WILLINGNESS TO PAY FOR HOUSEHOLD WATER SAVING TECHNOLOGY IN TWO CALIFORNIA SERVICE AREAS

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1 Introduction and Executive Summary

There seems little doubt that water shortages of various kinds will continue to haunt California for decades to come. While improving the reliability of water supplies is certainly one important strategy, demand management is clearly another. Among the ways to better manage demand is to have water users adopt a variety of water-saving technologies.

The central question addressed in this report is under what conditions urban home owners are prepared to purchase water-saving technology. We consider this question using data from over 600 customers of the Los Angeles Department of Water and Power (LADWP) and from the East Bay Municipal Utility District (EBMUD).

Between April 10th and May 25th, 1995, 616 randomly selected home owners were interviewed by telephone using a survey instrument based on a fractional factorial design. Respondents were each presented a number of rebate plans for different kinds of retrofitting options and under a number of different drought scenarios. In particular, we considered the prospects that homeowners would, under varying drought scenarios and rebates of different sizes adopt 1) water-saving showerheads, 2) water-saving toilets, 3) water-saving washing machines, 4) water-saving irrigation, and 5) low water use landscaping. The key response elicited was "willingness to pay." The findings, summarized immediately below, provide an optimistic picture in which respondents are prepared to invest non-trivial sums to save water over the long run. Retrofitting homes with water-saving technology would seem to be one viable strategy for demand management.

1. Most homeowners in the LADWP and EBMUD service areas have lived through at least the most recent California drought and have become quite knowledgeable about the importance of water resources, the precarious water situation in which Californians find themselves, and some of the things they can do to use less water in and around their homes.

2. Most homeowners also seem to have incorporated important aspects of a conservation ethic, at least if recycling behavior is a good indicator.

3. Many homeowners already have some water-saving technology installed in or around their residences. With the exception of water-saving washing machines, there is already considerable market penetration.

4. But even for water-saving showerheads, market saturation is not an issue. There is ample room for significant water use savings with the adoption of additional water-saving technology.

5. Even for the smallest rebates tested, large fractions of respondents seemed ready to accept the rebate offer. About a third of the respondents claimed to be prepared to install each of the water-saving technologies offered at the lowest rebate levels.

6. Increasing the rebates increased the adoption rate. At highest rebates offered, a little over half the respondents seemed prepared to adopt the most expensive technologies (irrigation and landscaping), and about two-thirds seem prepared to adopt the least expensive technologies (showerheads and toilets).

7. Typically, the higher the price of the water-saving technology estimated by respondents, the less likely they were to accept the rebate offer. This is not surprising, but indicates that respondents were weighing several economic considerations.

8. It was common, but by no means universal, for the prospect of higher water prices to increase the likelihood of adoption. However, the price effects were relatively small. Price increases within the range that are likely to be politically acceptable in the medium term will not have large effects on the rate at which homeowners install water-saving technology.

9. There is no evidence that the larger equity issues we addressed in the drought scenarios had an impact on respondents' inclinations to accept rebate offers. Rather, respondents seemed more narrowly focused on what the given water-saving technology would cost to purchase and install, given the rebates.

10. The results for LADWP customers and EBMUD customers were quite similar.

We suspect that the proportions of respondents who accepted the rebate offers are somewhat inflated. Given the recent drought and the explicit topic of the survey, the demand characteristics of the survey instrument are strong. Social desirability biases are likely in which respondents, wishing to appear to be good citizens, exaggerate their willingness to adopt water-saving technology. Past research suggests that the the rates of adoption are too high by perhaps 15%.[1]

At the same time, we do not intend to dismiss the importance of motivations to improve the public welfare, or environmental quality, that affect *both* the answer elicited by the interviewer and the likelihood of, in fact, installing a given water-saving technology. The data strongly suggest that there is more to the adoption decision than a narrow benefit-cost analysis. Respondents place a substantial value on public and environmental goods. And there is also no doubt a substantial motivational component centered on doing "the right thing" as long as the costs are not are within reasonable bounds.

But in short, the answer to our central question of whether rebates can be a useful demand management tool is clearly yes.

2 Sampling

The population was defined as English speaking, adult, resident homeowners who are responsible for paying the household's water bill, and who are served in Los Angeles by the Department of Water and Power and in the Bay Area by the East Bay Municipal Utility District. Limiting the population to resident homeowners responsible for paying the water bill followed from the desire to obtain information from the most knowledgeable person in households, which had control over purchases of water saving technology for their homes. The limitation to English speaking respondents followed from a desire to save costs and from information that most homeowners in Los Angeles and the Bay Areas could manage in English. (In fact, only 4% of the interviews had to be terminated because the respondent could not proceed in English.) Limiting the population to customers of the the Los Angeles Department of Water and Power and to the East Bay Municipal Utility District was determined by the utilities that were at the time prepared to participate in the study.

Simple random samples were selected from both companies' lists of customers. The phone numbers selected were sent to Telematch, a national

[1]For example, if the estimated proportion who would adopt a particular technology is estimated at 50%, a conservative estimate would be .50-(.15 * .50) = .425 or 42.5%

telephone number "look-up" service. When Telematch provided a number different from the number provided by the utility, the Telematch number was used as the primary phone number. Telematch was able to find about 35% of the telephone numbers for the Los Angeles cases. Of those, 23% were updated and 77% were verified. For the Bay Area, matches were found for 40% of the numbers. Of these, 46% were verified, and 36% were updated. Phone numbers were provided for the remaining 18%, which were not available from EBMUD. Phone numbers were deleted when they appeared to be a business or when the account showed no water use for the two most recent billing periods (provided those billing periods totaled at least 90 days).

3 Questionnaire Design

The questionnaire had three components. At the beginning of the instrument, each respondent was asked about the nature of his/her home and property, and in particular, about water using appliances and activities. At the end of the instrument were the usual sorts of questions about the respondent's background.

The core of the questionnaire was a set of scenarios linked to questions about possible rebates for water saving household technology. The goals were to determine what levels of rebates might be necessary for adoption, and if those levels were affected by the price of water and drought conditions. In particular, there was interest in whether water customers would differ in their willingness to pay for water saving technology, depending on whether drought-created water use reduction fell most heavily on agriculture or businesses or wildlife habitats or on residential customers.

Since the content of each drought scenario depended in a variety of factors (described below), it would have been impossible to give each respondent the full set of scenarios; there would have been far too many different scenarios. Rather, each respondent was given a random sample of one partial scenario and three full scenarios. The first partial scenario established a baseline.

After the introductory section asking respondents a number of questions about the water use technology they already had at home, the questionnaire turned to the scenarios. Immediately before the scenarios were presented, each respondent was read the following introductory material.

Now, I would like you to think about the water situation in California *and in [Los Angeles] [the Bay Area]. Although it may be a little difficult to remember right now, in general the problem in California is water* **shortages**. *Even though there is not much chance of a drought in 1995, I'd like you to consider the situation that California will face over the long run.*

The price of water for residential customers, like you, is currently about 25 cents for every 100 gallons of water used, which is a monthly bill of about $20, not including sewer charges. Of course, your bill may be somewhat higher or lower. Keep these circumstances in mind — the typical water situation and the current prices of water for people like you — as you answer this next set of questions.

I am going to ask you about a number of possible rebate programs. Please evaluate each rebate program as if it were the only one being offered. Do not consider your answers from the other rebate programs mentioned.

The scenarios were constructed from the following dimensions with one level randomly selected from each.

I. Kind of Rebate

1. Shower Heads at $2, $5, $10
2. Toilets at $50, $100, $150, $200
3. Landscaping at $200, $300, $400, $500
4. Irrigation System at $50, $100, $200, $300
5. Washing Machine at $100, $150, $200, $250

II. Water Price/ Water Bill

1. Use PRICE OF WATER REMAINS STABLE scenario
2. Use PRICE OF WATER CHANGES scenario with "**35** cents per hundred gallons. If people still used the same amount of water as they do now, the average water bill would **go** from about $20 to about **$28** a month, a **40 percent increase.**"
3. Use PRICE OF WATER CHANGES scenario, with "**50** cents per hundred gallons. If people still used the same amount of water as they do now, the average water bill would **double** from about $20 to about **$40** a month."

III. Sectors Affected

1. Fish and Wildlife
2. Farms
3. Businesses
4. Residential users like you

IV. Shortages

1. "**twice** as much as other areas, that is, a **40** percent decrease of"
2. "**half** as much as other areas, that is, a **10** percent decrease instead of"

For scenarios in which the price of water changed (chosen at random), the scenario was structured as follows.

Suppose that water for [insert from III] was reduced by [insert from IV] a 20 percent decrease. Also, suppose that as a result of the drought, your water bill went from from 25 to [insert II].

An *example* would be: *Suppose that water for* **businesses** *was reduced by* **twice** *as much as other sectors, that is a* **40** *percent decrease instead of a 20 percent decrease. Also, suppose that as a result of the drought, your water bill went up from 25 to* **50** *cents per hundred gallons. If people still used the same amount of water as they do now, the average water bill would* **double** *from about $20 to about* **$40** *a month.*

For scenarios in which there is no change in the price of water (chosen at random), the text was as follows. *Suppose that water for [insert III] was reduced by [insert IV] a 20 percent decrease. Also, suppose that although there was a drought, the price you paid for each gallon of water stayed the same.*

An *example* would be: *Suppose that water for* **residential users like you** *was reduced by* **twice** *as much as other sectors, that is, a* **40** *percent decrease instead of a 20 percent decrease. Also, suppose that although there was a drought, the price you pay for each gallon of water stayed the same.*

Before being presented with drought scenarios, each respondent was asked whether he/she would purchase each of the water saving technologies if the rebate were a particular, randomly selected (from I above) amount. These were, in effect, warm-ups for the more complicated rebate decisions to follow and provided baseline information derived on the status quo. Three randomly selected drought scenarios were then asked and for each, willingness to pay elicited, as before, for each of the water saving technologies.

4 Data Collection

Personalized advanced letters on Center for the Study of the Environment and Society letterhead, and with the senior author's signature, were mailed first-class to every respondent selected.[2] The letters explained the purpose of the study and provided a telephone at UCLA and a toll-free telephone number for the Response Analysis Corporation(RAC), in case recipients of the letters needed more information. Each letter also included the telephone number listed for the respondent and asked that the recipient call to correct or update the number if necessary. So that each household could be called soon after the arrival of the letter, three separate mailings were made.

Approximately 25 people called in response to the letter. Most wished to update their telephone number. Several inquired about the purpose of the study and a few requested that they not be called.

Eight procedures were used to maximize the response rate.

1. A minimum of 10 calls were placed to each working telephone number and an unlimited number of attempts were made to complete the interview once contact was made. The only accepted reason for not completing an interview was a firm refusal (but see below).

2. If an evening call revealed that the telephone number was listed for a business, a daytime call-back was scheduled. If the telephone was for a business, but the person selected was no longer with company, the interviewer attempted to get as much contact information as possible.

3. Most attempts were made during an evening or weekend. Attempts were made for each household on different days of the week and different times of the evening. If no contact was made after several calls, a weekday daytime call was scheduled. Call-backs were scheduled for whatever day of the week and time of the day was most convenient for the respondent. Interviewers were also instructed to provide RAC's

[2]Much of this section was taken directly from documentation provided by the Response Analysis Corporation, the survey firm that collected the data.

toll-free 800 number to those respondents who preferred to call the Telephone Center to complete the interview, rather than waiting to be called.

4. Interviewers were required to attend a training session on refusal-avoidance techniques.

5. The field period of the project was scheduled over a six-week period to enable adequate spacing for call attempts.

6. In all cases where an interview could not be completed, the interviewer coded the reason for the problem and also wrote a short note explaining the reason. This allowed supervisors to identify cases that were likely to be receptive to call-backs. A special team of interviewers, trained and skilled in refusal conversion, recontacted those households. In most cases, refusal conversion attempts were made at least two weeks after the initial refusal.

