The Effect of Social Desirability Bias on Willingness-To-Pay for Organic Beef.

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Abstract

Researchers regularly conduct willingness-to-pay or valuation studies for product marketing or public policy purposes. However, a large volume of research suggests valuation tools such as conjoint analysis may be subject to social desirability bias, where subjects misrepresent their true preferences to create a favorable impression. The objective of this study is to measure the effects of social desirability bias on conjoint survey responses. Consumers were asked to rank organic ground beef relative to other ground beef products at various prices. A popular scale measuring individuals' tendency to exhibit social desirability bias was also administered. Regression analysis found no correlation between individuals' social desirability scale scores and their preferences for organic beef. Thus, in this study, social desirability bias does not appear to be a problem for valuation researchers.

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Consumer research is an important activity for gauging the potential success of new products. Marketing research indicates high failure rates for new products (Crawford). For instance, Microsoft calculates that 75 percent of new product launches do not succeed (Microsoft). This high failure rate is credited primarily to inaccuracies inherent in marketing research (Crawford). Thus, the ability of marketing research to better assess a products' potential success can lead to large savings for companies, and those savings can benefit consumers through lower product prices.

The price of a product is one of many factors that influence the success of a product. The profit maximizing price depends on consumers' willingness-to-pay and the cost of production. In economics, a consumer's willingness-to-pay (WTP) is the maximum amount of money that she is willing to give up in order to obtain a product outright or exchange a product with one type of characteristic (e.g., non-organic food) with an otherwise identical product with another characteristic (e.g., organic food) (Norwood).

The economics and marketing literature have developed scientifically valid methods for obtaining WTP from surveys. The easiest method entails open-ended contingent valuation questions. These questions simply ask consumers to state their WTP for a product or service. For example, one could ask, "Assuming the price of a typical pound of ground beef is $3.00, what is the most you would be willing to pay for an otherwise identical pound of organic ground beef?" However simple this question may seem, consumers often find answering this question a daunting task (Norwood). For this reason, open-ended contingent valuation questions are infrequently used in market research. Another method to measure WTP is to use questions such

as dichotomous choice contingent valuation questions. In such a question, consumers may be asked if they would purchase the product at a price of $1.50. The same question is posed to numerous subjects and the price varies across subjects, so that one can estimate how the tendency to purchase varies with price. The price at which 50% of subjects are expected to purchase and 50% abstain from purchasing is said to be the WTP estimate (Norwood).

Even though contingent valuation questions offer valuable information, the information typically regards WTP for only one good or only one characteristic of a good. Many agriculture economists and marketers use conjoint analysis to measure WTP for multiple good attributes. Conjoint analysis refers to the process where consumers rank products that are side by side and described by several features.

A consumer good can be conceptualized as a collection of attributes. A conjoint analysis experiment begins by selecting attributes that are important to consumers when choosing whether or not to purchase a product. Then, based on these attributes, researchers present subjects with several goods, each good having a different set of attributes. Consumers are then asked to rank the product descriptions in terms of their desirability to purchase the product, or to indicate the one good they would purchase. To illustrate, see the conjoint question illustrated in Figure 1.

Although a conjoint analysis experiment is a useful method for measuring WTP, it, like all WTP methods, is subject to a weakness: Social Desirability Bias (SDB). Social desirability bias occurs when individuals misrepresent their true beliefs or preferences because they know their actions are being monitored or recorded (Crowne & Marlow). Products especially vulnerable to SDB are those with emotionally-charged or normative attributes. For example, goods that are good or bad for the environment, or ones that generate any type of externality, are

subject to greater social pressure to purchase or abstain from purchasing, and therefore are more vulnerable to SDB.

