
PROGRAM EVALUATION OF THE NEW YORK STATE ENERGY EFFICIENT APPLIANCE REBATE DEMONSTRATION PROGRAM: THE FREE RIDER FACTOR

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Introduction

The New York State Energy Efficient Appliance Rebate Demonstration Program administered by the New York State Energy Office was designed to determine if financial incentives influence consumers to purchase energy efficient appliances. It was also designed to serve as a mechanism for returning petroleum overcharge dollars to consumers in an expeditious manner. The program offered rebates from \$50 to \$125 for refrigerators and \$35 to \$75 for room air conditioners meeting the Program's standards for energy efficiency.

The rebates were available to individuals living, buying, and installing an eligible appliance in seven counties located in both upstate (Cortland, Erie, Niagara, Onondaga Counties) and downstate (Nassau, Suffolk, Orange Counties) regions of the State. These regions represent broad geographical diversity as they include rural, suburban and urban areas. Consumers in the downstate region pay electric rates which rank among the highest in the nation while the cost of electricity in the upstate region is only marginally higher than the national average.

The Rebate Program awarded over 73,000 rebates (\$5.6 million) between April 1, 1987, and May 21, 1988. While there have been other energy efficient appliance rebate programs in New York State, this Program was, by far, the largest. The other programs were operated by the State's utilities primarily on a pilot basis.

The New York State Energy Office's Evaluation Unit evaluated the Rebate Program based mainly on the actions and attitudes of participating consumers and appliance dealers. The results discussed in this paper are only a portion of the complete evaluation report.

In this paper, we focus our analysis on the barriers to accurately determine the percentage of consumers who would have purchased the same appliance model even if the rebate were not available. These individuals are often referred to in energy conservation program literature as "free riders." The free rider factor is a key statistic

in assessing the effectiveness of appliance rebate programs.

We examined the free rider factor from both the consumer and dealer perspective and discovered two radically different estimates of free rider proportions. In addition, we raised serious questions about the ability of traditional evaluation techniques to accurately determine what appliance a consumer *would have* purchased if the rebate were not available.

Evaluation Methodology

The evaluation methodology featured a multifaceted approach. Specifically, a consumer questionnaire was included as part of the Rebate Application form to determine the impact of the rebate on consumers' purchase decisions. This questionnaire was followed up by a phone survey of randomly selected consumers who received a rebate check to verify the application questionnaire data and gather additional information. A mail survey of all participating appliance retailers was used to determine the Program's influence on inventory and sales.

The Free Rider Factor—The Consumer's Perspective

A key question in most evaluations of energy efficient appliance rebate programs is to determine if consumers would have purchased a less efficient appliance model if the rebate were not available. Our evaluation was no exception. When consumers were asked if they would have purchased the same appliance without the rebate, 72% claimed that they would not have changed their purchase decision (See Table 1). This free rider statistic is consistent with other appliance rebate evaluations performed by both the private and public sectors.¹

Limitations of the Consumer Data

On the surface, a 72% free rider rate would imply that the Program's impact on moving consumers to purchase

Table 1. "Would you have purchased the same room air conditioner or refrigerator if the rebate were not available?"

Responses	Percentages		
	Total Sample	Air Conditioner Buyers Only	Refrigerator Buyers Only
Same	72	79	65
Different	17	11	22
Don't Know	11	9	13

higher energy efficient appliances was only moderately successful. There is, however, evidence that rebate evaluations have tended to exaggerate the number of free riders because of limitations in accurately assessing consumers' attitudes and purchasing practices.

We argue that simply asking consumers if they would have purchased the same appliance if the rebate were not available is inadequate to gain a comprehensive understanding of the free rider factor. This belief was supported by our research which uncovered several apparent contradictions in the way consumers responded to key questions.

Specifically, 72% of the consumers indicated that they would have purchased the same appliance without the rebate, but an even larger percentage (75%) indicated that the rebate was influential in their purchase decision. When consumers were asked on our application survey the major reason they purchased the model appliance they did, less than 2% cited the rebate as the major reason. On the same survey (the very next question), 25% of the consumers indicated that they would have purchased a different model if the rebate were not available.

There are many possible theories to explain these contradictions, but there are no simple and definitive answers. The most plausible explanation deals with the limitations of determining what consumers would have done absent the rebate.

In asking what appears to be a simple and straightforward question such as "Would you have purchased the same appliance if the rebate were not available?" the researcher is forced to confront the forces of complex consumer behavior. In recent years, there has been extensive research into the topic of consumer behavior by behavioral scientists, marketing specialists, economists, and others. There are several professional journals devoted primarily to consumer behavior.

