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Eco-Premium or Eco-Penalty? Eco-Labels and Quality in the Organic Wine Market

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Abstract

Eco-labels emphasize information disclosure as a tool to induce environmentally friendly behaviors by both firms and consumers. The goal of eco-labels is to reduce information asymmetry between producers and consumers over the environmental attributes of a product or service. However, by focusing on this information asymmetry, rather than on how the label meets consumer needs, eco-labels may send irrelevant, confusing, or even detrimental messages to consumers. In this article, the authors investigate how the environmental signal of eco-labels interacts with product characteristics such as brand, quality, and price. In a discrete choice experiment, the authors examine consumer response to two similar eco-labels for wine, one associated with a quality reduction and the other not. The results show that respondents preferred both eco-labeled wines over otherwise identical conventional counterparts when the price was lower and the wine was from a lower quality region. However, they preferred conventional, more expensive wine from a high-quality region. This preference indicates that respondents not only obtain some warm glow value from eco-labeled wine but also possibly interpret eco-labeling as a signal of lower quality. This relationship held across both types of eco-labels, meaning that consumers did not understand the difference between

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them. This research contributes to the literature on information disclosure policies by highlighting important elements for effective eco-labels. These elements include consumer awareness and understanding of the eco-label, and consumer willingness to pay for an eco-labeled product. The results emphasize the need to create eco-labels that communicate clearly both the environmental attributes and the private benefits associated with them.

Keywords
green marketing, organic wine, eco-label, eco-premium, differentiation strategy

Eco-labels are part of a new wave of environmental policies that emphasize information disclosure as a tool to induce environmentally friendly behaviors by both firms and consumers (Dietz & Stern, 2002). The goal of eco-labels is to reduce the information asymmetry between producers and consumers about the environmental attributes of a good (Crespi & Marette, 2005; Leire & Thidell, 2005). Prominent examples of eco-labels include the U.S. Department of Agriculture (USDA) organic label for agricultural products, the Energy Star label for energy appliances, and the Forest Sustainable Stewardship label for lumber. The number of eco-labels programs on the market has proliferated from a mere dozen worldwide in the 1990s to more than 450 programs today.[1] The corresponding market for eco-labeled products has grown significantly in value over the same time period, with products such as organic fruit and vegetables capturing 12% of the U.S. market in 2010 (Organic Trade Association, 2011). However, not all eco-labels are successful. While some may thrive, many also flop. For example, after devoting considerable resources to certifying many of their products with United Kingdom's Carbon Trust label, the British supermarket chain Tesco dropped the process citing prohibitively high costs and minimal consumer recognition.[2]

Eco-labels are often developed by government agencies and non-governmental organizations distinct from firms that produce and sell the eco-product. This third-party certification lends credibility to the eco-labels (D'Souza, Taghian, Lamb, & Peretiatko, 2006; Leire & Thidell, 2005; Nilsson, Tunçer, & Thidell, 2004), but may result in eco-labels that do not meet the needs of consumers (de Boer, 2003; Rex & Baumann, 2007; Stern, 1999). This effect might stem from the difference in the informational goals of producers and labelers. Producers wish to use information over environmental attributes to match their products to the needs of consumers (Peattie, 2001), whereas the

third parties who actually issue the labels aim to close the information asymmetry between producers and consumers (de Boer, 2003; Rex & Baumann, 2007; Stern, 1999). Although these two goals may sometimes align and create increased demand for eco-labeled products (Bjorner, Hansen, & Russell, 2004; Teisl, Roe, & Hicks, 2002), this alignment is not always the case. Many studies have found that consumers are unsure of the extra value that the eco-label presents (Nilsson et al., 2004; Yiridoe, Bonti-Ankomah, & Martin, 2005), are confused by different eco-labels (Bhaskaran, Polonsky, Cary, & Fernandez, 2006; Leire & Thidell, 2005), do not match the eco-label to environmental problems (Teisl et al., 2004; Van Amstel, Driessen, & Glasbergen, 2008), and associate the eco-label with negative product attributes (Delmas & Grant, 2014; Rivera, 2002).

This article investigates consumer responses to two different eco-labels in the wine market to understand the interaction between the signal sent by the eco-label and other product attributes such as quality and price. The U.S. wine market is particularly suited for this type of investigation due to both institutional and product characteristics. Institutionally, the government agency responsible for food-related eco-labels,[3] the USDA, has created two very similar organic eco-labels, one of which is legitimately associated with product quality concerns and one that is not. Moreover, wine is a differentiated product with a variety of characteristics that may interact with or cancel out the signal that the eco-label sends.