7. Specially trained staff monitored telephone interviews, both for general quality control and for study-specific issues. Study-specific training for this survey focused especially on listening to the interviewer-respondent dialogue in the opening minutes of the calls when refusals are most common. This type of monitoring was most useful for providing feedback to individual interviewers that they could use to increase their cooperation rate.

8. Each day of the field period, the Telephone Center distributed an electronic production report to the research director and other project staff, which included daily and cumulative data from Los Angeles and the Bay Area. Information was provided on completions so that immediate action could be taken if problems surfaced.

To calculate the response rate, Response Analysis Corporation used the accepted CASRO (Council of American Survey Research Organizations) procedure, which was established to create a uniform formula for measuring response rates in survey research. This relatively conservative method includes estimates of the percentage of the sample with unknown usability that would be become usable and the percentage of the sample with unknown eligibility that would become eligible if time were unlimited and the study continued indefinitely. In other words, the usual base from which response rates are calculated is enlarged. Using these procedures, the response rate for Los Angeles was 72.8% and the response rate for the Bay Area was 73.9%. Less conservative, but commonly reported procedures, would put the response rate at well over 75 percent.

5 Statistical Procedures

The questionnaire was designed, in part, to simplify the data analysis. In particular, the scenarios employed a fractional factorial design so that each scenario was a random sample of all possible scenarios, and each scenario dimension was empirically unrelated to the other scenario dimensions.

Also, the response to the scenario was a simple binary answer. As a result, one can quite properly examine each scenario dimension by itself, computing nothing more complicated than a proportion for each level of each dimension. That is, one simply computes the proportion of respondents who accept the rebate offer under each of the conditions. No multivariate procedures are necessary to obtain unbiased estimates of the impact of each scenario dimension.

However, in order to obtain unbiased estimates of the impact on willingness to accept the rebate offer for biographical characteristics of the respondent or characteristics of respondents' homes and yards, multivariate procedures are required. While the scenario dimensions are constructed to be orthogonal, all other variables are not. Indeed, as an empirical matter, many are likely to be substantially correlated. [3]

We will employ a relatively simple multivariate procedure: logistic regression. For those familiar with linear least squares regression, the interpretation of logistic regression differs in two important ways. First, the dependent variable is the log of the odds for the outcome in question. In our case, it is the log of the odds of accepting a rebate offer. Second, probably the best way to interpret the regression coefficients is as multipliers; the effects are multiplicative in the odds, not additive, as in linear regression. For exam-

[3] Since the experimentally manipulated variables are assigned at random, they are uncorrelated on the average with all other included and potential explanatory variables. Therefore, unbiased estimates of their associations with the response variable are obtained regardless of what other variables are included in the logistic regression equation.

ple, a logistic regression coefficient of 2.0 represents a multiplier computed by raising the constant e to the power of 2.0, or 7.4. This implies that the odds of accepting a rebate offer are 7.4 *times* larger for each unit change in the explanatory variable. These issues will be revisited when the first set of logistic regression results are presented later.

Of course, the validity of logistic regression, like the validity of all multivariate procedures (and indeed all statistical procedures) depends on a number of assumptions, many of which are impossible to verify. Consequently, the impact of respondent and dwelling characteristics are "best-guess" estimates that do not have nearly the credibility of the estimates of scenario impact.

Finally, for all of the scenario effects, estimates of the standard errors (on which the statistical inference is based) are almost certainly a bit optimistic. The sample size is the number of respondents times the number of scenarios; the scenario is the unit of analysis. However, the design decision to give each respondent four scenarios risks within-person correlations among the residuals. Past experience with scenario studies suggests that these correlations are small, but estimates of the standard errors are biased downward as a result. It is possible directly to correct the standard errors through multi-level models, but another layer of assumptions is required. We prefer, therefore, to simply discount the standard errors a bit, consistent with past research, and then test the robustness of our statistical inference through simulations. The bottom line is that with so large a sample (the number of respondents times the number of scenarios), any findings large enough to be important are also large enough to be statistically significant.

6 Performance of the Instrument

A key issue in any questionnaire study is whether the respondents take the task seriously and are able to handle the material. Obvious signs of trouble are apparent to interviewers and are routinely reported. For example, if respondents are clearly not paying attention to the questions, it is apparent to interviewers who report such difficulties to their supervisors. In our case, fortunately, there were not obvious signs of difficulties.

There were also a number of consistency checks built into the interviewing so that obvious contradictions could be corrected on the spot. For example, A person who had one shower could not plausibly claim to have two water-saving shower heads.

More subtle problems are not so easily addressed. For example, respondents may try their best but not fully understand what is being asked. If their answers are broadly sensible, all will seem well to the interviewer. Then, one has to examine patterns in the data for possible problems.

We examined the distributions for all of the questions asked and considered whether they were sensible. We were particularly concerned about the rebate questions. If they did not "work," much of the study was in jeopardy. Fortunately, here too all seemed to go well.

Rebates for Water-Saving Showerheads: As the rebates were increased from \$2 to \$5 to \$10, the proportion of respondents who agreed to purchase a water-saving shower head increased consistently (i.e., monotonically) from about 45% to about 65%.

Rebates for Water-Saving Toilets: As the rebates were increased from \$50 to \$100 to \$150 to \$200, the proportion of respondents who agreed to purchase water saving toilets increased consistently from about 40% to about 75%.

Rebates for Water-Saving landscaping: As the rebates increased from \$200 to \$300 to \$400 to \$500, the proportion of respondents who agreed to purchase water-saving landscaping increased from about 30% to about 40%. While the increases were not quite monotonic taken at face value, there were monotonic within sampling error.

Rebates for Water-Saving irrigation: As the rebates increased from \$50 to \$100 to \$200 to \$300, the proportion of respondents who agreed to purchase water-saving irrigation increased consistently from about 30% to about 45%.

Rebates for Water-Saving Washing Machine: As the rebates increased from \$100 to \$150 to \$200 to \$250, the proportion of respondents who agreed to purchase water-saving washing machines increased consistently from 45% to about 65%.

From these patterns, the answers elicited from respondents by and large made sense: the larger the rebate, the larger the proportion of respondents who accepted the offer.

In a similar fashion, it would have been surprising if the likelihood of accepting the rebate offer was not related to the respondent's estimated price of the water-saving technology. And in general, the higher the estimated price, the less likely the rebate offer was accepted. This finding speaks well for how seriously the respondents took the task because the estimated price of each water-saving technology was not part of the scenarios. Respondents had to be considering the rebates offered in a broader context than the scenarios for the estimated price to have expected effect.

In short, there is ample evidence that respondents took the interview seriously. One important consequence is that if some other variables have no impact on the likelihood of accepting a rebate offer, the null findings can perhaps be taken at face value; they are not the result of respondents choosing not to "play."

7 Characteristics of the Sample

An important part of the "deep background" necessary to understand the key findings reported below is characteristics of our sample. Since our sample represents a population of homeowners, one would expect a sample that is a bit older and bit better off financially than the average for either the Los Angeles or Bay Areas. Immediately below are the details, with perhaps a few surprises.

Gender: 53% of the overall sample are men, with 54% of the LADWP sample men and 51% of the EBMUD sample men. The distribution is a bit unexpected since we did not ask for a random respondent, but the respondent "responsible for paying the water bills." Our results imply that there are a number of women living without men, and also women in male-female households with more responsibility, in at least some financial matters, than the usual stereotypes suggest.

Income: About half of the total sample earn $50,000 or more, with 63% in that range for the EBMUD sample and 46% in that range for the LADWP sample; the Bay Area sample is a bit more affluent.

Occupation: 54% of the total sample are employed in positions described as either executive, administrative, managerial, or professional. The rest of the sample are spread across lower status jobs. The occupational distributions are not very different in the two areas, suggesting that Bay area residents may be earning more than the Los Angeles residents who are holding roughly comparable jobs.

Work Status: About half the overall sample are employed full-time, 10% work part-time, and about 30% are retired. There figures hold approximately for both the LADWP and EBMUD samples.

Education: The EBMUD sample is a bit better educated than the LADWP sample. 53% of the former have at least a college degree while only 44% of the latter have at least a college degree.

Age: The overall sample tends to be middle aged or older. Less than 10% of the respondents are under the age of 35, and only about 30% of the respondents are under 45. Thus, most of the sample are beyond their child bearing years for both LADWP and EBMUD service areas.

Household Size: For both the LADWP and EBMUD samples, the median household size is a little more than two people. The modal number is two. It is important to keep in mind that these are the household sizes for homeowners who the data show tend to be in their late 30's, 40's and older. At least in Los Angeles and the Bay area, young couples with large numbers of small children do not tend to be homeowners.

Length of Residence in California: The mean and median number of years respondents have lived in California is nearly 40.

Recycling Behavior: About 90% of all respondents in both areas claim to do at least some recycling. When broken down into types of recycling, 86% of the EBMUD sample say they recycle paper (primarily newspapers) and 58% of the LADWP sample say they recycle paper (also primarily newspapers). About 60% of both samples say they recycle glass, about 60% of both samples say they recycle plastics, and about 75% of both samples say they recycle metal (primarily metal cans). These are impressive figures that are probably exaggerations. A number of respondents claim to be recycling things that that are not easily recycled: plastic wrapping (about 10%), aluminum foil (about 10%), and milk and juice cartons (about 5%). Approximately 15% also claim to be recycling yard debris, which may reflect some composting; perhaps composting is for some confused with recycling. Based on these figures and past research, we suspect that the overall recycling figures need to be discounted by about 15%. Still, the vast majority of households probably engage in at least some demonstrable recycling. And no doubt, virtually all are familiar with the concept and the environmental concerns it implies.

To summarize, the backgrounds of our respondents allow one to anticipate that many should be both knowledgeable about water issues and ready to adopt water-saving technology. Our respondents tend to be well-educated relatively affluent and already involved in many different kinds of recycling. Differences between LADWP and EBMUD customers are small, but the EBMUD customers may be a bit more affluent and a bit more conservation aware.

8 Respondents' Homes

As important as knowing a bit about respondents' backgrounds is knowing about key features of their homes. The impact of respondents' backgrounds on the likelihood of adopting water-saving technology will be influenced substantially by physical characteristics of respondents' homes.

Years in Home: Overall, the respondents had lived in their current homes an average of about 17 years. The length of residence is slightly shorter for EBMUD customers. About half the respondents overall are planning to stay in their current homes "all my life," while for respondents who think they might well move in the future, the median years until that move is around 5. Thus, for most there would be ample time to live with any water-saving technology adopted.

Size of Home: The median number of rooms falls between 5 and 6 for the entire sample with no important differences between LADWP and EBMUD customers. The median number of bathrooms overall is a little less than 2, with about 30% reporting 3 bathrooms. Most of the bathroom have showers and virtually all have toilets.

Water Saving Technology — Showerheads: 73% of all LADWP customers report that all of their showerheads are of the water-saving kind, compared to 57% of all EBMUD customers who report that all of their showerheads are of the water-saving kind. In both areas, the average estimated cost of water-saving showerheads is a little over $20.00. Clearly, water-saving showerheads have been widely adopted, but saturation has not been achieved.

Water Saving Technology — Toilets: 37% of all LADWP customers report that all of their toilets are water efficient (i.e., 1.6 gallon tank) while only 11% of EBMUD customers report that all of their toilets are water efficient. For Los Angeles respondents, the estimated cost of water-saving toilet is about $440. For Bay Area respondents, the estimated cost of a water-saving toilet is about $450.

Water Saving Technology — Washing Machines: Virtually all respondents have conventional washing machines. The mean estimated cost of a new, water-saving washing machine is about $200 in the Los Angeles Area and about $240 in the Bay area.

Characteristics of Yard: Virtually all respondents also report having a yard. The mean yard size is about 12,000 square feet for EBMUD customers and about 10,500 square feet for LADWP customers. But the mean is increased dramatically by a few customers with very large yards. The 10% trimmed mean is 8300 square feet for EBMUD customers and 7300 square feet for LADWP customers. EBMUD customers have larger yards on the average, but a smaller fraction of the yard is landscaped with grass. About half of the yards in the LA areas are planted with grass, while only about a third of the yards in the Bay Area are planted with grass.

