i.e., responses of "1-3") or "High Influence" (i.e., responses of "8-10") for each time period. The scale originally was 0-10, but was changed to 1-10 for 2020 and 2024 evaluations.

The evaluation team found a similar level of discrepancies in respondents' ratings over time in the analysis of the following questions, which is summarized in the following cross-tabulation:

- The rebate application question: *"Did the rebate influence your decision?"*
- FR8. *Without the [PROGRAM NAME] program rebate, how likely is it that you would have purchased the same* <MEASURE>? Please use a scale from 1 to 10, where 1 means "not at all likely" and 10 means "very likely."

This second question assumes that program free-riders provide a higher rating for this than non-free riders, given that free riders would not be influenced by the program to make a purchase decision and therefore would purchase the *" same measure"* without the rebate. Examining these results tell a different story.

As Table 5 shows, ten respondents provided contradictory answers in 2017, and four did in 2020; however, this number increased to 33 in 2024. Overall, these inconsistent and contradictory results could have influenced the overall free ridership scores by as much as 36% in 2017, 12% in 2020, and 79% in 2024.

Table 5: Illustration of contradictory findings regarding purchasing the exact same measure

Source	Question: *Without the program, what is the likelihood that you would have purchases the exact same measure?"*			
Participant Survey	*Did Rebate Influence Purchase Decision*?	2017 (n=28)	2020 (n=33)	2024 (n=42)
	Yes	8	4	21
	No	***8***	***3***	***21***
	Blank	11	6	0
Spire Rebate Database	Yes	***2***	***1***	***12***
	No	0	0	4
	Blank	3	1	0
Contradictory Findings		10	4	33
% of Contradictory Responses		***36%***	***12%***	***79%***

Conclusions and Recommendations

Table 6 summarizes these qualitative free ridership estimates based on this multi-year analysis for 2017, 2020, and 2024. Overall free ridership for 2017 was estimated at 36%. Most telling, *none* of these results suggest a free ridership rate higher than 44%, which differs markedly from the NTG algorithm's calculation of free ridership based solely on customer surveys.

The free ridership rate dropped to 28% in the 2020 program evaluation, using this multi-question approach. The customer survey revealed that free ridership accounted for 45%. However, the analysis of the rebate application questions yielded a much lower rate due to the respondents "flipping" their answers.

To arrive at a reasonable free ridership estimate, the evaluation team calculated the weighted average of responses from two data sources: the rebate program databases, excluding blank applications, and the weighted averages of the survey responses. This free ridership rate estimate incorporates data from both the rebate applications and the customer surveys. It is also slightly lower than the previously calculated free ridership estimate of 35% but is consistent with program planning estimates (see Table 6).

Table 6: Summary of estimated free ridership rates from comparison analysis

Question	2017 Free Ridership Estimate	2020 Free Ridership Estimate	2024 Free Ridership Estimate
No Rebate Influence by purchased exact same measure- Rating "8-10" – no and blanks	44%	14%	29%
No Rebate Influence by Influence in Database- "1-3" Rating for No and Blanks-	29%	15%	32%
No Rebate Influence by Yes Decided to Purchase	44%	15%	15%
Revised Free Ridership Estimates from All Sources	36%	28%	35%

The key takeaways from this multi-year analysis are:

- Determining free ridership is a complex task and requires multiple approaches to ensure a consistent and reliable estimate.
- Program participant responses are not always reliable. One of the most surprising findings from these analyses was identifying the number of customers who changed their answers over time. The analysis revealed that the percentage of contradictory responses increases over time, which suggests that the battery of free ridership questions *overestimates* free ridership.
- It is essential to monitor free ridership rates throughout the program cycle by including identical questions on the initial rebate application and the follow-up customer surveys. This additional layer of analysis will provide more significant insights into the overall reliability of free ridership estimates and serve as another important data source for analyzing free ridership rates over time.

References

Illinois Technical Reference Manual, Version 6, Volume 4, Figure 4-6, p. 70

Johnson, Katherine. 2017. *"Appendix G: Memo on Free Ridership for Laclede Gas Company's Program Evaluation Results,* Prepared for Mr. Shaylyn Dean, Manager, Energy Efficiency Program. November 30.

_____. "Appendix D: Memo on Free Ridership for Laclede Gas Company's Program Evaluation Results," *Energy Efficiency Program Evaluation Results for SPIRE MOE (Laclede Gas) Residential Water Heating and Space Heating Program and C&I Rebate and Custom Programs*, Prepared for Mr. Shaylyn Dean, Manager, Energy Efficiency Program. November 6.

_____, 2025, “Appendix C: Memo on Free Ridership for MOE’s and MOW’s Program Evaluation Results,” Prepared for Mr. Shaylyn Dean, Director, External Affairs, Feb. 24.