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Evidence from Field Auctions

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Abstract

Information about cigarettes can help smokers come to an informed decision about what cigarettes to purchase. Countermarketing information, which helps counter potentially biased marketing information, can fill this void, but little is known about the value of this information to smokers. In this paper, we use data from experimental auctions to estimate the value of countermarketing information to smokers. We find that countermarketing information has significant value to smokers who have been exposed to marketing information from tobacco companies, but we find no evidence it provides value to smokers not exposed to marketing information

Introduction and Background

Quitting smoking is difficult for many smokers. This is largely due to the addictive nature of nicotine. Surveys of U.S. smokers suggest that although 70% of smokers say they want to quit and 34% of smokers try to quit each year, only 10% succeed in remaining tobacco free for at least a year (IOM, 2001). These facts indicate that a significant population will almost certainly remain at risk of the negative health effects of smoking, suggesting a role for harm reduction (i.e., a strategy to offer those smokers who cannot quit a "safer" alternative to cigarette smoking) (IOM, 2001).

Recently, tobacco companies have tried to address smokers' concerns about the health risks of smoking by offering new types of tobacco products claiming reduced health risks. These products have become known as PREPs (potentially reduced exposure products) (see IOM, 2001). Tobacco companies are seeking the support of the public health, regulatory, and medical communities in this effort (Shiffman et al., 2004). Some of the claims for PREPs (e.g., advertising for Eclipse, a PREP offered by RJR Tobacco, states that Eclipse is "the next best choice" to quitting) (Shiffman et al., 2004) are reminiscent of claims made for light cigarettes (e.g., "Considering all I heard, I decided to either quit or smoke True®. I smoke True®.")

RJR's Eclipse cigarette may be the most well known of the alternative PREPs. Recent advertisements claimed that "there is no cigarette like [Eclipse]" (www.eclipse.rjrt.com) and that the cigarette, which heats rather than burns tobacco, "may present less risk of certain smoking-related illnesses" (www.eclipse.rjrt.com), including cancer, inflammation in the respiratory system, and development of cardiovascular disease (www.eclipse.rjrt.com; Slade, Connolly, and Lymperis, 2003).

An independent study by the Massachusetts Tobacco Control Program, however, showed that Eclipse actually had higher levels of some carcinogens and reported that the Eclipse marketing campaign and claims were deceptive (Tomar, 2003).

Marketing Information

Efforts to produce lower risk cigarettes have largely been driven by public opinion—in particular, by growing concerns about the health effects of smoking. Lowering the risk of tobacco products has been an option that tobacco companies have considered and pursued, in an attempt to satisfy demand in a "highly competitive market for 'healthier' products" (Dunsby and Bero, 2004, p. 362). The specific changes in tobacco products have also been driven by consumer opinion. After the Surgeon General's report in 1964, which detailed the health risks many suspected, public concern about the effects of tobacco use rose and industry executives learned of the "profit opportunities inherent in products that made some cigarettes appear healthier" (Pollay and Dewhirts, 2002, p. i20). Modifications, such as the addition of a filter, were made to cigarettes so they appeared to limit "the cancer and other health risks being publicized" (Pollay and Dewhirts, 2002, p. i18). Consumer misunderstanding of the health risks of nicotine has even prompted tobacco companies to investigate development of a less addictive product if it were perceived to be healthier (Dunsby and Bero, 2004).

However, it appears that the health claims for light and low-tar cigarettes have reached a health-conscious public. Use of light or mild cigarettes has increased substantially between 1996 and 2000 (Ashley, Cohen, and Ferrence, 2001), and more than half of adult and adolescent smokers report smoking light cigarettes (Cummings and Giovino, 2004). The effectiveness of marketing efforts are also found when looking at beliefs about light

cigarettes. Various studies have found smokers think light cigarettes are less dangerous than conventional cigarettes. This includes smokers who perceived that smoking light cigarettes made them "less likely to get lung cancer, have a heart attack, die from a smoking-related disease, get a bad cough, have trouble breathing, and get wrinkles" (Kropp and Halpern-Felsher, 2004 p. e445) and smokers who thought using light or ultra-light cigarettes would improve their health and reduce their chances of getting cancer or heart disease (Kropp and Halpern-Felsher, 2004; Shiffman et al., 2001a,b). With the advent of alternative tobacco products (e.g., Advance, Quest, Eclipse), it is likely that much of the misconceptions associated with light and low-tar cigarettes will be transferred to these PREPs.