To conduct the research, tools developed and commonly used in the marketing literature were used to extend our current understanding of information disclosure policies. The authors run a discrete choice experiment over eco-labeled and non-eco-labeled wine to investigate circumstances where eco-labels may send insufficient or undesired information to consumers. In this study, 830 participants from across the United States made a series of choices, where they selected between hypothetically purchasing one of four graphical representations of wine bottles, or nothing. This method allowed us to randomly vary wine attributes, price and eco-label, thereby revealing the full range of consumer preferences, rather than the subset circumscribed by the existing market choices. This discrete choice exercise was combined with a survey that allowed us to link attitudes, demographics, and behavior to wine choices. The results show that consumers prefer eco-labeled wine at lower prices, but prefer non-eco-labeled wine at higher prices. As price acts as a signal of quality in the wine industry (Lockshin, Jarvis, d'Hauteville, & Perrouty, 2006; Mtimet & Albisu, 2006), it can be inferred that consumers interpret eco-labels as a signal of lower quality. This price penalty on eco-labeled wine at high prices persisted even when another signal of quality—region—was added. Finally, of the two different eco-labels, the label with a

clear, concise message about environmental attributes is preferred even though it is associated with product quality concerns. This article contributes to the growing literature on information disclosure as an environmental policy tool, by showing that publicly disclosing eco-attributes may not be sufficient to overcome the information asymmetry over these attributes between producers and consumers. In addition, our findings present a valuable lesson for policy makers who utilize and frame information disclosure policies, as well as the industry participants who wish to use them.

Because eco-labeled products are often associated with a price premium due to the additional cost associated with the environmental and social improvements of the products, consumers need to be willing to pay for this premium for the eco-label to thrive. Focusing purely on information asymmetries will not necessarily create eco-labels that align eco-products with the needs of consumers. Customer knowledge development has been shown as an essential marketing tool for managers (Joshi & Sharma, 2004), and government organizations need to work with producers and marketers to ensure that eco-labels provide information that clearly communicates their value to consumers.

Information Policies

Information disclosure policies are increasingly gaining prominence as a "new tool" in environmental management policies (Dietz & Stern, 2002). These policies augment or replace government regulation by publicly providing information that will presumably assist more cost-effective private and legal forces (Delmas, Montes-Sancho, & Shimshack, 2010). Environmental information disclosure policies can be instituted at either the firm, product, or consumer level. Firm-level information policies normally entail voluntary or mandatory disclosure policies (Delmas et al., 2010). Common examples include the toxics release inventory, lead paint disclosures, drinking water quality notices, and the International Standards Organization's voluntary ISO 14001 program. Empirical research into corporate disclosure has yielded mixed results. Jin and Leslie (2003) found that mandatory hygiene cards positively affected restaurant quality and health outcomes, while Delmas et al. (2010) found that mandatory disclosure over utility electricity generation mixes resulted in an increase in cleaner fuels. However, Lyon and Kim (2011) found that firms participating in the Department of Energy's Voluntary Greenhouse Gas Registry engaged in "green-washing" by selectively reporting emission reductions when overall firm emissions were increasing.

Information polices at the consumer level entail providing better information over the unobservable environmental impact of a consumer's behavior

(Asensio & Delmas, 2015; Delmas & Lessem, 2014). This information can be feedback about their *own* behavior, social norms over aggregate behavior, or publicly disclosed information about a specific individual's behavior. In a number of studies in the electricity industry, improved feedback over an individual's own electricity usage has been shown to reduce electricity consumption by 7% on average, although some studies report finding no or perverse effects (Delmas, Fischlein, & Asensio, 2013). Information over social norms has been shown to be effective at inducing conservation in a number of settings, including recycling (Schultz, 1999), towel reuse (Goldstein, Cialdini, & Griskevicius, 2008), litter reduction (Cialdini, Reno, & Kallgren, 1990), water conservation (Ferraro & Price, 2013), and energy conservation (Allcott, 2011; Costa & Kahn, 2013; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007).

Eco-labels are the prime example of a product-level information policy. The aim of eco-labels is to reduce the information asymmetry between producers and consumers that arises as consumers are not present during the production of the product and therefore cannot assess its environmental qualities. Attributes such as environmental quality, which cannot be verified before or after purchase, are called credence attributes (Darby & Karni, 1973). Credible eco-labels transform credence attributes into search attributes, where search attributes, such as color, size, or price, can be identified by consumers prior to purchase (Nelson, 1970; Sammer & Wüstenhagen, 2006). The term *eco-label* commonly refers to a producer's right to use a symbol or a phrase on their product labels, after passing a voluntary third-party environmental certification (Leire & Thidell, 2005; Rex & Baumann 2007). The International Standards Office (ISO) gives a broader description of eco-labels, classifying them as either mandatory or voluntary, with voluntary split into three types. The commonly used eco-label definition above would be categorized as Type I, whereas Type II are self-declared environmental claims, and Type III are quantified environmental claims, usually having to do with the life cycle impact of the product.

The primary question that has occupied researchers over eco-labels is whether consumers value eco-production and actually use it as a search attribute in purchasing products. Teisl et al. (2002) found a premium for dolphin safe tuna using U.S. supermarket scanner data, although identification is not clear as there is no cross-sectional variation in certification. Looking at apparel catalogs, Nimon and Beghin (1999) found an eco-label premium for organic cotton clothing but not for low-impact dyes. Using a panel of weekly shopping data for Scandinavian consumers, Bjorner et al. (2004) found that the Nordic Swan eco-label increased the probability of purchase for toilet paper and paper towels but not detergents. In a study of eco-labeled hotels in

Costa Rica, Rivera (2002) found that eco-labels generated a price premium for the top-rated eco-hotels (based on a green leaf rating), but generated an eco-penalty for hotels with lower eco-ratings compared with uncertified hotels. In a discrete choice experiment, Sammer and Wüstenhagen (2006) found that Swiss consumers are willing to pay more for better energy efficiency ratings on washing machines. Delmas and Grant (2014) showed a price premium for eco-certified wines (where certification was unknown to consumers), but an eco-penalty for eco-labeled wines in the United States.