Water-Saving Technology — Landscaping: Consistent with these findings, about a quarter of LADWP customers have their yards landscaped with drought tolerant plants, while about 40% of EBMUD customers have their yards landscaped with drought tolerant plants. The mean estimated cost of installing new water-saving landscaping is about $3000 in both areas. However, the distribution is highly skewed so that the

10% trimmed means are about \$2500 for the Los Angeles Area and about \$2800 for the Bay Area. (The median for both areas is \$2000.)

Water-Saving Technology — Irrigation: About a third of EBMUD customers have water efficient irrigation for their yards compared to about a quarter of LADWP customers. With that said, for both areas, respondents with water efficient irrigation report that only about 30% of their yards are irrigated with the water-saving technology. For LADWP customers, the mean estimated cost of installing water-saving irrigation is about \$1900. For EBMUD customers, the mean estimated cost of installing water-saving irrigation is about \$1700.

To summarize, water conservation technology has made significant inroads with both LADWP and EBMUD customers. Los Angeles residents seem to have more readily adopted indoor water saving technology while Bay Area residents seem to have more readily adopted outdoor water saving technology. In both cases, however, there is still a long way to go before saturation.

9 Drought Perceptions

As part of the background information collected, respondents were asked a number of questions about their experiences with and perceptions of droughts. We began by asking about experiences with previous droughts. Given the earlier figures about length of residence in California, it is not surprising that well over 90% of the sample have lived through a previous drought in California. Nearly 70% had lived through at least two previous droughts. And based on these experiences it is not surprising that overall, 38% think it "very likely" that there would be in California "a drought leading to water shortages" within the next five years. Another 38% think such a drought was "somewhat likely." In short, respondents are, by and large, expecting water supply problems over the next 5 years to be about the same as the water supply problems over the past five years. Differences in expectations between LADWP customers and EBMUD customers are small.

In anticipation of the drought scenarios, respondents were then asked for each of the four sectors (i.e., agriculture, businesses, wildlife habitats, urban residential), whether when faced with water shortages, water use would be reduced appropriately. For farms, 44% say somewhat or very likely, for businesses, 61% say somewhat or very likely, for wildlife habitats, 61% say somewhat or very likely, and for urban residential users, 86% say somewhat or very likely.

Two messages follow. A substantial fraction of respondents believe that each of the four sectors would be more likely than not to do their fair share. But, it was people like themselves, residential users, who would be by far the most likely to cooperate. If nothing else, the vast majority of respondents are claiming to be good citizens with respect to water conservation, which in fact corresponds to the water consumption data from the two most recent droughts. Other players, however, cannot be counted on to perform as well.

Finally, respondents were asked by what percentage they thought they could reduce their water use around the home from current levels should their be a drought. The median overall and for both the LADWP and EBMUD samples is 20%. This too roughly corresponds to the recent historical record.

In summary, respondents from both service areas seem to be very sensitive to the possibility of future droughts and willing to to do their fair share. They also seem to have rather reasonable expectations of the kinds of water use reductions they could accomplish. No doubt, many important lessons have been learned from the water shortages of the past decade.

10 Responses to Rebates

The key question we will address is what factors affect the likelihood that a rebate offer will be accepted. It is then a small step to estimate how much respondents are willing to pay for household water-saving technology. More specifically, we turn now to a consideration of which variables affect the odds that a rebate offer will be accepted. Our discussion will draw from a large set of logistic regression equations with the scenario as the unit of analysis.[4] However, scenarios for respondents who already had the technology in question are not included.

The equations for the overall sample are included here, while the tables for the two subsamples are available upon request. Note that while the

[4] This means that were are using a multilevel framework with scenarios nested within respondents

model specifications include many variables that were not manipulated experimentally (e.g., household income), the effects for the variables that are experimentally manipulated would be virtually the same no matter which explanatory variables were included (thanks to randomization).

There are a large number of potential results to discuss. It will be simpler if we clear the decks by beginning with hypothesized relationships that did not materialize.

10.1 Drought Impact

Recall that the drought scenarios postulated an overall 20% decrease in the supply of water through the State, but allowed for some sectors to be hit harder than others. We had hypothesized, based on the very visible and heated controversy about distributional issues in water cutbacks, that the willingness of urban residential customers to pay for water-saving technology would be affected by who got hit the hardest.

There is an experimental literature in social psychology showing that people are less likely to conserve if others in comparable situations are not conserving as well. Consequently, we wondered if respondents would be less likely to accept the rebates when urban residential water users were depicted as carrying a disproportionately large share of the burden.

We also wondered whether bad press agricultural users had gotten during the recent drought might lead to less sympathy for the agricultural sector than the other three (i.e., urban water users, businesses, and wildlife habitats), and in turn, affect the acceptance of rebates. Finally, we were curious whether the recent publicity surrounding aquatic wildlife habitats would have an impact on respondents as well.

In fact, differences in which sectors were hit the hardest do not make a meaningful or statistically significant difference in willingness to pay. Figure 1 provides an illustration using the results for showerheads. There are five side-by-side boxplots showing the distributions of predicted probabilities (of accepting the rebate offer) from the logistic regression for showerheads. [5]

Table 1 shows the details of that logistic regression. We stress that the boxplots display *predicted probabilities* so that the dispersions reflect the im-

[5] "Current" refers to the respondent's first scenario in which the current water situation provided the context. Medians are displayed for each boxplot

pact of all of the variables included in the analysis. The dispersion is not the result of the "residuals." There is one boxplot for each experimental level and for the "current" situation.

It is easy to see from Figure 1 that the medians (and the entire distributions) for each boxplot are all about the same. Not surprisingly, a likelihood ratio test applied to the logistic regression results fail to reject the null hypothesis of no effect. That is, the sector on which the most burden fall does not affect the odds of accepting the rebate offer for showerheads. Nor does it matter which sector has a lighter burden. And the results for each kind of water-saving technology are much the same.[6]

The size of the inequality also does not matter. The overall shortage was pegged at water reductions of 20%, but sometimes a sector was singled out for only a 10% reduction ("half as much") and sometimes a sector was singled out for a 40% reduction ("twice as much"). As Figure 2 illustrates, these differences do not materially affect willingness to pay, and a likelihood ratio test again failed to reject the null hypothesis.

The story was virtually the same for the LADWP and EBMUD subsamples. In not a single instance do the water-saving burdens for different sectors make an important or statistically significant difference in the odds of accepting a rebate offer.[7]

To summarize, questions of equity do not seem to figure in respondents' willingness to pay, even when urban residential water users are the ones being short-changed. One possible explanation is that despite lots of heated exchanges between partisans, typical residential water users do not care. Water rights are for lobbyists to fight over and not an everyday concern of the average residential water user. Another possible explanation is that they care, but such concerns do not translate into willingness to pay. That is, respondents do not make a connection between equity in the allocation of drought hardships and the need to install water-saving technology. Concerns about violations of equity are perhaps expressed in other ways.

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[6]We also examined interaction effects of the sector specified and the size of the reductions required. These also proved not to be productive.

[7]In a number of instances, it appeared that willingness to pay was lower for the "current" situation compared to any of the richer drought scenarios. But likelihood ratio tests failed to reject the null hypothesis and even if the differences had been statistically significant, questionnaire artifact is the most likely explanation.

10.2 Changes in the Price of Water

Respondents were randomly presented with three different water prices linked to the hypothetical drought: no change in the water, a 40% increase, and a doubling of the price of water (see above for the exact wording). We expected to find the likelihood of accepting the rebate offer would increase monotonically with the price of water.

Often this is true, but it is the price increase of 100% that is the primary driver (See Tables 1-5). So, to simplify matters and save a few degrees of freedom, we forced a linear form on the dummy variables. Then, with one exception all of the effects are statistically significant. The positive effect of the price of water on showerhead rebates is in the expected direction, but does not reach conventional levels of statistical significance. For all other rebates, the odds of accepting a rebate increase as expected with the price of water.

However, the effects are small. For example, if one assumes a linear impact on the log of the odds of accepting any given rebate,[8] *doubling* the price of water only increases the odds of accepting any rebate by a maximum factor of about 1.3.

To help put this in context, suppose, for example, that 60% of all respondents would accept a given rebate offer under current pricing. The odds of accepting the offer are then just .6/.4 or 1.5 to 1. For every person who does not accept the rebate offer, there will be 1.5 people who do. Under a price doubling policy, the odds of accepting that same offer would increase to about to about 1.95 (i.e., 1.5 times 1.3) to 1, implying for every person not accepting the rebate offer there will now be nearly 2 people who do. This means that about 66% of the respondents would accept the given rebate offer. This is, of course a rather small change from the initial 60%.

Given this relatively small impact overall, it is not surprising that price effects are difficult to find for the individual service areas. By and large, the signs are positive; higher water prices are associated with greater odds of accepting a rebate. But only for the LADWP (with its larger sample) are the effects statistically significant, and then only for water-saving washing machines, landscaping, and irrigation.

In short, it would take very large increases in the price of water to substan-

[8]This is just a fancy way of saying that we did not break up the price variable into dummy variables

tially increase the likelihood that urban residential customers will purchase water saving technology, even with significant rebates. Given existing water prices and the fraction of water consumption that might be attributed to each of the residential uses studied, this is perhaps not surprising. For example, a respondent might have to pay $200 after the rebate to purchase a water-saving washing machine. Even if the price of water were doubled so that a typical winter monthly water bill of $20 became a bill of $40, it would take several years for the investment to be returned. If a reasonable discount rate is applied, the time to full pay-back would recede even further. In short, water is so cheap relative to the cost of much water saving technology (showerheads and perhaps toilets are exceptions) that price increases likely to be politically acceptable are probably too small to have much impact on the adoption of water saving technology for most urban users. It seems to us that here lies a very important message for demand management: price increase can play on a small supporting role.

10.3 Rebate Amount

The rebates for adopting water-saving technology have large effects. We provide estimates below based on the logistic regression equation results shown in tables 1-5. We will consider each of the technologies in turn and then provide some summary commentary.

Rebates for Showerheads: For the total sample, the odds that a respondent will buy a water-saving showerhead are increased by a factor of 1.61 when a $5 rebate is offered instead of a $2 rebate. The odds are increased by a factor 2.32 when a $10 rebate is offered compared to a $2 rebate. Again, perhaps an example will help put the size of the effect in context. Suppose 40% of the respondents will buy a water-saving showerhead with a $2 rebate. The odds are then, .4/.6 or .67 to 1. For every person who will buy, there would be about 1.5 who will *not*. With a $5 rebate the odds increase to approximately 1 to 1, and with a $10 rebate, the odds increase to about 1.6 to 1. Thus, with a $10 rebate for every person who will not buy a water-saving showerhead there are now 1.6 who will. Alternatively, Figure 3 shows the predicted probabilities from Table 1, segmented for the three levels of rebates. Clearly, the proportion of respondents who accept the rebate offer increases from a median of little over .4 to a median of little over .6 as the rebates increase from $2 to $5 to $10. The same story is found for the two service areas separately, at least within the bounds of sampling error.

Rebates for Toilets: The rebate effects for toilets are even more impressive. The odds that a respondent will accept on offer for a rebate for a water-saving toilet are increased by a factor 2.08 when a $100 rebate is offered compared to a $50 rebate. The odds are increased by a factor 3.56 when a $150 rebate is offered instead of a $50 rebate. And the odds are increased by a factor of 4.90 when a $200 rebate is offered compared to a $50 rebate. To help put this in context, supposed that at a $50 rebate there is one person who will not accept the rebate offer for every person who will; the odds are 1 to 1. With a $200 rebate, there will be nearly 5 people who will accept the rebate offer compared to every one who will not. As before, the same results can be simply graphed using the predicted probabilities from a logistic regression model (See Table 2). Figure 4 shows that the predicted probability of accepting the rebate offer increases monotonically from a median of about .40 when the rebate is $50 to a median of nearly .80 as the rebate increase to $100, $150 and $200. Finally, as before, the differences between LADWP and EBMUD customers are well within sampling error; there are no important differences in the results between the Los Angeles and Bay areas.