Hamilton et al. (2004) looked at smokers' responses to advertisements for regular and light cigarettes and PREPs (e.g., Advance, Eclipse, and Omni). After reviewing one actual advertisement for each type of cigarette, they were asked to rank the level of health risk and to identify the main messages of the ads. Smokers believed that PREPs were less risky than light cigarettes and that light cigarettes were safer than regular cigarettes. Although analyses of the advertisements concluded that none explicitly detailed health benefits, smokers believed that light and PREP ads "convey[ed] positive messages about health and safety" (p. s353) and that the ads indicated that PREPs would be helpful in quitting smoking.

Shiffman et al. (2004) also gauged reactions to PREP advertising, with similar results. After hearing claims made by Eclipse in its advertising, smokers and ex-smokers overwhelmingly believed that Eclipse was safer than regular cigarettes (91%), and nearly one-fourth "considered Eclipse to be completely safe" (p. 80). They concluded that smokers may reduce their readiness to quit based on interpretation of a reduced risk product's ad.

O'Hegarty et al (2007) used focus groups to assess adult smokers' reactions to PREP print advertisements and promotional materials and found that these materials influenced participants' decisions to try PREPs. A study by O'connor et al (2007) found that advertising influences how college students view light and PREP cigarette brands.

Countermarketing Information

There is evidence that antismoking or countermarketing campaigns can be effective in targeting users who are increasingly interested in these new products. While some countermarketing campaigns simply try to discourage all smoking, others take a different approach. With light cigarettes, for example, the goal of a countermarketing campaign is not directly to tell people of the immediate risks of smoking. The direct goal is to inform smokers that light cigarettes are not safer than conventional cigarettes. When this first goal occurs, then smokers who may consider quitting will be less likely to instead choose to switch to light cigarettes. Research has found this strategy has some merit, as there is evidence that smokers would be more likely to quit if they understood that using light cigarettes did not significantly reduce health risks (Ashley, Cohen, and Ferrence, 2001; Kozlowski et al., 1998, Shiffman et al., 2001a,b).

This type of information strategy may be useful for PREPs, as well. A recent study by Biener, et al. (2007) examined smokers' beliefs about the toxicity and health risks associated with PREP's (Advance and Eclipse) and the effect of corrective health information on these beliefs. They reported that corrective health information had an effect on ratings of health risks and reduced perceptions that switching to a PREP would lower the risk of cancer though smokers' rating of toxicity were not effected by the corrective health information.

In this study, we create an experimental auction to value countermarekting information that is designed to accurately inform participants about PREPs. In our design, the information is not directly attempting to inform smokers in such a way that they quit smoking entirely, but simply to provide smokers with more accurate information about PREPs. Those in public health fields would hope that this step will then help those who are considering quitting choose to quit and not choose to switch to a PREPs cigarette because they are misinformed about the risks. We assess the value of countermarketing information by examining how more-informed smokers make a choice between regular and conventional cigarettes by using experimental auctions.

Experimental Design

Experimental auctions have been use to estimate the consumer demand for a dozens of products and recent studies have used experimental auctions to examine smokers' demand for cigarettes (Monchuk et al., 2007; Thrasher et al. 2007). Experimental auctions have also been used to examine whether information has value to consumers. Several different studies have used experimental auctions to measure the value of information on items such as GM foods and choice of fish (Rousu et al. 2007, Marette et al. 2008)

We designed and conducted an experimental auction to examine the value of countermarketing information about PREPs to smokers. Because many smokers purchase cigarettes at grocery stores, we conducted our field experiment in grocery stores. (e.g., see Rousu et al. 2005, Monchuk et al. 2007). According to Harrison and List's (2004) taxonomy, this would be considered a "framed field experiment".