This literature does not provide a clear picture of the characteristics of eco-labels associated with price premiums. In examining the effectiveness of eco-labels, it has focused mostly on single eco-labels and has not been able to compare various attributes of similar labels in the same industry. One exception is Mueller, Loose and Remaud (2013) who compare several eco-labels in the wine industry and find a small but positive premium for organic certification as compared with several hypothetical labels indicating corporate social responsibility (CSR). However, they did not study how the signal of eco-labels interacts with product characteristics such as brand, quality, or price. As argued, it is important to study these interactions because they might affect negatively the appeal of the label to consumers and have been under studied in the literature.

This article studies consumer preferences for two different wine eco-labels with different product characteristics, including brand or quality, and price. It uses a discrete choice exercise (choice-based conjoint [CBC]) developed in marketing research. This methodology allows the respondent to express preferences by choosing from sets of concepts, rather than by rating or ranking them. The choice-based task is similar to what buyers actually do in the marketplace. It can use verbal presentation, paragraph description, and graphically pleasing presentation of a real-life setting. The collection and analysis of the real-life situations is conjoint analysis's advantage over traditional survey systems.

Hypotheses

In this section, hypotheses regarding the elements for a successful eco-label are developed. These hypotheses include consumer willingness to pay for an eco-labeled product, and consumer awareness and understanding of the eco-label. Our approach focuses exclusively on how the eco-label is perceived by consumers and how such consumers might respond to the information provided in eco-labels to make purchasing decisions. We believe that this marketing approach is vital to explain the success or failure of eco-labels. First, because eco-labeled products are often associated with a price premium due

to the additional cost associated with the environmental and social improvements of the products, consumers must be willing to pay for this premium for the eco-label to thrive. This willingness to pay might be higher for altruistic consumers, or when eco-labels are associated with other attractive product attributes such as quality. Second, the signal sent by the eco-label needs to be recognized and understood to effectively reduce the information asymmetry between producers and consumers regarding the environmental attributes of the product and effectively prompt green consumers to choose eco-labeled products. We argue that the validation of these two essential elements of eco-labels can help managers evaluate the efficacy of eco-labeling options.

Altruistic Consumers

Green products have been defined as "impure public goods" because they yield both public and private benefits (Cornes & Sandler, 1996; Ferraro, Uchida, & Conrad, 2005; Kotchen, 2006). They consist of a private good, such as the pleasure of drinking wine, jointly produced with a public good, like biodiversity protection due to organic farming. Eco-labels may appeal to the altruistic values of environmentally aware consumers who would like to promote sustainable production. Altruistic customers may want to purchase eco-labeled products as a substitute for donations to an environmental organization (Kotchen, 2005). Altruistic consumers who care about the environment may receive a good feeling or "warm glow" from engaging in environmentally friendly activities that contribute to this public good (Andreoni, 1990). Such warm glow altruism has been shown to be a significant motivator of eco-consumption among environmentally minded consumers (Clarke, Kotchen, & Moore, 2003; Kotchen & Moore, 2007; Kahn & Vaughn, 2009), with green consumption acting as a substitute for donations to environmental organizations (Kotchen, 2005). The authors, therefore, hypothesize the following:

> **Hypothesis 1:** Consumers who are more environmentally minded will prefer eco-labeled to non-eco-labeled goods.

Private Benefits and Eco-Labels

Such altruistic customers might, however, only represent a very small percentage of the consumer population. Indeed, research shows that truly altruistic, "true blue green" customers represent only 9% of the population (The Roper Organization, 1990). Emerging research indicates that consumers are more likely to purchase green products if the certified practices provide them

additional private benefits. The environment is a public good that is non-excludable and non-rival in consumption. This definition means that consumption of the good by one individual does not reduce the amount of the good available for consumption by others. So it is often the most rational strategy for private actors to enjoy the public good without contributing to its production. The public good nature of green products raises the question of whether consumers are willing to pay for it, and if so how much.

Magnusson, Arvola, Koivisto Hursti, Aberg, and Sjoden (2001) found that the most important purchase criteria for organic products were related to private benefits (i.e., quality) rather than the environmental attributes. The private benefits include criteria such as "taste better" and "longer shelf-life." Similarly, highly energy-efficient light-emitting diode (LED) lighting has many advantages over traditional light sources. According to the U.S. Department of Energy, some of these advantages include compact size, increased lifetime (longer than even compact fluorescent bulbs), and greater dimming and control capability.[4]

Another private benefit commonly associated with green products is their health attributes. Many consumers presume not only that organic foods taste better, but that they also provide greater health benefits than their conventionally grown counterparts (Huang, 1996; Huang & Lin, 2007; Jolly & Norris, 1991). Cows that produce milk certified by the USDA as organic, for example, are not exposed to the carcinogenic hormones, antibiotics, and pesticides of conventional dairy practices.[5] Several other studies showed that health concerns were a major reason, along with environmental concerns, why people choose organic food products (Davies, Titterington, & Cochrane, 1995; Tregear, Dent, & McGregor, 1994; Wandel & Bugge, 1997).