Consider the following examples. Leggett et. al. discovered that the "presence of an interviewer may lead to social desirability bias, whereby respondents provide responses that they think will please the interviewer or be consistent with society norms" (Leggett et. al., pg 562). Lusk, Norwood, and Pruitt found that "subjects exhibit stronger moralistic and pro-social behavior when they know they are being scrutinized" (Lusk et. al., pg 290). Consumer preferences for particular products depend on their tendency to exhibit SDB, leading King and Bruner to conclude "social-desirability bias is considered to be one of the most common and persuasive sources of bias affecting the validity of experimental and survey research findings in psychology and social sciences" (Maryon, pg 80). The literature leaves no ambiguity: SDB is a problem in marketing surveys. However, this genre of aforementioned marketing studies does not include valuation studies. No study has tested whether SDB contaminates responses to WTP studies. Furthermore, if SDB does bias valuation tools, the question then becomes: can we eliminate the bias?

Objective

The objective for this study is to evaluate a method for detecting and removing SDB from conjoint surveys. This naturally requires some measurement of SDB. In order to measure social desirability bias, the Crowne-Marlowe Social Desirability Bias (MCSDB) scale is used. Two psychologists, Crowne and Marlowe, developed the MCSDB scale to measure SDB by asking subjects to read 33 statements and indicate whether the statement describes their personality by answering "true" or "false." Each statement contains an attitude or activity that is thought to be

socially and morally desirable, yet untrue to virtually all people. Giving the socially desirable, but unlike true answer, counts for one point. Once all points are added together, the sum measures their SDB. In this study, the sum is then divided by 33 so that the scale lies on the zero to one interval.

After measuring SDB, determining the effect of SBD on conjoint survey responses is the next step. A regression equation is estimated which predicts consumer-purchasing decisions as a function of the SDB scale. The regressions dependent variable is an organic product's ranking among competing products, and one of the explanatory variables is the SDB scale. If the SDB scale significantly affects the product ranking, its effect can be removed by setting the SDB scale value equal to zero. However, this bias can only be corrected if the SDB variable is statistically significant. The purpose of this study is to determine whether this is the case, using organic beef as the product of interest.

Data

To discover if SDB affects the ranking of the organic beef product, a laboratory experiment was conducted. In the experiment, subjects were randomly recruited throughout the community of Stillwater, Oklahoma. A $40 participation fee was dispersed to those that were involved in the experiment, to entice their participation. This money could then be used to purchase ground beef products, one of which was organic ground beef.

The first task for the subjects was to peruse the four ground beef products listed in Figure 1: Fresh Ground Beef, Cattle Tracks Organic Ground beef, Lean Ground Beef and Diet Lean Ground Beef. Cattle Tracks Organic Ground Beef is a private organic beef label. All products were presented in their normal product label and packaging with no additional information than

that would be provided in a grocery store. Then, the subjects were presented with five shopping scenarios, where each scenario uses a different set of prices. For example, Figure 1 is one single scenario. For each scenario, subjects were asked to rank the products according to their preferences where 1 = most preferred and 5 = least preferred.

Before indicating their rankings, the subjects were informed that one scenario would be randomly chosen as the binding scenario where their ranking may result in an actual purchase. For example, if the number one is drawn the first scenario is binding. Subjects receive one item from the binding scenario, and that item depends on their ranking. The participants were told that the item they will receive is determined by an electronic roulette wheel shown on a screen during the experiment. Specifically, if the roulette wheel chooses 1 through 15, they receive their highest ranked item; if the roulette wheel chooses 16 through 25, then they will get their second ranked item, and so on. This mechanism gives subjects the incentives to rank the products according to their true preferences.

After that part of the experiment was completed, the subjects were asked to take a true/false questionnaire comprising the MCSDB scale. This questionnaire provides a quantitative measure of the subject's tendency to exhibit SDB. Thirty-three statements were presented and the subjects were asked to respond with either a true of false answer. Refer to Figure 2 for sample questions. Each statement contains an attitude or activity that is thought to be socially and morally desired, yet virtually untrue for all people. When the subjects give the social desirable but virtually untrue answer, it counts for one point. Then, the points are totaled, divided by 33, resulting in a measure of their SDB. The distributions of SDB scores are illustrated in Figure 3. It is clear that subjects differ in their tendency to exhibit SDB. Recall that this study seeks to determine whether subjects with high SDB scores have different

preferences than those with low or medium SDB scores. Figure 3 shows there is enough variation in SDB scores to make this determination.