We posted signs inside the grocery store indicating that smokers could earn $15[1] for 10 to 15 minutes of their time on a research project for Susquehanna University. For legal and ethical reasons, we limited our sample to adults who were 18 years of age or older. The experiment monitors checked the participant's photo identification when the participant looked younger than 28 years old. We also assume in our analysis that when an auction participant purchases a pack of cigarettes, that they are the end consumers. This is essentially the same as assuming that when a smoker purchases a regular pack of cigarettes they intend to consume the cigarettes. In an attempt to ensure the participants in our experiment were end-users, we asked all potential participants if they were (currently) smokers and limited our sample to those individuals.

We conducted our field experiments in December 2006 and January 2007. Four hundred and four[2] participants took part in this study in groups of either one-at-a-time or six or fewer, depending on how many other people were interested in participating at the same time. The experiments were conducted at grocery stores in four locations, Laurel, MD; Harrisburg, PA; Allentown, PA; and Selinsgrove, PA. We chose these four locations for several reasons. First, the grocery store chain that allowed us to conduct the experiments had branches in each of these locations.[3] Second, using multiple locations helped us obtain a more-diverse sample than if we had chosen one area. One store was in a rural area (Selinsgrove, population 5,300), two were in mid-size cities (Harrisburg has a population of 49,000 while Allentown has a population of 106,000) while Laurel is a suburb of major

[1] Some participants received only $10. This occurred on the first day of experiments with only 12 individuals. We struggled to recruit smokers with only a $10 incentive payment, so we increased the incentive payment to $15 for the all other participants.

[2] While 404 people participated, we collected incomplete bid information from nine of these participants, leaving us with a sample of 395 participants.

[3] We attempted to run experiments in other locations (e.g. Miami, FL; Durham, NC) but were unable to obtain to run experiments in these areas as the stores we contacted would not allow us to conduct experiments in their stores.

metropolitan areas (Washington, DC and Baltimore, MD). Table 1 summarizes the characteristics of our sample.

The auction mechanism

For this study, we used the Becker-DeGroot-Marschak (BDM) (1964) auction, which is designed to encourage participants to truthfully identify a products value. In the BDM auction, after each participant places a bid for a product, a market-clearing price from a uniform distribution is selected randomly from a fixed interval of prices. In this experiment, the possible market clearing prices ranged from $0.10 to $6.00 in increments of $0.10. If a participant bids more than the randomly selected price, he or she purchases the product for the market-clearing price; a participant who bids less than the selected price does not purchase the product. The BDM auction is a "demand-revealing" auction, that is, each participant's best strategy is to place a bid that is equal to the amount he or she would pay for the cigarettes. It is in a participant's best interest to bid his or her true value for the product because a bid higher than the true value may result in paying a higher price than what he or she was willing to pay, and a bid lower than the true value may result in not being able to purchase the good at a price he or she was willing to pay. For more on the properties of this auction, see Becker, DeGroot, and Marschak (1964).

The cigarettes

Participants in our experiment bid on Eclipse cigarettes. RJR's Eclipse cigarette may be the most well known of the alternative PREPs. We had participants bid on both regular and menthol Eclipse, as some smokers in our sample preferred menthol cigarettes, while others preferred regular (non-menthol) cigarettes. In addition to bidding on the two packs of Eclipse cigarettes, participants indicated to us the brand of cigarettes they usually smoke

(henceforth referred to as their "regular brand"). Participants placed three separate bids on each of the three packs of cigarettes (Eclipse regular, Eclipse menthol, and their regular brand). This allows us to compare participants' demand for Eclipse relative to their regular brand, along with the ability to compare how information affects participants' preferences for Eclipse.

The information treatments

We wanted to estimate the value of countermarketing information both for consumers who received marketing information and for consumers who did not receive marketing information. With that in mind, we now summarize the information treatments. The information statements given to consumers can be found in appendix 1.

In treatment A (the control group), Participants received no information prior to bidding on the cigarettes. In treatment B, participants received (only) countermarketing information (about PREPs) prior to bidding on cigarettes. In treatment C, participants received marketing information (about PREPs) prior to bidding on cigarettes. Finally, in treatment D participants received both marketing and countermarketing information about PREPs.