It is important to note that the effect of quality on consumer willingness to pay can be a double-edged sword as it is also possible that consumer associated the attribute of the eco-label with a lower quality of the product. This has been shown in the case for recycled paper where consumer associated the recycling process with lower quality products (Mobley, Painter, Untch, & Rao Unnava, 1995). Recycled potable water is another example where consumers perceive that the quality of the water is deteriorated during the recycling process even when scientific tests attest to the contrary (Dolnicar & Saunders, 2005). In addition, because of some of the early generations of eco-labeled products were associated with lower quality products, some consumers might still associate eco-labels with lower quality and be reluctant to purchase them (Galarraga Gallastegui, 2002; Peattie & Crane, 2005). If consumers not perceive that by choosing eco-labeled products they must experience a trade-off between environmental attributes and other attractive product attributes such as quality, they might not be willing to pay a price premium

for the eco-labeled product. However, if eco-labeled products are perceived to be enhancing the provided benefits of the products, such as health or an increase in product quality, consumers will be willing to pay a premium for such products. Based on this discussion, the authors propose the following competing hypotheses:

Hypothesis 2a: Consumers will prefer eco-labeled products at lower price points.
Hypothesis 2b: Consumers will prefer eco-labeled products at higher price points.

In addition to the specific product characteristics associated with the eco-labeling process that might influence consumers' willingness to pay for the product, it is possible that there are some other quality signals, such as those associated with the brand of the company, that reinforce or interact negatively with the eco-label. These interactions could go either way—quality signals could carry enough credibility to override any concerns about the quality of eco-labeled products, or eco-labels may weaken other quality signals by increasing noise and diluting signal strength. For example if a product is perceived to be of lower quality because of the addition of recycled components, such perceptions might be improved by attaching a famous brand name to the product (Mobley et al., 1995). In that case, brand name could act as a quality cue that compensates for other shortcomings associated with the eco-label. However, the negative perception associated with the eco-labeling process might pollute the positive quality associated with the brand and drive consumers away from these products. The authors, therefore, propose the following hypotheses:

Hypothesis 3a: Higher quality product or brand attributes will enhance the preference for eco-labels.
Hypothesis 3b: Higher quality product or brand attributes will reduce the preference for eco-labels.

Eco-Label Understanding

Furthermore, if the signal sent by the eco-label is not well understood by consumers, this might hamper the successful adoption of the eco-label. Eco-labels are a tool for conveying information (Anderson & Hansen, 2004) to reduce the information search cost related to this environmental or social impact (Teisl et al., 2002). If the eco-label successfully reduces the information and search cost, then consumers need to be aware of the eco-label and

understand it. Consumer awareness indicates to what extent consumers know of the program's existence (Banerjee & Solomon, 2003). Understanding indicates "how thoroughly a consumer can interpret the connection between the environmental issue, the label's meaning, and actions needed to elicit results" (Banerjee & Solomon, 2003, p. 109). Although consumer awareness is a necessary first step, it must also be coupled with the ability of consumers to understand the environmental information conveyed by each label. There is some evidence that the profusion of eco-labels creates some confusion among customers over eco-label's goals, credibility, and expected benefits, which inherently will have an impact on eco-label's success and adoption (Leire & Thidell, 2005). Buyers and consumers are often unsure about the social and environmental benefits of the label (Harbaugh, Maxwell, & Roussillon, 2011). This confusion can inhibit the benefits that the eco-labels strive to achieve. Eco-labels should be simple to facilitate consumer awareness and understanding and foster eco-product adoption. This simplicity is particularly important for consumers with little knowledge about the eco-label. Consumers who are better informed about the environmental attributes of the eco-label should be better able to appreciate understand its message and appreciate the value of the underlying attribute. However, if the eco-product is associated with compromised quality, increased knowledge about the good's eco-attributes might decrease its attractiveness. The impact of eco-label knowledge on the choice of eco-product will be, therefore, positive or negative depending on the attributes of the eco-label. Consequently, the authors hypothesize the following:

Hypothesis 4: Uninformed consumers will prefer eco-labels with messages that are simple and easy to understand.

Empirical Context: Eco-Labels in the Wine Market

These hypotheses were tested by conducting an online discrete choice experiment, to examine consumer response to two similar eco-labels for wine, one associated with quality reduction and the other not. U.S. eco-labels in the wine market provide an excellent setting to test our hypotheses because of the existence of several relatively similar eco-labels that are still not well recognized and understood by consumers, and also because of the uncertainty regarding the relationship between such eco-labels and private benefits such as quality (Delmas & Grant, 2014).