After the subjects' SDB score was elicited, general information of the subjects was compiled. The general information included gender, age, length of education, income, children, race, and how often they purchased ground beef. Refer to Table 1 for summary statistics on these variables. There were 43 subjects in the experiment, with 28% being males. The fact that 81% of the subjects purchased beef at least once a month indicates consumers have familiarity with ground beef.

To test the relationship between subject behavior and SDB, only consumer preferences for organic ground beef is analyzed. Goods with normative attributes (e.g. attributes with positive or negative externalities) are at greater risk of being influenced by SDB than strictly private goods (Fischer). Organic beef is used, as opposed to the competing ground beef varieties, because organic beef has normative attributes. Some people believe that organic beef is good for the environment and has higher animal welfare standards. Those with a more conservative political affiliation may avoid organic beef because it has liberal connotations. The point is that organic beef contains emotionally charged attributes, and is therefore more vulnerable to SDB in marketing surveys.

Two statements dealing with social pressure to purchase organic beef were also presented in the survey. The statements were designed to find out how much social pressure that subject felt from society to buy an organic beef product. Since SDB is a tendency for one to overestimate their willingness to follow social pressure, to understand the theoretical impact of SDB on preferences one must first understand the impact of social pressure on preferences. After presented with the statements "purchasing organic beef is the right thing to do" and

"people important to me would want me to purchase organic beef," the subjects were asked to circle a number one through seven indicating the extent to which they agree or disagree with the statement (1 = strongly disagree, 4 = neither disagree nor agree, 7 = strongly agree). These two scores were averaged. Each individual's score was then subtracted by four, such that a negative (positive) number indicates social pressure to not buy (to buy) organic beef, and a score of zero indicates no social pressure.

Refer to figure 3 illustrating the range of social pressure scores. Out of the 43 subjects, 13 of them felt no social pressure. Individuals clearly experience different types of social pressure: some to purchase and some not to purchase organic beef. Since SDB can be though of as an exaggerated response to social pressure, two individuals with similar SDB scores may provide starkly different answers depending on their perceived social pressure. For example, of two individuals with high SDB scores, one may show distaste for organic beef if the social pressure is to abstain from organic products, while the other may show a strong preference if social pressure works in the opposite way. Clearly, this has important implications for the regression model specification.

Results

The objective for this research is to measure the impact of social desirability bias (SDB), as measured by the Marlowe-Crowne MCSDB scale, on conjoint survey responses. If SDB statistically affects product ranking in a regression analysis, the bias may be artificially removed by setting the SDB variable equal to zero in the regression. However, such corrections should only be made if SDB significantly influences product ranking. This section tests whether this is the case.

A regression equation is estimated where the organic beef product ranking is a function of the price of substitute goods, the organic beef price, social pressure, and the individual's tendency to exhibit SDB as measured by the MCSDB scale. The specific regression equation is

(1) **Predicted Ranking = a_0 + a_1(Price) + a_2(P1) + a_3(P2) + a_4(P3) + a_5(SP) + a_6(SP)(SDB)**

where

Price = Price of organic ground beef ($ / lb)
P1 = Price of fresh ground beef ($ / lb)
P2 = Price of lean ground beef ($ / lb)
P3 = Price of diet lean ground beef ($ / lb)
SP = Social Pressure (-3, -2, -1, 0, 1, 2, 3)
SBD = Marlowe-Crowne Social Desirability Bias Score (scale of 0-1)

The ranking of organic beef should be influenced by its own price, as well as the price of the three substitute ground beef products. The social pressure was included in the regression because people feel pressured by society to buy, or not buy certain products, as well as feeling no pressure at all. The last explanatory variable is an interaction term (SP)(SDB). To understand why this interaction term is needed, note that the marginal effect of SDB on the ranking is

(2) $$\frac{\partial(\text{Predicted Ranking})}{\partial \text{SDB}} = a_6(\text{SP})$$