There were two alternative types of both marketing and countermarketing information provided to participants. Both types of marketing information came from the Reynolds website (www.eclipse.rjrt.com). One of these messages emphasized potential health benefits of Eclipse in terms of reduced exposure to carcinogens. The other message suggested Eclipse as an alternative to quitting. The two types of countermarketing information were designed to counter each of the specific marketing claims. Note that within treatments B, C, and D, participants only received one of the two types of marketing and/or countermarketing

information. (For treatment D, groups received the countermarketing information that was designed to counter the specific marketing claim.)

Steps in the Experiment

After prospective participants read and signed consent forms we gave them experimental packets (which can be obtained by the authors upon request) and explained the BDM auction mechanism and answered any questions from participants. We next conducted a practice round in which we collected separate bids for two candy bars. This practice round demonstrated to participants that it was truly in their best interests to bid only their true value for a good in the auction—no more and no less. We also explained that, when participants bid on multiple products, only one product, chosen at random, would be auctioned. This avoids the possibility of participants purchasing multiple products that are similar and avoids any potential substitution effects. When the bidding for the candy bars ended, we determined whether the participant would purchase the randomly selected candy bar and at what price.

Following the practice round participants (who were not in the control group) were given information to read based on their treatment. The information they received was randomly determined based on the time they arrived. After participants read the information, bidding on the cigarettes began. Following Monchuk et al. (2007), we had participants indicate the brand of cigarettes they normally smoke (henceforth referred to as their "regular brand").[4] A package of each participant's regular brand of cigarettes was immediately purchased, if their specific brand was not already on hand, and displayed with the two packages of Eclipse cigarettes, regular and menthol. We then asked the participants to rank the three packs before them from most to least preferred. Once the consumers ranked the

[4] Note that it was feasible that a participant would indicate that his or her preferred brand was a PREP, but this did not occur in our experiments.

cigarettes, we asked them to place a separate bid for each of the three packs of cigarettes. Before they placed their bids, however, we reiterated that, similar to the candy bar round, only one of the three packs of cigarettes, chosen at random, would be sold in the auction.

Next the pack of cigarettes to be sold was randomly determined, as was the market-clearing price to determine whether a participant won the pack of cigarettes. Finally, participants completed a short post-auction questionnaire, were paid $15 for their participation and those who won the auction purchased cigarettes at the selected market-clearing price.

While our experiment follows standard procedures (e.g., see Shogren et al. (1994) and Lusk et al. 2001), we make several notable refinements. First, instead of a laboratory experiment, we conducted a "framed field experiment" (Harrison and List (2004)). Several recent experimental auctions have been conducted in a field setting (e.g., see Rousu et al. 2005, Lusk et al. 2001) because of the associated benefits. Chief among these is that the field environment is more familiar to participants. Second, we use adult consumers from four distinct geographic regions. This ensures our results are not an artifact of one geographic region. Finally, we chose not to endow participants with products and have them bid to upgrade to another product (e.g. see Alfnes and Rickertsen (2003)). Recent research has shown that there is an "endowment effect" that distorts bids (see Corrigan and Rousu (2006)).

Modeling the Value of Information

We now summarize the methodology used to estimate the value of countermarketing information. First, consider the empirical specification of the model leading to the public-

good value of countermarketing information. Our approach is similar to the approach taken by Rousu et al. (2007, 2004) to value information using an experimental auction and to the non-auction approaches to value information used in Foster and Just (1989), Teisl et al. (2001), and Marette et al. (2007). Information has value if an agent's observable behavior changes. For our case, information has social value if a participant/consumer changes his/her behavior as a result of receiving the information, i.e., *they "switched products that they purchased" — from Eclipse cigarettes to regular cigarettes, or vice versa*.[5]

Consider the two types of bidders that benefit from countermarketing information. One type purchases the brand of cigarettes they normally purchase (their "regular brand") before receiving countermarketing information, and then switches to Eclipse cigarettes after receiving countermarketing information. The second type purchases Eclipse cigarettes before receiving countermarketing information, and switches to their regular brand after receiving the countermarketing information.