Two of these labels are issued by the USDA and follow the U.S. National Organic Farming Standard, which prohibits the use of additives or alterations to the natural seed or plant, including, but not limited to, pesticides,

chemicals, or genetic modification.[6] The first of the USDA standards, "wine made from organically grown grapes," applies only to the production of the grapes, whereas the second, "organic wine," includes prescriptions for the wine production process. In particular, organic wine is prohibited from using sulfites in the wine-making process. As sulfites help preserve the wine, stabilize the flavor, and eliminate unusual odors, wine produced without added sulfites may be of lower quality (Waterhouse, 2012). Such quality concerns are most pertinent for red wines, which are usually kept for longer periods before consumption than white wines. This potential quality issue does not apply to wine made with organic grapes, which may add sulfites in the production process. Other wine eco-labels include the internationally administered "biodynamic" label and a variety of regional eco-labels, such as the "Lodi Rules" label.

To obtain the eco-label certification, wineries have to bear the cost of certification to the eco-label, and of the operational changes associated with the improved performance (Delmas & Gergaud, 2014). Studies have shown that these additional costs range between 15% and 30% for organic wine certification (Weber, Klonsky, & De Moura, 2005).

Although eco-labeled wines provide a public good by engaging in environmentally friendly production practices that reduce the environmental degradation associated with conventional wine production (Warner, 2007),[7] the private benefits associated with such wines are less clear. Wine made from organic grapes is free from pesticides and other potentially harmful toxins, while organic wines do not add sulfites in production. Sulfites have long been associated with various health problems such as asthma (Valley & Thompson, 2001) and nasal blockages (M. Anderson, Cervin-Hoberg, & Greiff, 2009), and are also incorrectly blamed for causing wine-induced headaches (Waterhouse, 2012). Research has shown that consumers do view organic foods as healthier than conventional products (Loureiro, McCluskey, & Mittelhammer, 2001; Miles & Frewer, 2001; Yiridoe et al., 2005), although they may perceive there to be fewer health benefits from processed products that contain alcohol (Forbes, Cullen, Cohen, Wratten, & Fountain, 2011).

Although eco-labeled wine may deliver some health advantages, consumers may perceive its main effect on the private aspect of consumption to be a reduction in quality. Quality concerns may arise for a number of reasons. First, organic wine, which is made without added sulfites, may indeed be of a lower quality than conventionally produced wine. This quality problem may incorrectly spillover to consumer perceptions of wine made from organic grapes if consumers are unaware of the distinctions between the two labels. The results of the survey of 830 respondents show that although most are familiar with the concept of eco-labeled wines, 67% were unaware of the

difference between the two labels. Quality concerns may also exist because early generations of eco-labeled wines, like many other eco-labeled products, were often experimental products, made by marginal producers and hence of variable quality (Galarraga Gallastegui, 2002; Peattie & Crane, 2005). This poor quality reputation may persist in the minds of consumer.

Method

To examine consumer preferences over eco-labels and other quality signals, an online discrete choice exercise was run, also known as a Choice-Based Conjoint or CBC exercise. CBC is a useful analytic technique for evincing consumer preferences in that it mirrors real-world choices as closely as possible, while still allowing the experimenter to randomize across prices and product attributes in a way that is not possible with real-world data. It also allows the experimenter to examine only those product attributes most relevant to the study. In a study specific to the wine industry, Mueller, Lockshin, Saltman, and Blanford (2010) found that visual cues from a CBC exercise better captured consumer preferences than a verbal survey. In our discrete choice exercise, consumers were shown images of four different wine bottle labels and asked to choose between them. They also had the option of choosing not to purchase any of the bottles on display, making the exercise more realistic (Louviere, Hensher, & Swait, 2000). Similar experiments on wine choice had variously examined the influence of medals (Lockshin et al., 2006), region of designation (Mtimet & Albisu, 2006), back-label information (Mueller, Lockshin, Saltman, & Blanford, 2010), and hypothetical CSR and eco-labels (Mueller Loose & Remaud, 2013). In addition to the CBC exercise, respondents completed a survey that included demographic and attitudinal questions.

Wine Labels and Wine Attributes

Wine labels are important in the wine purchase decision as the majority of wine purchases are unplanned, with consumers unaware of the quality difference between wines (Bombrun & Sumner, 2003; Chaney, 2000). Moreover, expert reviews that reveal wine quality are typically only available for the minority of wines at the top end of the price spectrum.[8] It was decided to focus our analysis on Californian wines produced for the U.S. market. The United States is the largest wine-consuming market in the world with retail sales totaling US$36.3 billion in 2013 (Wine Institute, 2014). Californian wines dominate the U.S. wine market, accounting for 90% of U.S. production and 60% of U.S. wine sales (Wine Institute, 2012). The U.S. wine market is

an ideal backdrop to investigate the potentially negative effect of eco-labels, owing to potential quality concerns over eco-labeled wine and confusion over wine eco-labels.

Each wine bottle label in the choice set had five attributes: brand name, varietal, eco-label, price, and region. The objective was to simulate the product choices that consumers would face in a brick and mortar or online store, including choosing between several competing brands. However, to avoid the conflating impacts of consumer knowledge and perceptions over the existing brands, fictitious brands were created by selecting names from a list of popular French last names. Four different brands were used: Chesnier, Challoner, Rutherfields, and Louis Devere, none of which corresponded to existing wineries. To simplify the analysis, all bottles were of the same varietal—cabernet sauvignon. In 2012, cabernet sauvignon was the most widely planted Californian red wine grape (Wine Institute, 2013). A red wine was specifically chosen to accentuate any potential eco-label quality concerns, as explained in section "Empirical Context: Eco-Labels in the Wine Market". The visual style of the bottle label was also standardized as several studies have shown that label illustrations and styles matter for purchase intent (Boudreaux & Palmer, 2007; Mueller & Szolnoki, 2010). To represent eco-labeling, wine labels either had "Organic Wine" or "Made With Organic Grapes." Bottles representing conventional wines did not have such labels.