Rebates for Landscaping: The effects for landscaping rebates are less impressive than the effects for toilet rebates. The odds that a rebate offer will be accepted are increase by a factor of 1.49 when the rebate $300 compared to $200. That factor is increased to 2.04 when a $400 rebate is offered but then declines a bit to 1.75 when a $500 rebate is offered (all compared to the impact of a $200 rebate). The results in a predicted probability metric are shown in Figure 5 (see also Table 3) where the median predicted probabilities range from a low of about .3 to a high of about .45. In any case, the decline for a rebate of $500 looks worse than it is; it is well within the bounds of sampling error. Finally, we once again find similar results for LADWP and EBMUD customers within sampling error.

Rebates for Irrigation: The effects of rebates for irrigation are similar to those found for landscaping. With an increase in the rebate from $50 to $100, the odds of accepting the rebate offer increase by a factor of 1.58. When the rebate is increased to $200, the odds are increased by a factor of 2.18. And when the rebate is increased to $300, the odds are increased by a factor of 2.45. The results in probability terms are shown in Figure 6, (see also Table 4) where the median predicted probabilities increase from about .25 to about .45 as the rebates increase from $50 to $300. As before, there are no important differences between the two service areas.

Rebate for Washing Machine: The rebate offer appears to have a substantial impact on the odds of purchasing a water-saving washing machine although is is unlikely that any respondents knew much about the technology. (Water-saving washing machines are currently available primarily in Europe.) As the rebates increased from $100 to $150 to $200 to $250 the median predicted probabilities of accepting the offer increased monotonically from .45 .49 to .59 to .67. Given the lack of information most respondents had on water-saving washing machines, we take the findings in part as evidence of "good citizenship" motivations; there was too little information to undertake a serious consideration of the economic tradeoffs.

To summarize, in contrast to the experimentally manipulated price of water, the experimentally manipulated rebate size has relatively large effects. However, just as it was very unlikely that policy makers would allow the price of water to be doubled, many of the larger rebate values are probably not feasible. And within the range of rebate values that are likely, the impacts are necessarily more modest. We suspect that within the practical range of rebates, one might anticipate an odds multiplier of about 1.5. That is, the odds of adoption with the rebate would about 1.5 times larger than at the least expensive rebate.

One must also not lose sight of the relatively large numbers of respondents who were prepared to adopt the given water-saving technology at the lowest rebate levels. Even for the least popular options, irrigation and landscaping, about a third of the respondents were prepared to make the investment.

Finally, we suspect that responses to the rebate offers were not based solely on narrow economic criteria. While we will return to this issue later, civic mindedness or more general concerns about the impact of droughts probably played an important role.

10.4 Estimated Price of the Technology

From here forward, we make an important transition. We have been to this point focusing on the impact of variables that were experimentally manipulated. We now turn to variable whose values were simply elicited from respondents. For at least two reasons, the impact of these variables is much harder to estimate: conclusions about cause and effect require a much larger inferential leap, and the size of the estimated effects depends on what other variables are included in the analysis (and by implication, what other variables have been left out). We will proceed, therefore, much more cautiously.

Non-Experimental Effects for Landscaping: We begin with landscaping because the story that emerges seems sensible on its face, despite the concerns just raised. The results are shown on Table 6, which differs from Table 3 because equal-interval variables such as household income and the estimated cost of landscaping are not broken up into dummy variables.[9]

- Other things equal, if a respondent does not wish to even hazard a guess about the price of landscaping, the odds of accepting the rebate offer are nearly 3 times smaller than if a figure is elicited. The odds are multiplied by a factor of .33. Lack of information seems to counsel caution. But among those who provide an estimate of costs, the odds of accepting the rebate offer decline by a factor of about .83 for every $1000 of cost. So, an estimated cost of $3000 would reduce the odds by almost half. In short, people who have some understanding of the costs of landscaping are somewhat less likely to accept the rebate offer, and among these individuals, cost is a significant deterrent.
- If respondents do not know their average summer water bill, the odds of accepting the rebate offer are decreased by a factor of

[9]We used dummy variables where possible in the earlier analyses because we did not want to force any particular functional form. Now in the interests of parsimony, we force a linear form (in the log-odds of the response variable).

about 1.3 (i.e., multiplied by .75). Uncertainty seems to breed caution. Among those who estimated their summer water bill, every $100 in cost increases the odds of accepting the rebate offer by 1.10. Both effects are modest.

- Other things equal, if a respondent does not provide an estimate of household income, the odds of accepting the rebate are about 3 times smaller than if an income estimate is provided (i.e., multiplied by .33). Again perhaps, a lack of information seems to foster caution. However, the association for income (among the vast majority who reported their income) is negative. Respondents with greater incomes were *less* inclined to accept the rebate offer. This anomalous finding stems from the set of respondents who are earning more than $75,000 a year. For both LADWP and EBMUD customers, but especially LADWP customers, households earning over $75,000 a year are less likely to accept the rebate offer than households earning between $15,00 and $75,000 a year. Moreover, the trend within that lower range is positive; with larger incomes respondents more likely to accept the rebate. When one recalls the various confounding variables that are included in the analysis, it is difficult to understand what is different in this instance about the relatively affluent.

- Respondents who lived through at least one drought in California are more inclined to accept the rebate offer. The odds that they would accept the offer are nearly twice as large as the odds for respondents who have no personal experience with droughts in California.

- The odds that an LADWP customers will accept the rebate offer are about 1.4 times larger than the odds that an EBMUD customers will accept the landscaping rebate offer. Otherwise, the results across the two service areas were substantively very similar.

- As Table 6 shows, a number of other non-experimental variables were included in the analysis. While some of these have statistically significant associations with accepting the rebate offer, the story that they imply does not hold consistently over the five water-saving technologies. We are inclined, therefore, not to make much of them.

Non-Experimental Effects for Irrigation: By and large, the key results for irrigation rebate shown in Table 7 look a lot like the key results for the landscaping rebate.

- Respondents who do not provide estimates of the costs of installing water-saving irrigation are less inclined to accept the rebate offer. The odds that they will accept the offer are about 2 times smaller (multiplied by .50) than the odds for respondents who provide estimates. When cost estimates are given, for every additional $500, the the odds of accepting the rebate offer decrease by a factor of .90. That is, the odds of accepting the rebates offer decline with the estimated cost of installing an irrigation system. But the decline does not have much bite until the costs reach the $1000 range. These results roughly correspond to the results for landscaping.
- Unlike the responses to the rebates for landscaping, there is no evidence that people who cannot (or will not) estimate their summer water bill are more likely to accept the irrigation rebate. The regression coefficient and t-value are very small (see Table 7). But once again, for those who can provide estimates, the anticipated effect appears, although the size of the effect is modest. For every $100, the odds of accepting the rebate offer increase by a factor of about 1.05.
- As before, we also find that respondents who do not provide estimates of their household income are less inclined to accept the rebate offer; The odds are decreased by a factor of about 1.5 (i.e., multiplied by about .66). However, we once again do not have a simple story for the impact of incomes for people who provide estimates. It is clear from Table 4 that people with earnings over $15,000 are far more inclined to accept the rebate offer than people with earnings less than $15,000. When when a linear form is imposed, no effects are found. Since most of our respondents earn more than $15,000, and since for respondent earning $15,000 or

more the response surface is flat, no substantial linear increase is found.

- It is still true, however, that having lived through a drought in California has an impact. The odds of accepting the rebate offer are increased by a factor of nearly 2.
- While there is a slight tendency for LADWP customers to more readily accept the rebate offer than EBMUD customers, it does not reach conventional levels of statistical significance. More generally, the results for the two service areas are much the same.

Just like for Table 6, Table 7 includes a number of variables we have not discussed. As we said earlier, these represent not just non-experimental effects, but at best somewhat indirect relationships with accepting a rebate offer. As before, we are strongly inclined to ignore them.

Non-Experimental Effects for Showerhead Rebates: The findings for showerhead are a bit less compelling. One reason may be that the purchase of a water-saving showerhead is a minor investment, even for lower income households. (See Table 8.)

- We once again find that respondents who do not provide cost estimates are less inclined to accept the showerhead rebate offer, and among respondents who provide cost estimates, the higher the costs, the less inclination to accept the rebate offer. Failing to provide an estimate decreases the odds of accepting the rebate offer by a factor of about 2.5 (i.e., multiplied by about .40). When cost estimates are provided, every dollar increase reduces the odds of accepting the rebate offer by a factor .98. The factor becomes .86 for every $10 increase.
- We also find once again that respondents who do not provide an estimate of the water bill (this time, the winter water bill, since the rebate is for showerheads), are less inclined to accept the offer. The odds are decreased by a factor of about 1.7 (i.e., multiplied by about .60). The sign for the effect for those who provide a water bill estimate is in the predicted direction (positive), but the t-value is under 1.0. Post hoc, we suspect that the winter water bill for so many urban residents is too small to be of much concern.

But that does not explain why respondents who do not provide estimates of their winter water bill are more likely to accept the rebate offer.

- Respondents who do not report their household's income are less likely to accept the showerhead rebate offer. The odds are decreased by a factor of about 3 (i.e., multiplied but about .33). However, when income is reported, it has no impact on the odds of accepting the rebate offer.
- Once again, respondents who lived through a previous California drought were more likely to accept the rebate offer. Experiencing a California drought increases the odds of accepting the rebate offer by a factor of nearly 4.
- Also as before, there is a hint that LADWP customers are a bit more responsive, but the effect is not statistically significant at conventional levels. More generally, the results are about the same in both locales.

The general story for showerhead rebates is like the general story for landscaping and irrigation. The one important exception is that estimates of the monthly water bill do not seem to matter. Another important exception is that reported household income has no effect.

Non-Experimental Effects for Toilet Rebates: The results for toilet rebates are a bit weaker still. Most of the interesting effects disappear. (See Table 9.)

- Respondents who do not provide estimates of the costs of water-saving toilets are less inclined to accept the toilet rebate offer. The odds are decreased by a factor of about 2.3 (i.e., multiplied by about .43). There are also strong suggestions that with increases in the estimate cost of a water-saving toilet, the odds of accepting the rebate offer decline. But the t-value is only -1.53 and does not make conventional levels for statistical significance. Perhaps we are just being victimized by type II error.[10]

[10] i.e., falsely failing to reject the null hypothesis as a result of sampling error

- There are no effects for the winter water bill whatsoever. It makes no difference whether respondents provided an estimate and then makes no difference what that estimate is.
- Once again, respondents who did not provide estimates of their household income seem less inclined to accept the rebate offer. The odds are decreased by a factor of approximately 2 Ii.e., multiplied by .50). But, when estimates are provided, they are not associated with accepting the rebate offer.
- We even fail to find an effect for living through a previous California drought.
- There are no important differences in the results depending on service area.

We have no ready explanation why so few of the non-experimental variables work for the toilet rebates.

Non-Experimental Effects for Washing Machine Rebates: The results for water-saving washing machines are also not very strong. But this may not surprising since none of the respondents have any experience with the relevant technology. (See Table 10.)

- Respondents who fail to provide an estimate of the cost of of water-saving washing machines are far less likely to accept the rebate offer. The odds are decreased by a factor of about 5.6 (i.e., multiplied by about .18). There are also strong effects for the estimated price, when it is provided. For every $100 in estimated cost, the odds of accepting the rebate offer declines by a factor of about .82. This is a large effect because the new technology will probably cost several hundred dollars.
- Respondents who fail to provide estimates of of their winter water bill are *more* likely to accept the rebate offer. This is the first instance of an increase in the odds. And the increase is non-trivial; the multiplicative factor is about 1.5. Still we inclined to dismiss this result as a consequence of sampling error. Note that, the estimates of the winter water bill have no impact on the odds of accepting the rebate offer.

- We once again find that respondents who do not provide estimates of their household income are less likely to accept the rebate offer. The odds multiplier is about .50. When income estimates are provided there is, if anything, a negative effect. Yet, the t-value is only -1.29, somewhat below conventional levels needed for statistical significance.
- Living in California during a drought has no impact on the odds of accepting the rebate offer.
- There is a suggestion that once again, LADWP customers are more inclined than EBMUD customers to accept the rebate offer. But whether the effect is statistically significant depends on minor changes in the model specification and is, therefore, not credible. Otherwise, the results for the two service area are much the same.