In order to gain a better understanding of our data, it is important that it be viewed in the proper context. For example, some consumers may be reluctant to admit that they would make a purchase different from the one they made. Research indicates that once a purchase is made, the consumer's perception of the product not selected will move toward the negative and their perception of the product actually purchased will become more positive.² In addition, consumers often actually seek out information (e.g., advertisements, magazine articles) which supports their purchase decision. Since we only surveyed consumers who had received rebate checks, most consumers would have had several months use of their appliances including air conditioning during a hot New York State summer.

Based on the extensive research in the area of consumer behavior, it would be reasonable to assume that there is an inherent bias against suggesting the purchase of different model appliances. Unfortunately, we were unable to quantify the impact this tendency may have on the free rider number.

A second major barrier to reliable free rider statistics is memory. A recent *Business Week* article dealing with polls and market surveys noted that "researchers have discovered that it is a big mistake to rely on people's ability to remember events." The article cited an experiment by a Stanford University psychologist, Lee D. Ross, who demonstrated that college students had difficulty recalling how many checks they had written during the course of a month.³ Our records indicated that as many as nine months had elapsed between the time a consumer purchased a qualifying appliance and the day they were surveyed. Even the application survey questionnaires were often completed several weeks after the appliance purchase. It seems unlikely that most consumers would remember the various makes and models that were available at the time they made their purchase.

A third barrier to developing an accurate free rider number is the lack of information on consumers who purchased an appliance that was eligible for a rebate but never submitted a rebate application. Since our only method of tracking the sales of appliances eligible for a rebate was the submission of the application form, we do not know how many consumers failed to submit an application.

It is also difficult to make projections of the number of rebates not returned based on available research. A recent issue of the *Journal of Advertising Research* noted that "although rebates are proclaimed to be the hot promotional tool of the 1980s, the literature on this topic is almost non-existent. There are no theoretical bases upon which testable hypotheses can be stated."⁴ We do know from the limited research available that most con-

sumers do not claim their rebates.⁵ However this data is based on typical consumer product rebates which are usually less than \$5.00 and not comparable to the rebates (\$35-\$125) offered under New York State's Rebate Program. The evaluation of the Northern States Power Company Appliance Rebate Program estimates that only about 40% of those eligible for rebates actually applied. The Northern States Program, however, offered rebates of between \$15-\$30 or less than 5% of the cost of the typical appliance and considerably less than New York's rebate program.⁶

The Free Rider Factor — The Appliance Dealers' Perspective

The dealer survey raises questions about the accuracy of the consumer free rider estimate. A major finding was that a large percentage of dealers participating in the program dramatically increased their inventory of energy efficient (rebate eligible) products as a direct response to the Rebate Program. In other words, many consumers in the demonstration counties would have likely found a greater selection of energy efficient appliances than before the program and, in most cases, a majority of the refrigerators and room air conditioners available from the dealer were rebate eligible. As a result, the consumer's choice was frequently limited to criteria such as style, brand and convenience features.

Our data indicated that the Rebate Program appeared to have a major impact in encouraging dealers to increase the selection of qualifying level energy efficient appliances they made available to their customers. Specifically, 63% of the dealers indicated that when they ordered appliances, their proportion of product line/inventory that would qualify for a rebate was increased. Approximately 50% of these dealers increased their inventory of qualifying models by at least 30%.

Moreover, we found that of the dealers that increased their qualifying level inventory, nearly 50% indicated that at least 40% of their models qualified for the rebate and over 17% claimed 80-100% of their available appliances qualified.

Unfortunately, we were unable to compare the inventory practices of the dealers in our participating counties to what was happening at the national level. The estimate of the weighted average efficiency of refrigerators and room air conditioners shipped in 1988 was not available from the Association of Home Appliance Manufacturers at the time this report went to press.

While most dealers changed their inventory mix to include more energy efficient appliances, the real question is what models did consumers actually purchase. Our data illustrated a strong shift to energy efficient applian-

ces compared to the year prior to the Rebate Program. Eighty-two percent of the dealers indicated that the percentage of rebate eligible models they sold increased during the life of the rebate program. Over 40% of those dealers indicated that sales of such appliances increased by 30% or more compared to a similar period prior to the availability of the rebate.

A key question in the interpretation of this data is determining the exact impact of the Rebate Program on the dramatic change in dealer inventories and sales. While we were unable to precisely quantify the impact, our data suggests the rebate had a strong impact. Specifically:

- 93% of the dealers stated that the rebate influenced sales, with 65% indicating that it was a very influential factor. Only 3% felt that the rebate was not influential.
- Approximately 49% of the dealers indicated that the rebate was the sole factor in their decision to increase their inventories of energy efficient appliances. Even among the dealers that indicated there were factors other than the rebate influencing their inventory decisions, a majority indicated that rebates were generally as important as the other factors (*e.g.*, increase in appliance efficiencies, manufacturer's incentives).