Four price levels were chosen, ranging from US$8 to US$29 at discrete US$7 intervals.[9] This range was chosen after a brief survey of the wine buying behavior of University of California, Los Angeles (UCLA) Anderson Business School faculty and students, and is higher than the US$8 average selling price of a Californian wine in the United States. A number of empirical wine demand studies have found that price acts as a signal of quality. Hedonic wine studies have found that quality, as assessed by professional wine reviewers, is a positive predictor of wine price (Bombrun & Sumner, 2003; Delmas & Grant, 2014; Landon & Smith, 1998). In the study of wine choice in restaurants, where consumers were most likely unaware of wine quality, Durham, Pardoe, and Vega (2004) found that demand increased with price for part of the price range. This relationship was even after controlling for whether a wine was the lowest priced in its respective category. Similar results were obtained in discrete choice experiments by Lockshin et al. (2006) and Mtimet and Albisu (2006).

To represent wine "brands," two Californian wine regions were used: the prestigious and well-known Napa Valley and the lesser known and less-prestigious Lodi. Region of origin (also known as appellation) has been shown to be a significant predictor of wine quality (Benjamin & Podolny, 1999). Of our two regions, Napa is known as a higher quality producer and is the most

famous location of wine production outside of Europe (Warner, 2007). Napa offers an ideal mixture of climate and soil conditions to produce a variety of premium varietals and is the oldest wine producing region in California (Warner, 2007). Lodi is less well known than Napa and has only been producing premium quality varietals for the last 20 years (Warner, 2007).

Implementation

Each experiment participant completed seven online discrete choice tasks and answered an online survey. The survey questions followed the discrete choice exercise, so as to not bias the discrete choice responses. As survey questions were focused on the existing behaviors rather than attitudes, we feel it unlikely that participation in the discrete choice exercise caused bias in our survey results.

Recruitment

Potential participants were asked to take part in an online survey related to wine preferences. Flyers advertising the survey were placed in several wine stores across the greater Los Angeles area and advertisements were placed on Facebook wine interest groups with membership totaling almost 100,000 people. Multiple emails were sent by both the authors and an undergraduate research team to professional and social contacts and wine blogs, with 4,845 people directly contacted. These primary contacts were asked to forward the survey to secondary contacts, although quantifiable information on the success of this strategy was not available to the authors. To motivate participation, a case of high-quality wine was offered as a prize to a randomly drawn participant. Respondents were unable to take the survey more than once and only adults 21 years and older (the legal drinking age in the United States) were allowed to take the survey. The survey was taken by 1,142 participants and after removing foreign and incomplete entries, 883 valid responses remained.[10] Although the majority of responses were centered in Los Angeles County (57%) and California (82%), the remaining respondents were drawn from 31 other U.S. states.

As could be expected given the recruitment methodology, the experiment sample was overrepresented by students relative to the general California population. This overrepresentation is shown in Table 1. This overrepresentation results in a lower average age for the sample than the population. The experiment sample is also more educated and has higher incomes than the general population. This income-education bias is possibly alleviated somewhat in that the true wine buying population of California is possibly

Table 1. Descriptive Statistics.

	Sample population				California 2000 census, age ≥ 21	
	M	*SD*	Minimum	Maximum	*M*	*SD*
Male[a]	0.524		0	1	0.486	
Age	37.039	12.773	23	75	45.938	16.970
Current student[a]	0.427		0	1	0.093	
College graduate[a]	0.375		0	1	0.234	
Graduate or professional degree[a]	0.478		0	1	0.088	
Income (US$ thousands)	90.431	64.729	0	200	67.659	69.824
Drinks wine at least once a week[a]	0.652		0	1		
Average US$ spent on wine bottle	10.883	9.117	0	40		
Organic percentage of purchases	0.323	0.312	0	1		
Informed about eco-labeled wine[a]	0.327		0	1		
Heard about eco-labeled wine[a]	0.814		0	1		
Tasted eco-labeled wine[a]	0.529		0	1		
Member of environmental organization[a]	0.210		0	1		
League of conservative voters score	161.817	18.426	43	200	104.080[b]	54.520[b]
n		883			1,150,934	

[a]Dummy variable.
[b]National average. The score for California was 160.