The economist's task is to approximate the net welfare change for bidders who change their observed behavior after receiving countermarketing information. Because we are trying to assess the average value of information for cigarettes, we assume all bidders purchase either their regular brand of cigarettes (which differed across individuals) or the Eclipse cigarettes. The bidder's surplus is approximated by the difference between his/her willingness to pay (WTP) and the "market price" (i.e., the price consumers would pay for a product in a store) for the product he/she purchases. Bidder *j*'s consumer surplus from purchasing Eclipse cigarettes or their regular cigarettes is defined to be:

(1) $surplus_{ECL}^{j} = WTP_{ECL}^{j} - MP_{ECL}^{j}$

[5] Note that our model does not assume an auction market, but a conventional market. But, auctions are essential for this analysis because our auction market elicits the non-hypothetical WTP under different information treatments that is not obtainable in a conventional market.

(2) $surplus_{REG}^{j} = WTP_{REG}^{j} - MP_{REG}^{j}$.

In equations (1) and (2), the bidder's WTP is revealed in the experimental auctions, MP is the price the bidder faces for the product in the marketplace, the superscript j refers to bidder j, and the subscripts ECL and REG refer to the Eclipse and regular versions of cigarettes.[6]

We assume a consumer is facing a decision in a market to purchase either the Eclipse or their regular brand of cigarettes. The product that bidder j purchases is assumed to be the one that gives him/her the higher surplus. Formally, if

$surplus_{ECL}^{j} > surplus_{REG}^{j}$ then $buy\_ECL_{I}^{j} = 1$ and $buy\_REG_{I}^{j} = 0$,

and if $surplus_{REG}^{j} < surplus_{ECL}^{j}$ then $buy\_ECL_{I}^{j} = 0$ and $buy\_REG_{I}^{j} = 1$,

where the subscript *I* refers to the information setting (whether or not the consumer has received countermarketing information). When a bidder purchase the product that gives him/her a higher surplus, we say the get earn a premium of surplus above and beyond the consumer surplus they would gain from purchasing the other product. Those who purchase the Eclipse cigarettes gain a premium of:

(3) $PREMGAIN_{ECL}^{j} = surplus_{ECL}^{j} - surplus_{REG}^{j}$.

Similarly, those who purchase the regular cigarettes after receiving countermarketing information gain:

(4) $PREMGAIN_{REG}^{j} = surplus_{REG}^{j} - surplus_{ECL}^{j}$.

[6] To compute this value of countermarketing information, we need to estimate market prices for cigarettes. Each participant indicated his/her regular brand, and we used 2006 Neilson data from the state in which the cigarettes were sold to estimate prices for the regular brand. For Eclipse cigarettes, we used an estimated price of $3.75. We also used several alternative prices to examine the sensitivity of our results to the assumed price for Eclipse cigarettes, which are available upon request.

Although all bidders enjoy the premium gained by consuming one product instead of another, as shown in expressions (3) and (4), the premium gained represents the increase in welfare (i.e., the value of information) only for those *who switch products*.

We next discuss the method used to estimate the percentage of bidders who change purchases when information is introduced. First, the percentage of bidders who purchase Eclipse products is denoted:

$$(5) \qquad percentbuyECL_I = \frac{\sum_{j} buy\_ECL_K^j}{N}.$$

Equation (5) shows that this number can be represented as the summation across bidders that purchase the Eclipse cigarettes given the information treatment, *I*, divided by the total number of bidders. Therefore, the percentage of bidders who purchase the regular brand of cigarettes version is 1-$percentbuyECL_I$.