To summarize, perhaps the strongest effects are found for the estimated costs of the water-saving technology. The results, by and large, make sense and are large enough to be of practical significance. The impact of the reported water bill are more equivocal, although typically the signs are in the predicted direction. The impact of income is still more uncertain. Finally, respondents who either cannot or will not provide estimate of the cost of the technology, their monthly water bill, or their household income are usually less inclined to accept the rebate offer. We suspect the negative results stem from a risk averse stance taken by respondents. When uncertainty is high, the status quo may be especially compelling.

At the same time, it is important to return to the concerns we expressed as we began this subsection on non-experimental effects. The effects of all of the non-experimental variables must be viewed with caution. We have been trying to estimate what would happen if the non-experimental variables were manipulated when in fact they were not.

Figure 1: Probability of Purchasing a Low-Flow Showerhead By Affected Sector

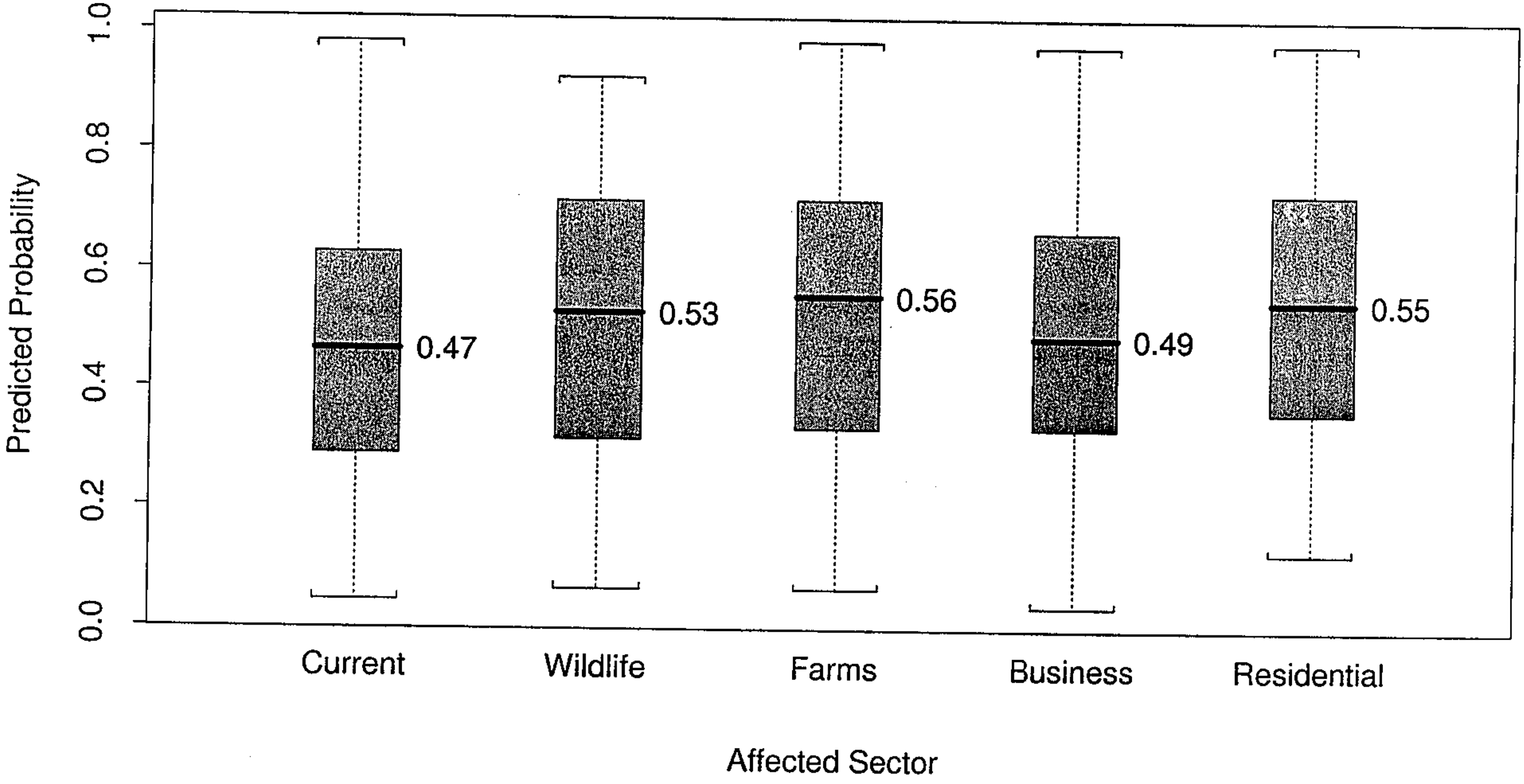

Figure 2: Probability of Purchasing a Low-Flow Showerhead
By Amount of Shortage

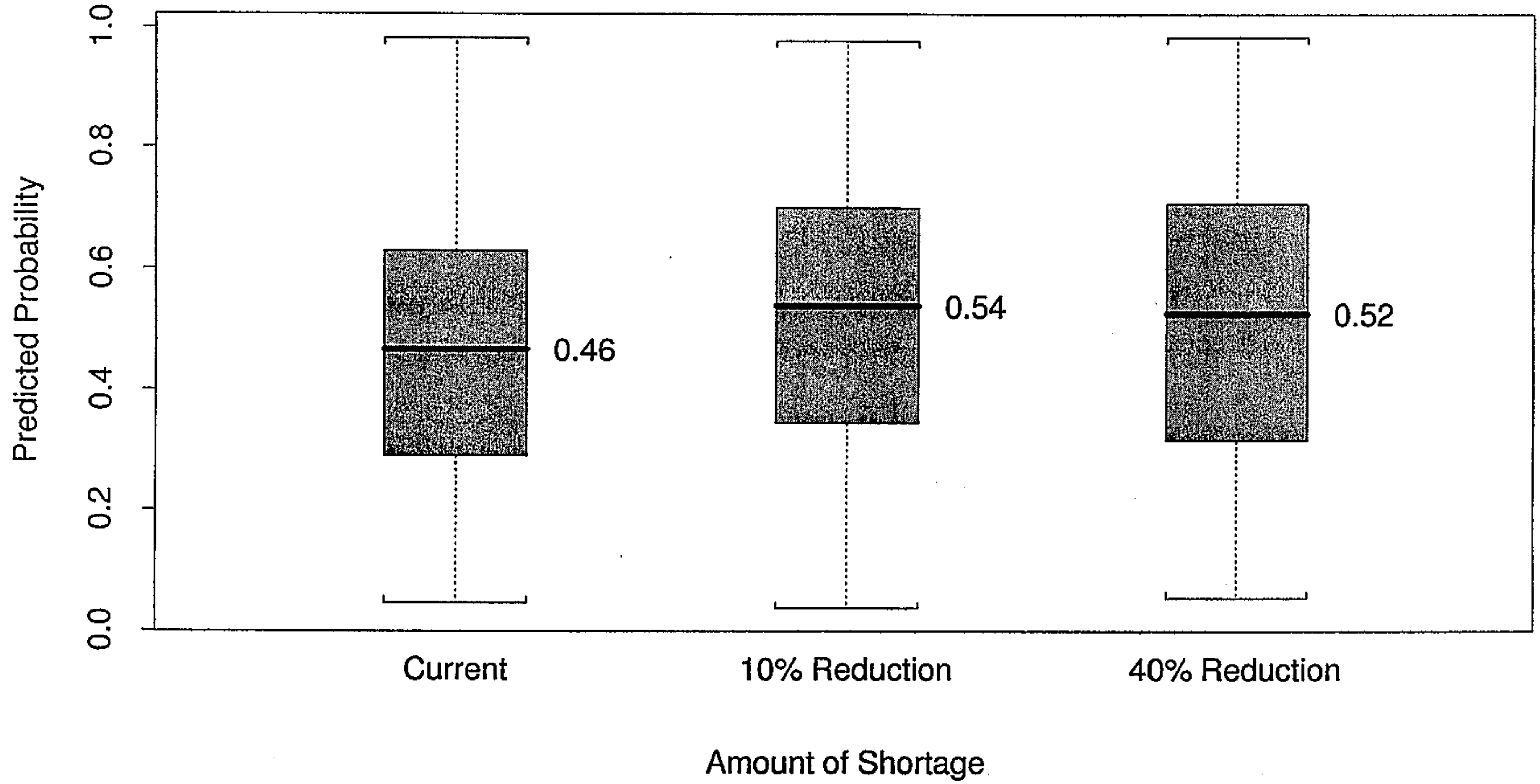

Figure 3: Probability of Purchasing a Low-Flow Showerhead By Amount of Rebate

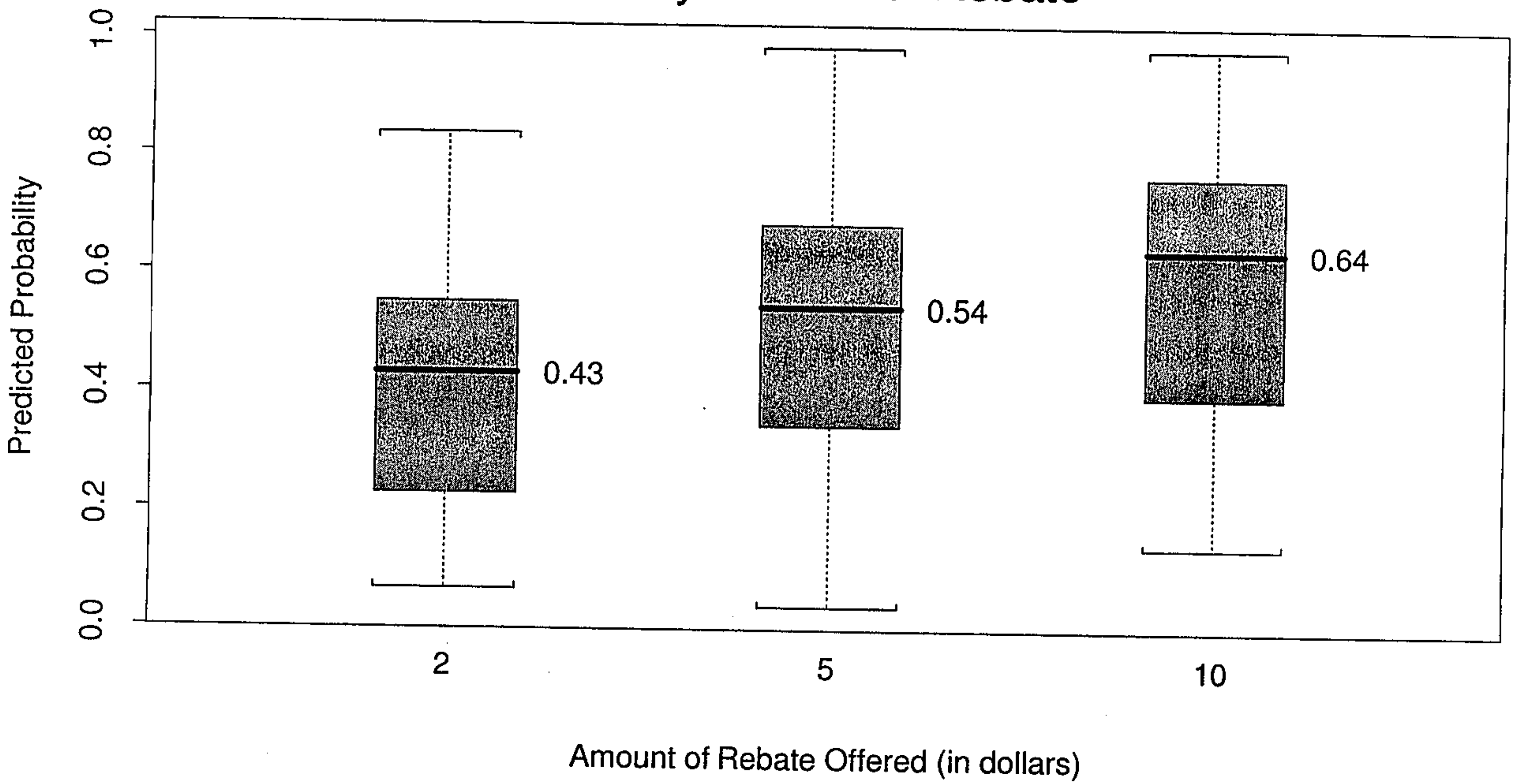

Figure 4: Probability of Purchasing an Ultra-Low-Flush Toilet By Amount of Rebate