In the previous section, it was shown that some individuals feel social pressure to not purchase organic beef (those with negative SP scores), while others (with positive SP scores) feel pressure to purchase it. Social desirability bias occurs when individuals indicate a greater willingness to conform to social pressure than they would outside of an experiment. Therefore, if SDB influences the ranking of organic beef, its qualitative effect on ranking depends on the SP score. Specifically, SBD should cause lower rankings when SP is positive (meaning organic beef is more preferred) and higher ranking when SP is negative (meaning organic beef is less preferred). Furthermore, SDB should have no effect on ranking if SP is zero and there is no

social pressure. According to this theory of social desirability bias, the value of a_6 should be strictly negative. If this is the case, then the derivative in (6) will be negative when SP is positive, positive when SP is negative, and zero when SP is zero, as hypothesized. Thus, the objective of this study is then accomplished by testing the null hypothesis that a_6 is equal to zero versus the alternative hypothesis that a_6 is negative.

The regression estimates are provided in Table 2. When interpreting the regression, recall that the dependent variable is the ranking of organic beef relative to four competing options where a ranking of one indicates the organic beef is most preferred. The Intercept, Price (price of Cattle Tracks Organic beef), P1 (Price of fresh ground beef), P2 (Price of lean ground beef), P3 (price of diet lean ground beef) and social pressure variables are significant at a 5% level. The regression signifies that as the price of organic beef rises, the ranking increases in value indicating a lower preference for organic beef. All three prices for the substitute ground beefs have an inverse relationship with the ranking of organic beef, as expected. The significant negative coefficient on SP also conforms to expectations. Positive (negative) SP values indicate social pressure to purchase (to not purchase) the organic beef, thereby resulting in a lower (higher) dependant variable and a greater (smaller) tendency to purchase organic beef. The significance of these variables and their conformity with theory suggests the data does indeed reflect true consumer preferences and can be used to measure the influence of SDB on preferences.

If social desirability bias influences responses to conjoint questions, the coefficient a_6 should be significant. Plus, if this influence is consistent with theory of social desirability bias, the coefficient should be significantly negative. Neither result is found, as the coefficient a_6 is both positive and insignificant. This implies that, at least in this experiment, social desirability

bias does not affect the consumers ranking in conjoint analysis surveys. This is welcome news for marketing researchers and economists, who consider conjoint analysis as one of their major research tools. Further data is required before one can be fully confident that social desirability bias is absent in conjoint analysis. However, this paper provides the first test of such, and until further evidence is collected, the research suggests conjoint analysis can be readily employed without fear of contamination by social desirability bias.

Summary and Implications

In some marketing studies, researchers have discovered that social desirability bias (SDB) affects consumer survey responses. The simple knowledge that the subject is participating in an experiment where their answers will be recorded and evaluated changes their behavior, however benign and uncontroversial the research may be. However, no one has tested whether SDB has an effect on willingness-to-pay (WTP) questionnaires. Given the popularity of conjoint analysis as a valuation tool, the statistical test performed in this paper is long overdue.

The objective of this study is to first determine if SDB is present in conjoint analysis results. If SDB significantly influences the product ranking through conjoint analysis, its effect can be removed by measuring its effect on subject responses and adjusting those responses appropriately. Yet, such adjustments should only be made if measures of SDB across individuals are indeed correlated with differences in survey responses. The purpose of this study is to test whether one particular measure of SDB is statistically related to WTP estimates, using organic beef as a case study.

A regression analysis found no correlation between individuals' SDB scores and their preferences for organic beef. Thus, social desirability bias was not detected. While this gives

greater credence to the conjoint method, it is unclear whether different valuation formats would also be immune to SDB. The experimental methods in this study which used real money provided a realistic market setting. Whether mail surveys that seem further removed from real markets would also be immune is unclear. Further research is warranted to determine if the results found in this study can be repeated using different samples of individuals, and to determine if conjoint analysis is immune to SDB using other conjoint formats, such as mail surveys and hypothetical choice experiments.

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Please rank the following items in terms of YOUR most preferred (ranking=1) to the least preferred (ranking=5).