Information causes a bidder to switch purchases if his or her surplus for one version (e.g., the regular cigarettes) prior to receiving countermarketing information, but higher consumer surplus for the other version (e.g., the Eclipse cigarettes) after receiving information. The net change in the percentage who purchase regular cigarettes due to the introduction of countermarketing information is the (absolute) difference between the "percentage who purchase Eclipse cigarettes when treated to countermarketing information" and the "percentage who purchase Eclipse cigarettes but do not receive the countermarketing information" given the other information they have received:

$$(6) \qquad Percentswitch^K = \left| percentbuyECL_{Counter} - percentbuyECL_{no-Counter} \right|.$$

In equation (6), the percentage of bidders who switched purchases is estimated as the absolute value of the difference in the percentage that purchase Eclipse cigarettes with and

without countermarekting information. We will estimate the percentage of bidders who switched for two information settings: one where participants have been treated to marketing information and one where they have not. The superscript *K* represents either Eclipse cigarettes or regular cigarettes, depending on which product bidders are switching to.

Who switches purchases once countermarketing information is introduced? Because bidders who receive different information treatments are in distinct experimental sessions, we do not know the specific persons who switch, but we can compute the percentage of the sample that switched after the introduction of countermarketing information. To do this, we assume that the bidders who switch have relative preferences for cigarettes that are uniformly distributed across the population that consumes the good that was abandoned. For example, we assume that bidders who switched to regular cigarettes after receiving countermarketing information had relative valuations of plain-labeled foods that were evenly distributed throughout the population of consumers who purchased the plain-labeled foods before information was introduced. Thus, without countermarketing information, treated and untreated participants have the same behavior.

We now compute the probability of a participant being a "switcher"—one who changes his or her behavior after countermarketing information is introduced:

$$(7) \qquad prob\_switch_{ECL} = \frac{Percentswitch^{ECL}}{percentbuyREG_{no-counter}}.$$

$$(8) \qquad prob\_switch_{REG} = \frac{Percentswitch^{REG}}{percentbuyECL_{no-counter}}.$$

To determine the expected value of countermarketing information to a participant, we multiply his or her premium surplus (PREMGAIN) by the probability that he or she switched products:

$$(9)\quad \begin{aligned} EVperson^{j} &= PREMGAIN^{j}_{ECL} * prob\_switch^{j}_{ECL} \\ &+ PREMGAIN^{j}_{REG} * prob\_switch^{j}_{REG} \end{aligned} .$$

In equation (9), $EVperson^{j}$ is the expected value of information to bidder j.[7] One can also think of this as the average value of countermarketing information across all bidders or participants. It is also important that we compute this value for both initial information treatments: the control treatment (receiving no other information) and the marketing treatment (receiving marketing information).

Next we need the expected value of information to a bidder who switches purchases. This is computed by dividing the expected value of countermarketing information per person by the percentage of bidders who switched purchases:

$$(10)\quad EVswitcher = \frac{EVperson^{j}}{percentswitch}.$$

In equation (10), *EVswitcher* is the average value of countermarketing information *to a bidder who switches* his or her purchase of cigarettes, either to Eclipse cigarettes from regular, or vice versa.[8]

In summary, the experimental auction data collected for this study allow us to calculate the percentage of bidders who switch in each of the information settings: receiving no marketing information and receiving marketing information. We then estimate an expected value of countermarketing information per experiment participant/bidder.

Results

[7] Note that because it is assumed that auction participants consume either Eclipse or regular cigarettes, only one of the two PREMGAIN coefficients will be positive while the other is zero. The PREMGAIN coefficients will also differ across participants.

[8] The SAS code used to estimate the value of information is available from the authors upon request.

Participant bids are presented in table 2.[9] Bids are segregated to show the impact of countermarketing information on bids both when marketing information is not presented and when marketing information is presented to smokers. Recall that each participant bid on both menthol Eclipse and regular (non-menthol) Eclipse cigarettes. We create a variable we call "preferred Eclipse", which simply takes the higher of the two bids. We do this because a participant will normally only purchase either menthol or non-menthol cigarettes, but not both. The higher bid represents the pack of cigarettes the smoker would prefer. Several facts are worth noting. First, participants bid less for the preferred Eclipse brand than for their preferred brand of cigarettes. This seems logical, since participants' preferred brand is the brand they usually smoke. It seems logical that they would have a greater demand for that pack of cigarettes. Second, the countermarketing information appears to decrease mean bids for Eclipse cigarettes, but it also seems to decrease bids for participants' preferred brand of cigarettes.