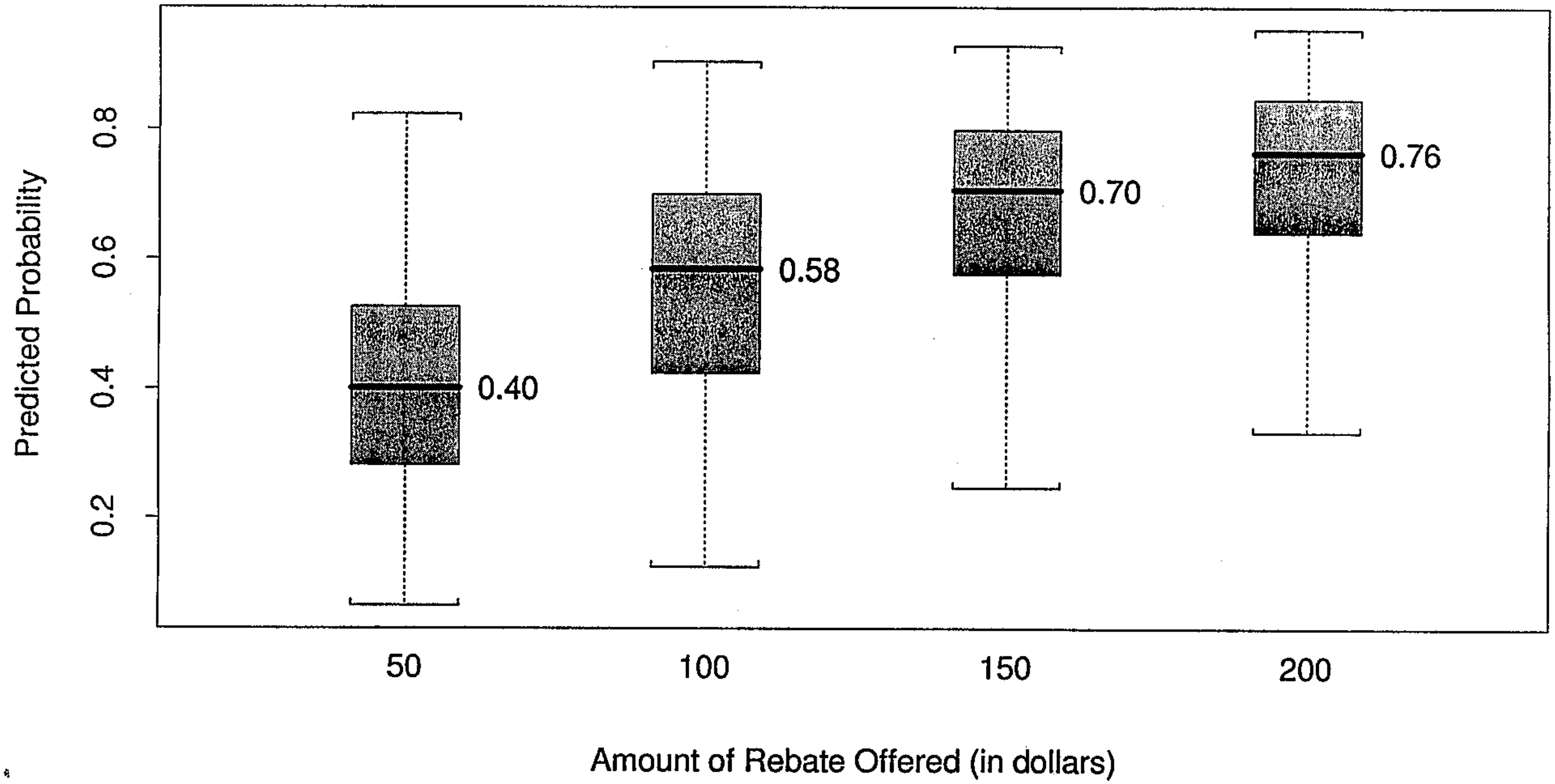

Figure 5: Probability of Purchasing Drought Tolerant Landscaping By Amount of Rebate

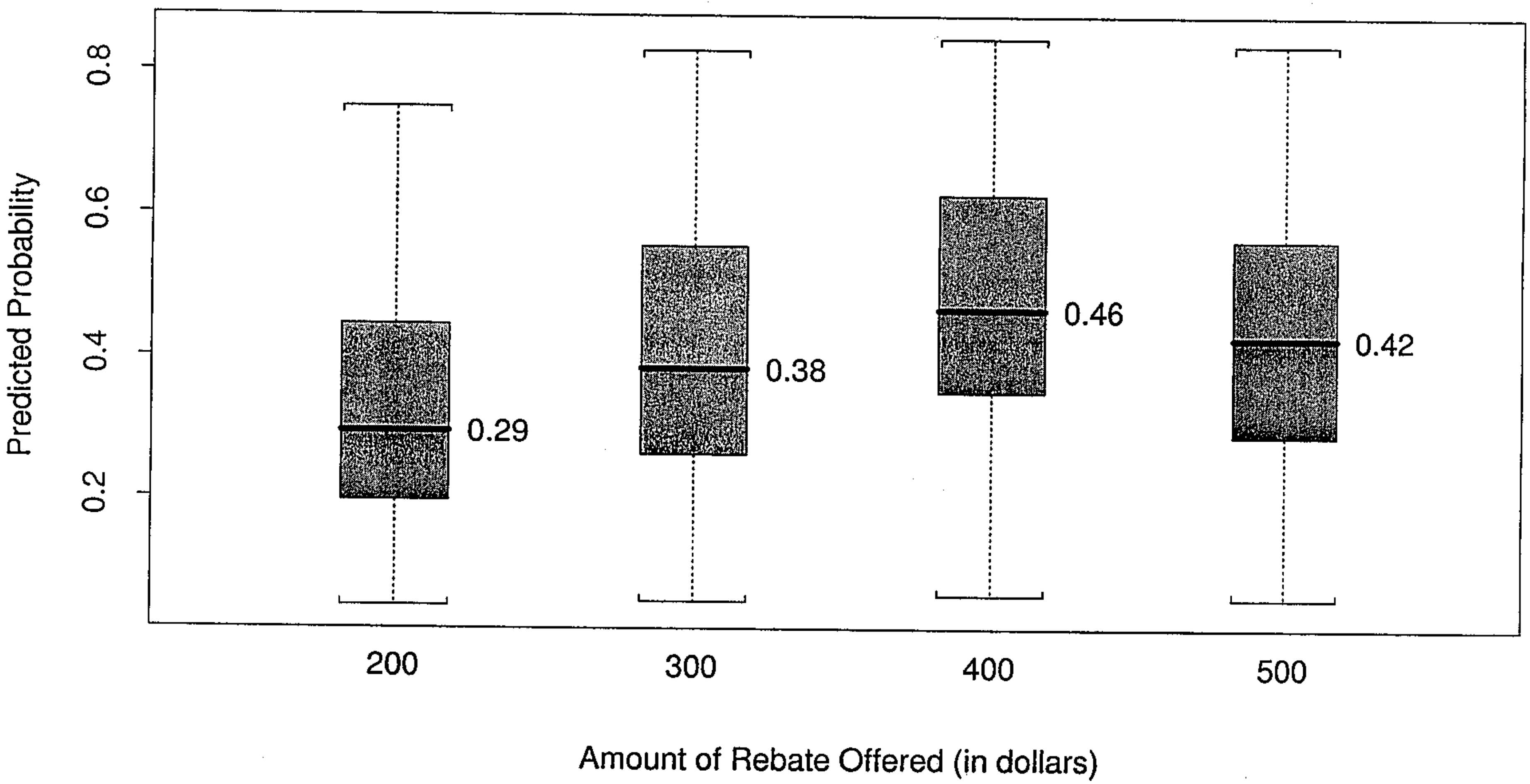

Figure 6: Probability of Purchasing Water Conserving Irrigation
By Amount of Rebate

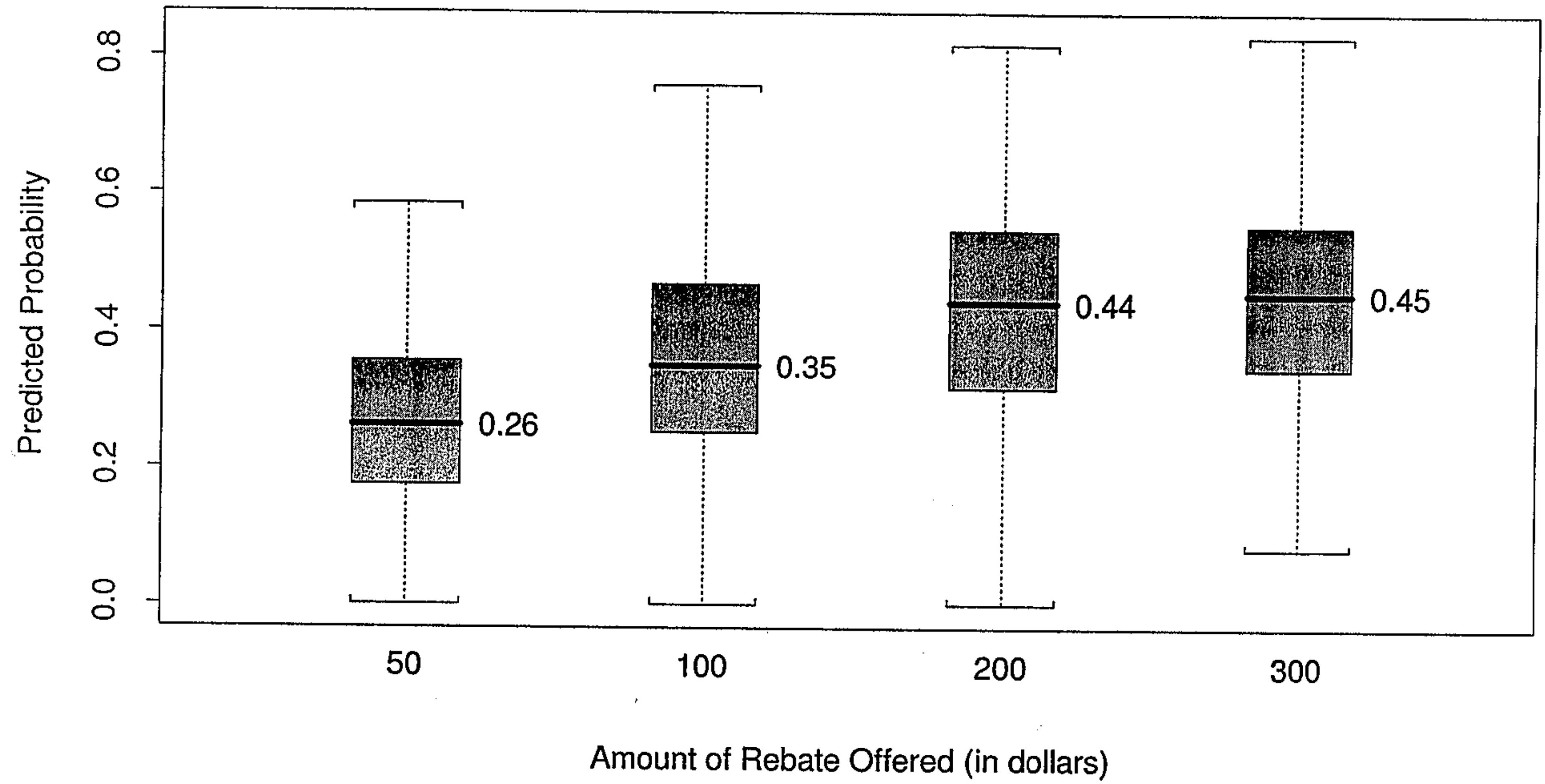

Figure 7: Probability of Purchasing Water Conserving Washing Machine By Amount of Rebate