	Fresh Ground Beef **$3.00**	Cattle Tracks Organic Ground Beef **$2.00**	Lean Ground Beef **$4.00**	Diet Lean Ground Beef **$2.00**	**NONE** **$0.00**
Ranking	☐	☐	☐	☐	☐

Figure 1. Example of Conjoint Analysis Survey Question

Listed below are statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to YOU PERSONALLY.

1) I sometimes feel resentful when I don't get my way.

Circle one **TRUE** **FALSE**

2) I have never intensely disliked someone.

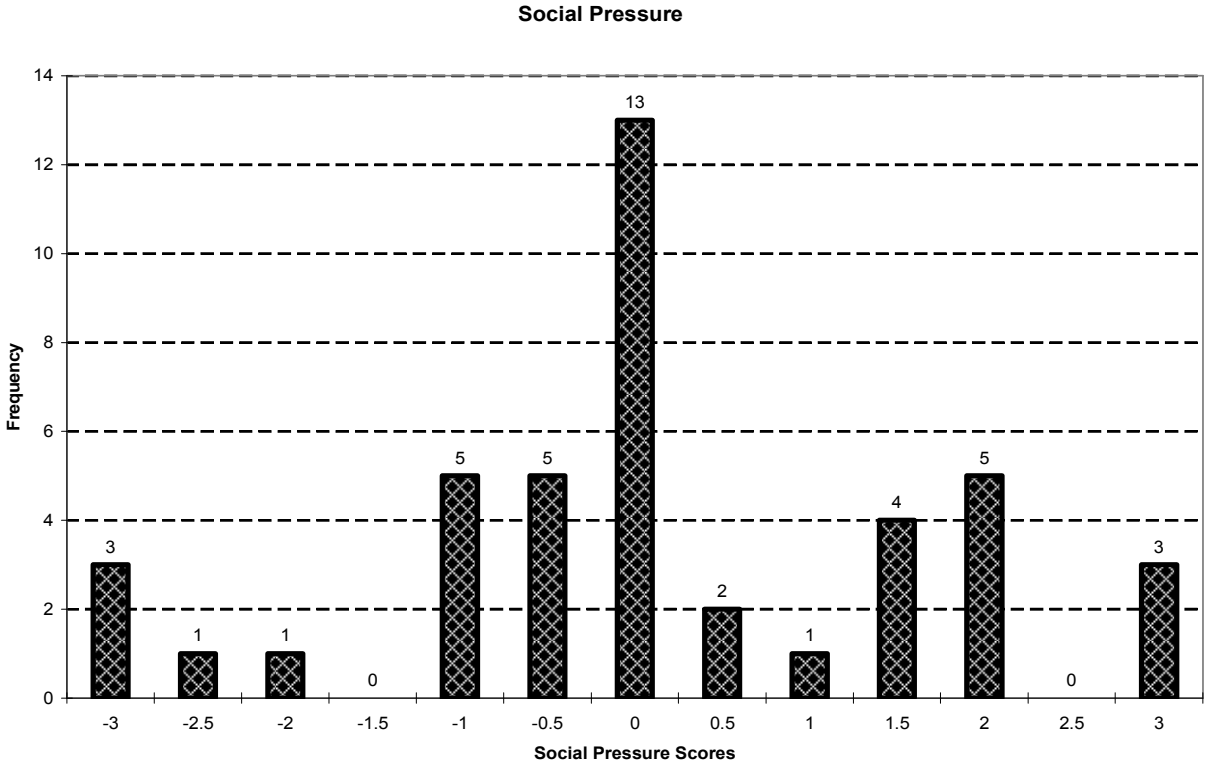
Circle one **TRUE** **FALSE**

3) I like to gossip at times.

Circle one **TRUE** **FALSE**

*Highlighted answer is virtually untrue. These are the first three questions in the 33 questionnaire.