Limitations of the Dealer Data

The ideal way to determine the impact of the Appliance Rebate Program without the inaccuracies inherent in a consumer survey would have been to examine sales data of the energy efficient appliances before and after the Rebate Program. At the same time, a similar analysis of appliance dealers located in counties not eligible to participate in the Program could have been conducted to determine the overall sales trend of energy efficient appliances. Assuming all the counties examined had similar characteristics (*e.g.*, income level, energy costs, climate) the difference between the two sets of numbers would produce a reasonable indication of the net impact of the Appliance Rebate Program.

Unfortunately, such sales data was unavailable to the Energy Office despite requests to appliance manufacturers, distributors, retailers, and trade organizations. Due to the highly competitive nature of the appliance industry, sales and inventory data are considered proprietary.

This lack of data made it necessary to develop an alternative method of determining the impact of the Program on the availability and sales of rebate eligible appliances. After consulting with several industry experts, we determined that the most effective solution to the problem was

to directly survey the appliance dealers, but ask for sales and inventory data utilizing ranges (e.g., 30-40% increase). It was our hope that the ranges would provide enough detail to allow us to analyze the data, but would be general enough to alleviate dealers' concerns about releasing proprietary information.

In our analysis of the consumer survey, we argued that the data tends to underestimate the impact of the program. In the case of the dealer survey results, we saw evidence that the data may overestimate the Program's effectiveness.

Most dealers were aware that the Program was being operated as a "demonstration" and would be closed as soon as funding was exhausted. Several dealers specifically indicated that we should "keep the program going" in response to an open-ended question on the survey. In general, it was a good incentive for the dealers because they could offer a rebate to the customer and have the Energy Office assume the burden of processing and fulfilling the rebate requests. While we lack statistical evidence, it is likely that some dealers exaggerated their answers fearing that a less than enthusiastic response might influence the Energy Office to cancel or curtail the Program.

The problem of obtaining reliable data from the dealers was complicated by the use of ranges to illustrate sales and inventory results (e.g., 10-20%, 40% or more). Obviously, the ranges sacrifice precision as "40% or more" could translate to anything from 40% to 100%. It is also possible that some dealers simply guessed at the questions dealing with sales and inventory. For some dealers, the reporting of such data would be a complex and time consuming undertaking. While we are confident that the dealers made a "good faith" effort to answer the questions, we have some concern about the degree of accuracy.

An additional concern involves non-response bias. Simply stated, the dealers most enthusiastic or strongly dissatisfied with the program would be the most likely to respond to our questionnaire. It is difficult, however, to quantify the extent of non-response bias. We did attempt to control for non-response bias by conducting follow up mailings to those who had not responded to the first mailing. Our efforts resulted in a reasonable degree of success. Our survey response rate of 46% is considered above average and the sample is of sufficient size to meet generally accepted standards for statistical precision and confidence levels. It is also important to note that the percentage of responses received from the dealers on a county basis accurately paralleled the percentage of rebates awarded in those counties. Based on questionnaire

responses, especially open-end questions, we received a fairly wide range of positive and negative comments.

General Conclusions

Simply stating that a certain percentage of consumers would have purchased a specific appliance if a rebate was not available does not necessarily provide an accurate assessment of the free rider factor. We believe that evaluations should place greater emphasis on what is actually happening in the marketplace and less emphasis on the consumers' assessment of what appliances they *would* have purchased. Our evaluation found several apparent contradictions in the way consumers answered certain questions and a sharply divergent and more positive assessment of the Program from the dealers' perspective.

Our overall conclusions concerning New York State's Appliance Rebate Program are that it served as an effective mechanism in returning petroleum overcharge dollars to consumers in an expeditious manner, and had indirect and direct benefits resulting in the reduction of energy consumption and positive economic impacts. In terms of the level of energy savings resulting from the dollars expended, the Program can be considered moderately successful.

Endnotes

¹Examples of other appliance rebate evaluations with similar free rider numbers include Wisconsin Power and Light Refrigerator Rebate Program (72% free rider), Central Maine Power Appliance Rebate Program (78% free rider), and New England Electric System (77% free rider).

²Bobby J. Calder, "Cognitive Consistency and Consumer Behavior," *Perspectives in Consumer Behavior*, Harold H. Kassarian and Thomas S. Robertson ed., Glenview, Illinois: Scott, Foresman and Company, 1973 p. 257-258.

³Sana Siwolop, "Excuse Me, What's the Pollsters' Big Problem?" *Business Week*, February 16, 1987, p. 108.

⁴Peter Tat, William A. Cunningham III and Emin Babakus, "Consumer Perceptions of Rebates," *Journal of Advertising Research*, August/September 1988, p. 46.

⁵Toni Mack. "Rebate Madness," *Forbes*, February 13, 1984, pp. 76-79.

⁶*Report on Market Research and Program Recommendations: Bonneville Power Administration Regionwide Promotion of Energy-Efficient Appliances*. Portland, Oregon: Brian Gard William Lesh, Inc, pp. 2-12.