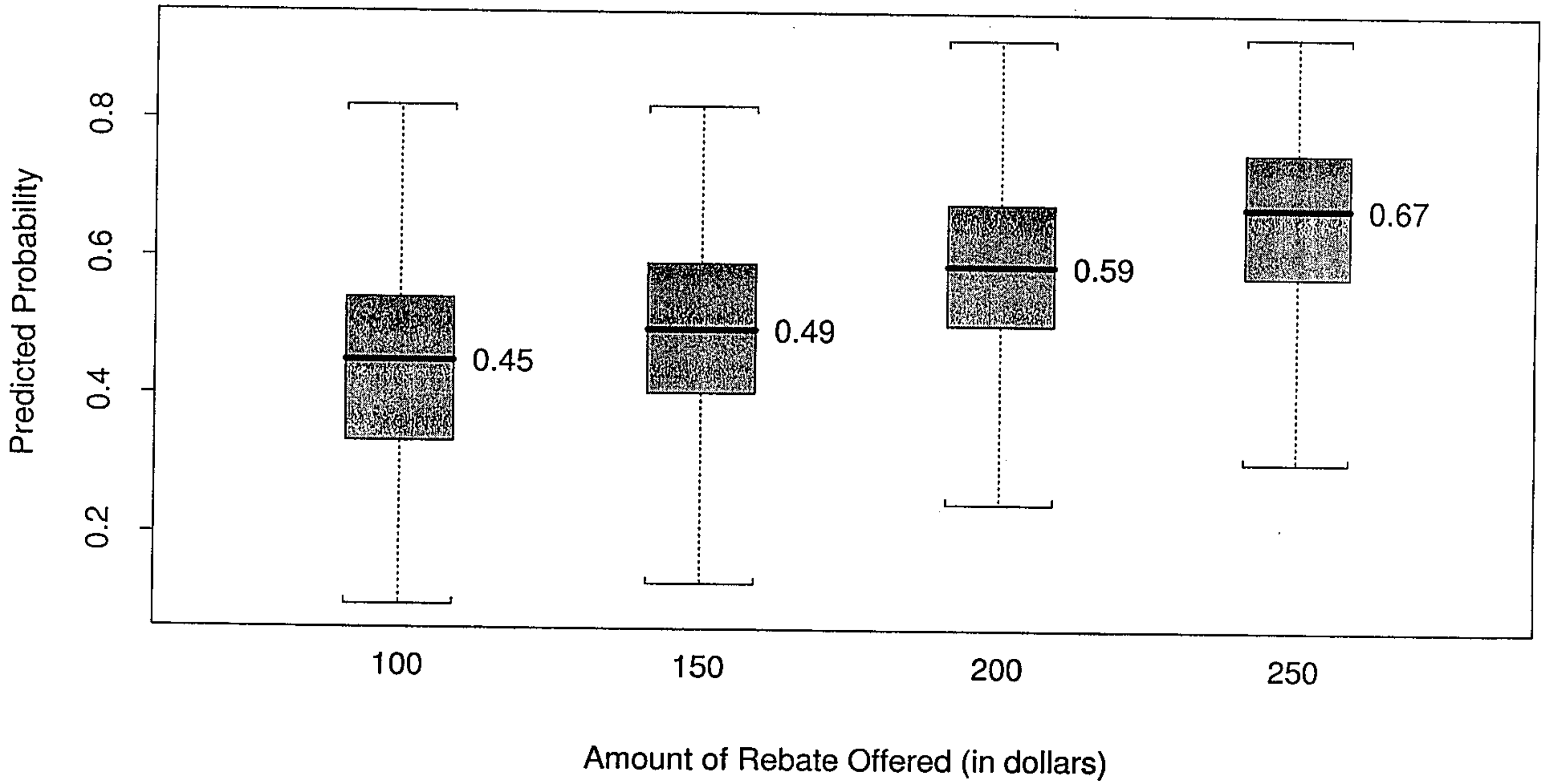

Table 1: Logistic Regression Coefficients for the Non-Parameterized Showerhead Model (N = 768)

Variable		Coefficient	Standard Error	t-value
Intercept		-2.88	0.81	-3.56
Rebate Amount:	5 Dollars	0.48	0.20	2.37
	10 Dollars	0.84	0.20	4.13
Price Increase:	40 Percent	-0.36	0.23	-1.54
	100 Percent	0.13	0.23	0.57
Sector Affected:	Fish and Wildlife	0.42	0.30	1.40
	Farms	0.37	0.31	1.20
	Business	0.17	0.29	0.58
	Residential	0.42	0.31	1.34
Change for Sector:	10 Percent Decrease	-0.04	0.19	-0.21
Cost of New Showerhead:	10 Dollars	2.01	0.39	5.11
	11-20 Dollars	0.60	0.25	2.40
	21-30 Dollars	-0.35	0.31	-1.12
	30+ Dollars	0.79	0.25	3.11
Amount of Winter Water Bill:	0-20 Dollars	0.19	0.23	0.80
	21-30 Dollars	-0.09	0.28	-0.32
	31-40 Dollars	0.70	0.33	2.13
	41-50 Dollars	-0.27	0.31	-0.86
	51+ Dollars	0.28	0.23	1.21
Demographic Variables				
Education:	High School	-0.93	0.54	-1.73
	1 or 2 Years of College	-0.72	0.52	-1.39
	3+ Years of College	-0.62	0.52	-0.54
	College	-0.62	0.52	-1.19
	Advanced Degree	-1.25	0.53	-2.34
Household Income:	<5 Thousand Dollars	0.79	0.97	0.82
	5-15 Thousand Dollars	0.57	0.53	1.09
	16-25 Thousand Dollars	0.53	0.43	1.21
	26-50 Thousand Dollars	0.54	0.36	1.49
	51-75 Thousand Dollars	1.51	0.37	4.10
	75+ Thousand Dollars	0.42	0.36	1.17
Other Demographic:	Experienced Drought	1.13	0.37	3.03
	Number of People	0.33	0.08	4.01
	Years in Home	-0.02	0.01	-1.90
	Move within 2 Years	0.21	0.23	0.93
	Children	-0.95	0.27	-3.51
	Over 75 Years Old	0.28	0.33	0.84
	Los Angeles	0.35	0.19	1.84

The reference category for rebate amount is two dollars, for price increase it is no increase or the current situation, for sector affected it is the current situation, for change for sector it is no change and 40 percent increase (because of singularities). Reference categories for showerhead cost, income, and water bill are all refusal to provide a response. For education, the reference category is less than high school.

Table 2: Logistic Regression Coefficients for the Non-Parameterized ULF Toilet Model (N = 1748)

Variable		Coefficient	Standard Error	t-value
Intercept		-2.16	0.48	-4.49
Rebate Amount:	100 Dollars	0.73	0.15	4.97
	150 Dollars	1.27	0.15	8.42
	200 Dollars	1.59	0.16	10.16
Price Increase:	40 Percent	-0.09	0.15	-0.61
	100 Percent	0.22	0.15	1.42
Sector Affected:	Fish and Wildlife	-0.03	0.19	-0.17
	Farms	-0.16	0.20	-0.80
	Business	-0.21	0.20	-1.05
	Residential	-0.06	0.20	-0.31
Change For Sector:	10 Percent Decrease	0.03	0.12	0.22
Cost of New ULF Toilet:	0-100 Dollars	0.67	0.21	3.18
	101-150 Dollars	0.62	0.19	3.21
	151-200 Dollars	0.39	0.18	2.11
	201-250 Dollars	0.20	0.23	0.87
	251-300 Dollars	0.84	0.21	3.93
	300+ Dollars	0.80	0.18	4.39
Amount of Winter Water Bill:	0-20 Dollars	0.16	0.15	1.01
	21-30 Dollars	0.10	0.18	4.39
	31-40 Dollars	-0.20	0.20	-0.08
	41-50 Dollars	0.13	0.20	0.66
	51+ Dollars	0.15	0.15	1.01
Demographic Variables				
Education:	High School	-0.42	0.33	-1.28
	1 or 2 Years of College	-0.53	0.32	-1.65
	3+ Years of College	-0.79	0.38	-2.10
	College	-0.54	0.33	-1.67
	Advanced Degree	-0.44	0.34	-1.32
Household Income:	<5 Thousand Dollars	-0.60	0.64	-0.94
	5-15 Thousand Dollars	0.30	0.28	1.07
	16-25 Thousand Dollars	1.25	0.26	4.83
	26-50 Thousand Dollars	0.65	0.18	3.65
	51-75 Thousand Dollars	1.12	0.19	5.82
	75+ Thousand Dollars	0.65	0.18	0.53
Other Demographic:	Experienced Drought	0.20	0.22	0.91
	Number of People	0.17	0.05	3.20
	Years in Home	0.01	0.01	1.68
	Move within 2 Years	0.52	0.17	3.10
	Children	0.35	0.17	2.01
	Over 75 Years Old	-0.27	0.19	-1.39
	Los Angeles	0.06	0.12	0.53

The reference category for rebate amount is fifty dollars, for price increase it is no increase or the current situation, for sector affected it is the current situation, for change for sector it is no change and 40 percent increase (because of singularities). Reference categories for showerhead cost, income, and water bill are all refusal to provide a response. For education, the reference category is less than high school.

Table 3: Logistic Regression Coefficients for the Non-Parameterized Drought Tolerant Landscaping Model (N = 2092)

Variable		Coefficient	Standard Error	t-value
Intercept		-2.38	0.44	-6.39
Rebate Amount:	300 Dollars	0.40	0.14	2.80
	400 Dollars	0.71	0.14	5.06
	500 Dollars	0.56	0.14	3.94
Price Increase:	40 Percent	0.06	0.14	0.43
	100 Percent	0.35	0.14	2.56
Sector Affected:	Fish and Wildlife	0.08	0.18	0.44
	Farms	0.07	0.18	0.39
	Business	0.14	0.18	0.82
	Residential	0.24	0.18	1.34
Change for Sector:	10 Percent Decrease	0.02	0.11	0.18
Cost of New Landscaping:	0-500 Dollars	0.65	0.14	4.51
	501-1000 Dollars	0.94	0.26	3.55
	1001-2000 Dollars	-0.35	0.23	-1.52
	2001+ Dollars	-0.24	0.14	-1.77
Amount of Summer Water Bill:	0-20 Dollars	0.50	0.14	3.54
	21-30 Dollars	0.23	0.15	1.47
	31-40 Dollars	0.19	0.18	1.07
	41-50 Dollars	0.04	0.18	0.25
	51+ Dollars	0.46	0.14	3.32
Demographic Variables				
Education:	High School	0.07	0.27	0.24
	1 or 2 Years of College	-01.17	0.27	-0.64
	3+ Years of College	-0.17	0.30	-0.57
	College	-0.15	0.27	-0.57
	Advanced Degree	-0.18	0.29	-0.64
Household Income:	<5 Thousand Dollars	0.18	0.64	0.28
	5-15 Thousand Dollars	0.54	0.27	2.01
	16-25 Thousand Dollars	1.23	0.22	5.38
	26-50 Thousand Dollars	0.91	0.17	5.39
	51-75 Thousand Dollars	0.86	0.18	4.83
	75+ Thousand Dollars	0.22	0.17	1.28
Other Demographic:	Experienced Drought	0.51	0.21	2.40
	Number of People	0.06	0.40	1.56
	Years in Home	-0.01	0.00	-3.01
	Move within 2 Years	0.22	0.14	1.54
	Children	0.12	0.15	0.80
	Over 75 Years Old	-0.65	0.19	-3.34
	Los Angeles	0.49	0.11	4.44

The reference category for rebate amount is 200 dollars, for price increase it is no increase or the current situation, for sector affected it is the current situation, for change for sector it is no change and 40 percent increase (because of singularities). Reference categories for showerhead cost, income, and water bill are all refusal to provide a response. For education, the reference category is less than high school.