Figure 2. Example Questions to Determine the MCSDB Score



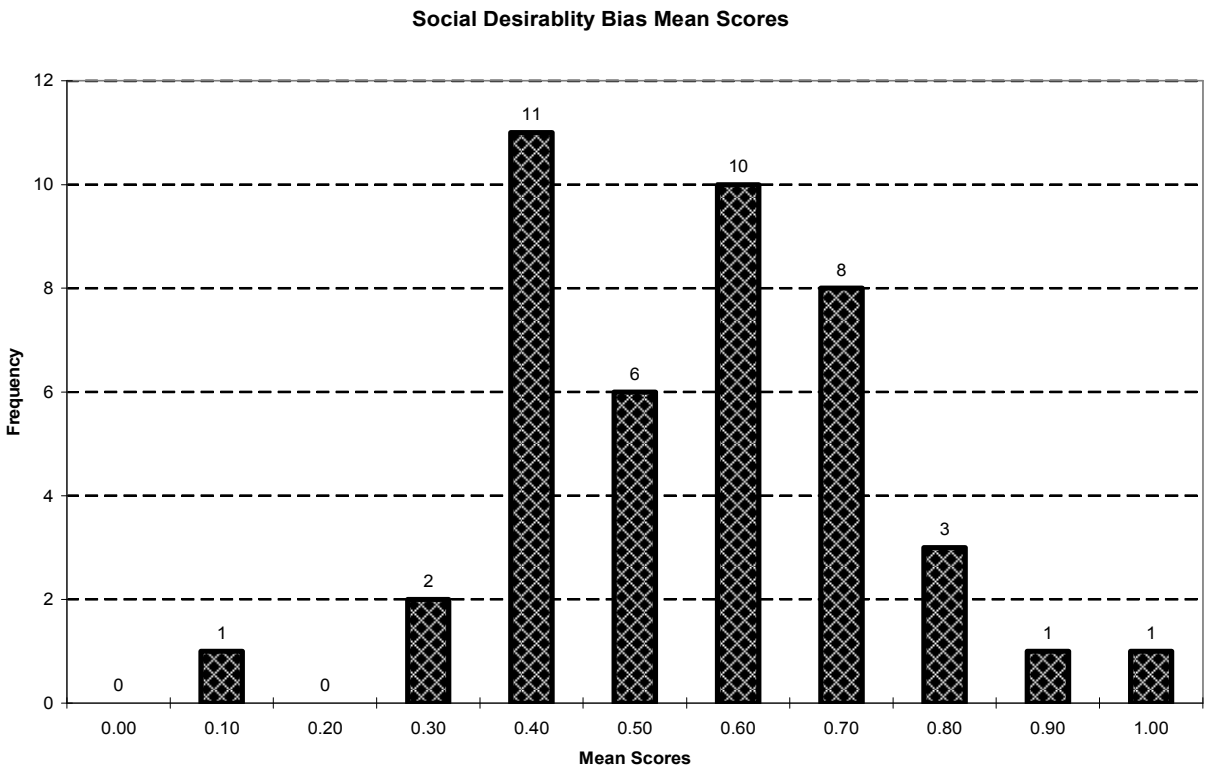


Figure 3. Mean SDB Scores and Social Pressure Scores Histograms

Table 1. Summary Statistics of Experiment Participants

Variable	
Number of Subjects	43.00
Gender (% male)	27.91%
Age (average, standard deviation)	48.23, 14.14
Percent White	86.04%
Posses Undergraduate Degree	46.51%
Household Income before Taxes Less than $60,000	69.76%
Number of Children under 12 Living in the House (average)	0.53
Purchases Beef at Least Once a Month	81.40%

Table 2. Regression Analysis of Organic Beef Ranking (dependent variable = ranking of organic beef, where lower nominal ranking indicates greater preference for organic beef)

Variable	Parameter Estimates (p-value)
Intercept	3.8821* (0.0000)
Price (Price of Organic Beef)	0.7356* (0.0000)
P1 (Price of Fresh Ground Beef)	-0.2931* (0.0031)
P2 (Price of Lean Ground Beef)	-0.3049* (0.0021)
P3 (Price of Diet Lean Ground Beef)	-0.2873* (0.0036)
SP (Social Pressure)	-0.5014* (0.0043)
(SP)(SDB) (Social Pressure times Social Desirability Bias)	0.4285 (0.1625)
R-Square	*0.35*

* denotes coefficients which are significant at the 5% level.