While examining participant's bids can be instructive, it does not give us information on whether participants gain value from countermarketing information. To determine the value of information, we must compare bids to market prices and estimate the percentage of participants that would switch purchases when presented with countermarketing information. Table 3 presents the results for the percentage of participants that would purchase Eclipse cigarettes under alternative information treatments. When marketing information is absent, there is no statistically significant difference between the percentage of participants that

[9] Recall that we presented participants with two types of marketing and countermarketing information. We present the combined results of the two marketing and countermarketing information sources. The reason is that for the important variables of interest in this paper, comparing the number of people who would switch purchases and the value of information, we did not find a statistically significant differences between the two types of marketing information; nor did we find a statistically significant differences between the two types of countermarketing information.

would purchase Eclipse vs. their regular brand. This is consistent with research that indicates that some smokers are not receptive to countermarketing information presented to them (Nonnemaker, Davis, Farrelly, and Crankshaw, 2008). However, when marketing information is present, we find that 18.6% of participants would purchase Eclipse cigarettes when they are not presented with countermarketing information, while only 11.6% would purchase Eclipse when presented in conjunction with marketing information. Thus, countermarketing information is effective in persuading smokers not to use Eclipse, but only for those smokers who have also been exposed to marketing information.

While table 3 shows us that some participants would switch away from PREP cigarettes when treated to countermarketing information, it does not show the value of countermarketing information. In table 4 we quantify the value of countermarketing information to participants. For those who don't receive marketing information, the value of countermarketing information is essentially worthless. It is worth a nickel per pack for those who switch – although switchers here are *switching to* Eclipse cigarettes. With so few participants switching, however, the average value per smoker/per pack is approximately 1/10 of a penny.

Participants who receive marketing information, however, gain a considerable amount from countermarketing information. Those who switch purchases gain an average value of $1.22 per pack resulting in an average value per smoker/per pack of 8.5 cents. Considering estimates there are billions of packs sold in the US annually, this information has a large value to smokers. If there are additional benefits in that the information may prevent some people who would switch to a perceived "safer" cigarette to instead quit, the annual value could be considerably higher.

Discussion and Conclusion

Accurate information on cigarettes and smoking could have tremendous value to smokers. This is especially true because marketing information by tobacco companies has been very influential over the years, especially as newer products, like light cigarettes, have been introduced. Accurate countermarketing could help inform participants to make the optimal decisions for themselves given their personal preferences. We designed and implemented an experimental auction to assess the value of countermarketing information.

We find that no evidence suggesting that countermarketing information has an effect on smokers behavior when smokers are not presented with marketing information. However, for smokers who are presented with marketing information, we find that countermarketing information has an average value per smoker in society of 8.5 cents per pack, and this value is much larger for the subset of smokers who actually change their smoking behavior because of countermarketing information. Further, since our estimate is only for smokers, our estimates may be an underestimate. If non-smokers were influenced by this type of information, there could be additional value, although this value can't be quantified through auction procedures.

It is important to be cautious in interpreting these results. Some anti-smoking advocates may disagree that countermarketing information could have value if smokers still choose to smoker. However, others would correctly point out that not all countermarketing information is designed to get smokers to quit immediately. Our goal of this study, however, was not to get into that argument, to but to examine the value of accurate countermarketing

information to smokers, given that accurate information should have value in helping smokers make a more informed decision.

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Table 1: Demographic and background information of participants

Table 1. Variables for auction participants-bidders and sample summary statistics (N = 395)

Variable	Definitions	Mean	St. Dev.
Selinsgrove	1 if the subject participated in Selinsgrove, PA	0.35	
Harrisburg	1 if the subject participated in Selinsgrove, PA	0.21	
Laurel	1 if the subject participated in Laurel, MD	0.25	
Allentown	1 if the subject participated in Allentown, PA	0.19	
Gender	1 if female	0.44	0.50
Age	The participant's age	38.6	16.3
White	1 if participant is white	0.79	
Black	1 if participant is black	0.14	
Hispanic/ Latino	1 if the participant is Hispanic or Latino	0.09	
None	1 if the participant received neither marketing nor countermarketing information	.195	
Marketing	1 if the participant received only marketing information	.258	
Counter	1 if the participant received only countermarketing information	.263	
Both	1 if the participant received both marketing and countermarketing information	.284	