Table 4: Logistic Regression Coefficients for the Non-Parameterized Water Conserving Irrigation Model (N = 2088)

Variable		Coefficient	Standard Error	t-value
Intercept		-2.81	0.45	-6.25
Rebate Amount:	100 Dollars	0.46	0.14	3.24
	200 Dollars	0.78	0.14	5.56
	300 Dollars	0.89	0.14	6.35
Price Increase:	40 Percent	-0.14	0.14	-1.04
	100 Percent	0.18	0.14	1.31
Sector Affected:	Fish and Wildlife	0.24	0.18	1.39
	Farms	0.18	0.18	1.02
	Business	0.15	0.18	0.84
	Residential	0.35	0.18	1.99
Change for Sector:	10 Percent Decrease	0.06	0.11	0.58
Cost of New Irrigation:	0-500 Dollars	0.59	0.13	4.60
	501-2000 Dollars	-0.03	0.22	-0.12
	2001-3000 Dollars	0.07	0.21	0.35
	3001+ Dollars	-0.56	0.17	-3.35
Amount of Summer Water Bill:	0-20 Dollars	0.04	0.14	0.28
	21-30 Dollars	0.21	0.16	1.31
	31-40 Dollars	0.51	0.18	2.82
	41-50 Dollars	0.20	0.18	1.11
	51+ Dollars	-0.10	0.14	-0.69
Demographic Variables				
Education:	High School	0.27	0.27	0.99
	1 or 2 Years of College	0.06	0.27	0.23
	3+ Years of College	0.24	0.31	0.76
	College	0.45	0.27	1.65
	Advanced Degree	0.09	0.29	0.33
Household Income:	<5 Thousand Dollars	-4.70	2.72	-1.73
	5-15 Thousand Dollars	0.12	0.27	0.47
	16-25 Thousand Dollars	0.97	0.21	4.57
	26-50 Thousand Dollars	0.48	0.17	2.79
	51-75 Thousand Dollars	0.67	0.18	3.67
	75+ Thousand Dollars	0.64	0.18	3.63
Other Demographic:	Experienced Drought	0.77	0.23	0.28
	Number of People	0.05	0.04	1.16
	Years in Home	-0.01	0.00	-3.23
	Move within 2 Years	0.37	0.14	2.64
	Children	-0.11	0.15	-0.71
	Over 75 Years Old	-0.31	0.19	-1.62
	Los Angeles	0.16	0.11	1.41

The reference category for rebate amount is fifty dollars, for price increase it is no increase or the current situation, for sector affected it is the current situation, for change for sector it is no change and 40 percent increase (because of singularities). Reference categories for showerhead cost, income, and water bill are all refusal to provide a response. For education, the reference category is less than high school.

Table 5: Logistic Regression Coefficients for the Non-Parameterized Washing Machine Model (N = 2436)

Variable		Coefficient	Standard Error	t-value
Intercept		-1.42	0.36	-3.91
Rebate Amount:	150 Dollars	0.19	0.12	1.63
	200 Dollars	0.57	0.12	4.66
	250 Dollars	0.92	0.12	7.59
Price Increase:	40 Percent	0.04	0.12	0.35
	100 Percent	0.28	0.12	2.29
Sector Affected:	Fish and Wildlife	0.00	0.16	0.02
	Farms	0.10	0.16	0.63
	Business	-0.11	0.16	-0.69
	Residential	-0.06	0.16	-0.36
Change for Sector:	10 Percent Decrease	-0.07	0.10	-0.67
Cost of New Washing Machine:	0-300 Dollars	0.96	0.15	6.50
	301-400 Dollars	0.64	0.13	4.87
	401-500 Dollars	0.28	0.14	2.05
	500+ Dollars	-0.04	0.16	-0.25
Amount of Winter Water Bill:	0-20 Dollars	-0.15	0.13	-1.19
	21-30 Dollars	0.02	0.14	0.13
	31-40 Dollars	0.07	0.16	0.42
	41-50 Dollars	-0.29	0.16	-1.78
	51+ Dollars	-0.02	0.12	-0.17
Demographic Variables				
Education:	High School	0.12	0.23	0.52
	1 or 2 Years of College	-0.04	0.23	-0.16
	3+ Years of College	0.23	0.26	0.89
	College	0.11	0.23	0.48
	Advanced Degree	0.13	0.24	0.53
Household Income:	<5 Thousand Dollars	0.40	0.42	0.95
	5-15 Thousand Dollars	0.15	0.23	0.65
	16-25 Thousand Dollars	0.79	0.19	4.13
	26-50 Thousand Dollars	0.54	0.15	3.71
	51-75 Thousand Dollars	0.52	0.16	3.33
	75+ Thousand Dollars	0.37	0.15	2.52
Other Demographic:	Experienced Drought	-0.22	0.17	-1.29
	Number of People	0.15	0.04	3.71
	Years in Home	0.00	0.00	0.04
	Move within 2 Years	0.37	0.13	2.84
	Children	-0.16	0.14	-1.15
	Over 75 Years Old	-0.55	0.16	-3.40
	Los Angeles	0.22	0.10	2.28

The reference category for rebate amount is 100 dollars, for price increase it is no increase or the current situation, for sector affected it is the current situation, for change for sector it is no change and 40 percent increase (because of singularities). Reference categories for showerhead cost, income, and water bill are all refusal to provide a response. For education, the reference category is less than high school.

Table 6: Logistic Regression Coefficients for the Parameterized Drought Tolerant Landscaping Model (N = 2064)

Variable	Coefficient	Standard Error	t-value
Intercept	-2.562	0.491	-5.221
Rebate Amount	0.002	0.000	4.371
Price Increase	0.003	0.001	2.505
Sector Affected: Fish and Wildlife	0.182	0.186	0.981
Farms	0.113	0.187	0.604
Business	0.125	0.185	0.678
Residential	0.335	0.185	1.813
Change for Sector	-0.002	0.004	-0.645
Cost of New Landscaping (thousands)	-0.186	0.000	-8.232
No Response on Landscaping Cost	-1.020	0.129	-7.939
Amount of Summer Water Bill	0.001	0.000	1.693
No Response on Amount of Water Bill	-0.305	0.140	-2.175
Education	-0.039	0.035	-1.132
Household Income (thousands)	-0.009	0.000	-3.882
No Response on Income	-1.058	0.200	-5.288
Experienced Drought	0.588	0.215	2.740
Number of People	0.090	0.042	2.154
Years in Home	-0.013	0.005	-2.683
Move within 2 Years	0.119	0.138	0.858
Children	-0.090	0.148	-0.606
Respondent's Age	-0.009	0.005	-1.918
Los Angeles	0.340	0.109	3.112

The reference category for sector affected is none (the current situation).

Table 7: Logistic Regression Coefficients for the Parameterized Water Conserving Irrigation Model (N = 2068)

Variable	Coefficient	Standard Error	t-value
Intercept	-2.441	0.481	-5.074
Rebate Amount	0.003	0.000	6.161
Price Increase	0.002	0.001	1.836
Sector Affected: Fish and Wildlife	0.123	0.183	0.672
Farms	0.061	0.186	0.328
Business	0.001	0.185	0.006
Residential	0.261	0.182	0.006
Change for Sector	0.001	0.004	0.357
Cost of New Irrigation (thousands)	-0.222	0.000	-6.353
No Response on Irrigation Cost	-0.674	0.124	-5.418
Amount of Summer Water Bill	0.001	0.001	2.565
No Response on Amount of Water Bill	-0.030	0.143	-0.208
Education	0.022	0.035	0.623
Household Income (thousands)	0.002	0.000	0.991
No Response on Income	-0.431	0.196	-2.204
Experienced Drought	0.639	0.229	2.785
Number of People	0.074	0.043	1.707
Years in Home	-0.015	0.005	-2.977
Move within 2 Years	0.372	0.138	2.692
Children	-0.288	0.148	-1.948
Respondent's Age	-0.004	0.005	-0.811
Los Angeles	0.113	0.109	1.035

The reference category for sector affected is none (the current situation).

Table 8: Logistic Regression Coefficients for the Parameterized Low-Flow Showerhead Model (N = 760)

Variable	Coefficient	Standard Error	t-value
Intercept	-5.098	0.826	-6.168
Rebate Amount	0.106	0.025	4.313
Price Increase	0.003	0.002	1.193
Sector Affected: Fish and Wildlife	0.148	0.304	0.488
Farms	0.237	0.310	0.764
Business	-0.015	0.301	-0.049
Residential	0.271	0.309	0.877
Change for Sector	-0.002	0.006	-0.357
Cost of New Showerhead	-0.015	0.006	-2.555
No Response on Showerhead Cost	-0.933	0.245	-3.804
Amount of Winter Water Bill	0.001	0.001	0.714
No Response on Amount of Water Bill	-0.573	0.244	-2.344
Education	-0.076	0.062	-1.229
Household Income (thousands)	-0.003	0.000	-0.729
No Response on Income	-1.157	0.403	-2.873
Experienced Drought	1.353	0.376	3.602
Number of People	0.282	0.076	3.721
Years in Home	-0.023	0.010	-2.309
Move within 2 Years	0.348	0.214	1.626
Children	-0.500	0.255	-1.960
Respondent's Age	0.020	0.008	2.497
Los Angeles	0.204	0.174	1.175

The reference category for sector affected is none (the current situation).

Table 9: Logistic Regression Coefficients for the Parameterized ULF Toliet Model (N = 1720)

Variable		Coefficient	Standard Error	t-value
Intercept		-2.081	0.507	-4.109
Rebate Amount		0.011	0.001	10.888
Price Increase		0.002	0.002	1.610
Sector Affected:	Fish and Wildlife	-0.100	0.203	-0.494
	Farms	-0.194	0.205	-0.947
	Business	-0.323	0.204	-1.583
	Residential	-0.168	0.205	-0.821
Change for Sector		0.002	0.004	0.414
Cost of New Toilet		-0.001	0.000	-1.532
No Response on Toilet Cost		-0.839	0.167	-5.023
Amount of Winter Water Bill		0.000	0.001	0.202
No Response on Amount of Water Bill		0.002	0.159	0.014
Education		-0.034	0.039	-0.880
Household Income (thousands)		0.001	0.000	0.231
No Response on Income		-0.701	0.207	-3.393
Experienced Drought		0.159	0.221	0.720
Number of People		0.198	0.053	3.704
Years in Home		0.009	0.006	1.551
Move within 2 Years		0.389	0.161	2.408
Children		0.125	0.175	0.712
Respondent's Age		-0.012	0.005	-2.307
Los Angeles		-0.023	0.115	-0.200

The reference category for sector affected is none (the current situation).

Table 10: Logistic Regression Coefficients for the Parameterized Washing Machine Model (N = 2404)

Variable		Coefficient	Standard Error	t-value
Intercept		-1.360	0.418	-3.257
Rebate Amount		0.007	0.001	8.645
Price Increase		0.003	0.001	2.445
Sector Affected:	Fish and Wildlife	0.011	0.165	0.067
	Farms	0.104	0.168	0.618
	Business	-0.144	0.166	-0.871
	Residential	-0.039	0.165	-0.236
Change for Sector		-0.002	0.003	-0.731
Cost of New Washing Machine		-0.002	0.000	-6.951
No Response on Washing Machine Cost		-1.718	0.189	-9.075
Amount of Winter Water Bill		0.000	0.001	0.833
No Response on Amount of Water Bill		0.039	0.124	3.154
Education		0.021	0.032	0.661
Household Income (thousands)		-0.003	0.000	-1.286
No Response on Income		-0.624	0.171	-3.660
Experienced Drought		-0.228	0.177	-1.288
Number of People		0.169	0.042	4.060
Years in Home		0.001	0.004	0.265
Move within 2 Years		0.308	0.130	2.378
Children		-0.283	0.138	-2.052
Respondent's Age		-0.013	0.004	-2.973
Los Angeles		0.115	0.097	1.189

The reference category for sector affected is none (the current situation).