wealthier and better educated than the population average. Some support for this is given by a 2009 Gallup poll that showed that a small majority of college graduates preferred wine over beer, whereas the vast majority of those who did not attend college preferred beer to wine (Gallup, 2009).[11] Lockshin et al. (2006) reported similar results for Australia. It is not clear to what extent sample bias may be a problem, as our results are driven by relative preferences (which are ordinal) rather than any cardinal measure, such as willingness to pay. For example, if our sample is wealthier and more educated than

the general U.S. population (although as we pointed out, this may not hold true for the wine drinking population), then the turning points on price may come at lower prices. Or if our sample is more environmentally minded (young, wealthy, Californian), this orientation will shift the price–response curves down for eco-labeled goods. Neither effect will change the shape of the curves, just their position in space, which will not materially affect our key results. Because our respondents were voluntary participants, it is possible that they responded to the invitation to fill out the survey because of their interest in wine. In other words, it is possible that our respondents were more knowledgeable about the wine production process and the existing eco-labels in that industry than the general population. However, as observed, knowledge about wine eco-labels was very limited with only 33% of the respondents with some knowledge about eco-labeled wine. Given that the focus of the research was on eco-labeled wine, it is not clear if self-selection bias does exist and if so, in what direction it goes.

Respondents report that, on average, they purchase organic products one of every three trips to the grocery store, with 36% of respondents purchasing organic products on at least half of store visits. Similarly, about 20% of the sample report being members of an environmental organization. While we are unable to find reliable statistics on environmental organization membership for the U.S. or California populations, the U.S. Bureau of Labor Statistics (2011) reported that the percentage of people who performed unpaid volunteer activities in 2010 represented 26.3% of the population. Even though more people are likely to belong to an environmental organization than contribute to environmental volunteer activities (lower cost), this is indicative that our sample is more environmentally focused than the U.S. population at large. Given the nature of the sample, which includes young students, this is to be expected. However, even though respondents are probably more environmentally friendly or "greener" than average, it should be noted that green consumerism is an increasingly important trend in the developed world. According to the Organization for Economic Co-Operation and Development (OECD; 2005), "27% of consumers in OECD countries can be labeled 'green consumers' due to their strong willingness-to-pay and strong environmental activism." In the United States, retail sales of organic foods increased from US$3.8 billion in 1997 to US$26.6 billion in 2010 (Organic Trade Association, 2011). As an additional measure of environmentalism, each respondent was linked to his or her state of residence's League of Conservation Voters (LCV) environmental rating for 2010. The LCV environmental rating is compiled by scoring how each state's elected representatives vote on a host of important environmental issues and has been used as a measure of the environmental sentiment of the people of a state (Delmas & Montes-Sancho, 2010, 2011).[12]

Figure 1. Wine Choice Tasks.

Discrete Choice Exercise

Experiment participants were initially asked to complete seven choice tasks. In each choice task, the respondent was asked to imagine that he or she was attending a seated dinner party with family and friends and needed to choose a bottle of wine to bring along for the occasion. "A seated dinner" was selected rather than "a party" because of the expectation that this convivial setting would prompt respondents to think about their own preferences but also those of others. Respondents were then presented with images of four different bottles of wine, each with a different price. The images were truncated to set focus on the wine bottle labels. Subjects were asked to choose which bottle of wine they would purchase, with the option of choosing to purchase none of them. Respondents selected their preferred option by clicking on it. An example of a choice task is shown in Figure 1.

Increasing the number of choice tasks faced would have helped to better identify interactions between wine attributes. However, this would have come at the cost of greater attrition, especially as the respondents were unpaid volunteers. Instead, four different versions of the survey were offered, each with its own seven choice tasks and unique attribute combinations. This approach has the same effect as increasing the number of choice tasks (after controlling for individual attributes).

Each bottle of wine had one level of each of the five attributes. The levels of the attributes were randomized across the 28 different choice tasks (4×7) using Sawtooth Software's Choice-Based Conjoint Software. An algorithm was used to ensure that each level of each attribute appeared an equal number of times

Table 2. Attribute Frequency in Choice Set.

Product attribute	Proportional frequency in choice set	Proportional frequency in selected bottle
Price		
8	.2	.265
15	.2	.354
22	.2	.189
29	.2	.096
Brand name		
Rutherfields	.2	.229
Chesnier	.2	.227
Challoner	.2	.224
Louis Devere	.2	.226
Region		
Napa	.4	.607
Lodi	.4	.298
Eco-characteristics		
Eco-label[a]	.4	.480
No eco-label	.4	.425
Organic	.2	.242
Organic grapes	.2	.238
Buy none	.2	.095

[a]Eco-label includes organic and made with organic grapes.

across all surveys, but did not repeat in the wine bottles within each choice task. This approach was done to make sure that the respondent did not see the same level (e.g., the same price) across all the choices in one task. To ensure that the choice set was not dominated by eco-label wines, the number of non-eco-labeled wines was doubled. Thus, every choice set had one organic wine, one made with organic grapes wine, and two non-eco-labeled wines. Table 2 shows each of the attribute levels and its display and selection frequency.

In our discrete choice exercise, fictitious wine brands were used, so that our results would not be conflated by the existing consumer brand beliefs. These fictitious wine brands, as expected, did not affect significantly the choice of a wine bottle. Table 2 shows no significant difference in the frequency of selecting a bottle by brand name.

Econometric Specification

Each subject was given seven discrete choice tasks to complete ($C \in [1 \ldots 7]$). In each task, the subject was asked to choose between hypothetically

purchasing one of four different bottles of wine and buying none of them. Each bottle of wine is represented by a vector of attributes W_j^C, $j \in [0 \ldots 4]$, where $j = 0$ indicates the none option. No bottles of wine were repeated for a given consumer. The ordering of the discrete choice tasks was randomized across consumers, although within a given choice task the four bottles always appear in the same order (which resulted from an initial randomization).