Table 2: Smokers bids for cigarettes under alternative information treatments

Part A: Mean and Median bids when marketing information is not given to participants

	Mean bids		**Median Bids**	
	No information (N=77)	Only Countermarketing information (N=104)	No information (N=77)	Only Countermarketing information (N=104)
Eclipse Regular	$2.12	$2.14	$2.25	$2.00
Eclipse Menthol	$2.08	$1.83	$2.00	$2.00
Preferred Eclipse	$2.48	$2.37	$3.00	$2.50
Regular Brand	$3.71	$3.61	$4.00	$3.50
Difference between Preferred Eclipse and Regular Brand	$1.22	$1.23	$1.00	$1.00

Part B: Mean and Median bids when marketing information is given to participants

	Mean bids		**Median Bids**	
	Only Marketing information (N=102)	Both marketing and Countermarketing information (N=112)	Only Marketing information (N=102)	Both marketing and Countermarketing information (N=112)
Eclipse Regular	$1.82	$1.82	$2.00	$2.00
Eclipse Menthol	$1.77	$1.51	$2.00	$1.50
Preferred Eclipse	$2.25	$2.09	$2.28	$2.00
Regular Brand	$3.47	$3.23	$3.62	$3.55
Difference between Preferred Eclipse and Regular Brand	$1.22	$1.19	$1.00	$1.00

Table 3: Percentage who would buy Eclipse cigarettes with and without countermarketing information

		% who would buy Eclipse cigarettes	% who would switch away from Eclipse cigarettes
The impact of information when no marketing information is presented (N=181)	No information	10.4%	-2.1%
	Received countermarketing Information	12.5%	
The impact of countermarketing information when marketing information is presented (N=214)	Marketing Only	18.6%	7%*
	Both Marketing and Counter	11.6%	

* Statistically significant at the 10% level using a Wilcoxon Signed Rank test
** Statistically significant at the 5% level using a Wilcoxon Signed Rank test
*** Statistically significant at the 1% level using a Wilcoxon Signed Rank test

Table 4: Value of Countermarketing Information to Smokers

	Value to a smoker who switches	Average value of information to all smokers
The value of information when no marketing information is presented	$0.05***	$0.001***
The value of countermarketing information when marketing information is presented	$1.22***	$0.085***

** Statistically significant at the 10% level using a Wilcoxon Signed Rank test
** Statistically significant at the 5% level using a Wilcoxon Signed Rank test
*** Statistically significant at the 1% level using a Wilcoxon Signed Rank test

Steps in the experiment

Step 1

Participant signs consent form and receives packet

Step 2

BDM auction mechanism is explained

Step 3

Practice auctions with candy bars

Step 4

Only Countermarketing information

Only marketing information

Both marketing and countermarketing information

Step 5

Real Auctions with the three cigarettes

Step 6

Determine which product is auctioned, whether participant won, and the price.

Step 7

Participants filled out a short questionnaire and were paid

Appendix 1: Information given to participants.

Marketing Information

Version A

Extensive analysis of Eclipse shows that the smoke it creates contains far less of many of the compounds that have been linked to the risk of cancer and associated with certain other smoking-related illnesses.

Version B

Eclipse is for smokers who have decided not to quit but who are interested in a cigarette that responds to concerns about certain smoking-related illnesses, including cancer. For many smokers, it may well be a better way to smoke.

Countermarketing Information

Version A

Scientific studies show that smoke from Eclipse contains at least as many chemicals linked to the risk of cancer and other smoking-related illnesses as regular cigarettes.

Version B

The best choice for smokers who are worried about their health is to quit. Smokers of Eclipse cigarettes are still using tobacco and are not reducing their risk of smoking-related illnesses, including cancer. For all smokers, it is better to stop smoking completely.