Individual attributes were obtained from the survey and are represented by vector $\mathbf{X}_i$, $i \in [1 \ldots N]$. The interaction between subject and product attributes is $Z_{ij}^C = vec[W_j^{C'} \mathbf{X}_i]'$. The outcome variable, y_{ij}^C, is a dummy variable indicating whether the bottle was purchased or not.

The utility subject *i* gets from bottle *j* is as follows:

$$U_{ij} = \mathbf{X}_i B_X' + W_j^C B_W' + Z_{ij}^C B_Z' + \varepsilon_{ij}^C = V_{ij}^{C,V} + \varepsilon_{ij}^C, \tag{1}$$

where ε_{ij}^C is an individual-specific taste shock. If we assume that within choice C, $\tilde{\varepsilon}_{ikj}^C$[1] is i.i.d. (independent and identically distributed) and distributed extreme value type 1, we get the familiar logit equation:

$$\Pr\left(y_{ij}^C = 1\right) = \frac{\exp\left(V_{ij}^C\right)}{\sum_{k=0}^{4} \exp\left(V_{ik}^C\right)}. \tag{2}$$

To account for repeated choice tasks by each subject, we clustered standard errors at the subject level.

Results

Preferences Over Eco-Labeled Wine

Table 3 shows preferences for eco-labeled and non-eco-labeled wines. To this end, organic wine and wine made from organic grapes are grouped together. All comparisons are with respect to a non-eco-labeled wine from Lodi, priced at US$8.[13]

Model 1 examines whether consumers have an absolute preference for eco-labeled over non-eco-labeled wines, where this preference does not vary with other wine characteristics (Hypothesis 1). Consumers are slightly more likely to purchase eco-labeled wine (2.4% points), but this difference

[1]Where $\tilde{\varepsilon}_{ikj}^C = \varepsilon_{ik}^C - \varepsilon_{ij}^C$ is the difference in individual-specific taste shocks between bottle j and bottle k.

Table 3. Conditional Logistic Choice Model Representing Choices Between Four Wines and Buy Nothing.

	(1)	(2)	(3)	(4)	(5)
Eco-label	0.0244**	0.0985	0.146***	0.215**	
	(0.0114)	(0.108)	(0.0157)	(0.102)	
Napa	0.175***	0.184***	0.214***	0.222***	0.224***
	(0.00881)	(0.00913)	(0.0120)	(0.0123)	(0.0123)
Price = 15	0.0729***	0.0786***	0.0697***	0.0754***	0.0733***
	(0.0134)	(0.0140)	(0.0128)	(0.0135)	(0.0135)
Price = 22	−0.0831***	−0.0830***	−0.000594	−0.000608	−0.00163
	(0.0171)	(0.0176)	(0.0189)	(0.0196)	(0.0195)
Price = 29	−0.242***	−0.250***	−0.167***	−0.176***	−0.179***
	(0.0170)	(0.0169)	(0.0212)	(0.0214)	(0.0215)
Eco-label × P high[a]			−0.171***	−0.172***	
			(0.0185)	(0.0188)	
Eco-label × Napa			−0.106***	−0.104***	
			(0.0202)	(0.0204)	
Organic					0.258**
					(0.101)
Made with organic grapes					0.157
					(0.107)
Organic ×P high					−0.174***
					(0.0221)
Made with organic grapes × P high					−0.158***
					(0.0235)
Organic × Napa					−0.0799***
					(0.0246)
Made with organic grapes × Napa					−0.135***
					(0.0225)
Individual characteristics	N	Y	N	Y	Y
Significant individual characteristics effect on eco-label					
College graduate		−0.0635*		−0.0628*	No difference[b]
		(0.0336)		(0.0337)	
Graduate degree		−0.118***		−0.118***	No difference[b]
		(0.0334)		(0.0339)	
Income (thousands)		−0.000818***		−0.000803***	No difference[b]
		(0.000203)		(0.000201)	

(continued)

Table 3. (continued)

	(1)	(2)	(3)	(4)	(5)
Drinks wine frequently		−0.0767*** (0.0270)		−0.0772*** (0.0270)	No difference[b]
Spends on wine		−0.00573*** (0.00138)		−0.00563*** (0.00136)	No difference[b]
Proportion organic		.412*** (0.0421)		.405*** (0.0415)	No difference[b]
Environmental organization		0.0927*** (0.0271)		0.0900*** (0.0260)	
Organic × Environmental organization		0.0927*** (0.0271)		0.0900*** (0.0260)	0.112*** (0.0279)
Made with organic grapes × Environmental organization		0.0927*** (0.0271)		0.0900*** (0.0260)	0.0685** (0.0289)
Observations	6,181	6,181	6,181	6,181	6,181

Note. Half of the wines had eco-labels (with these split equally between organic and made with organic grapes), while price, label name, and region varied randomly across choices. All coefficients below are marginal effects and are calculated with respect to the base case of a non-eco-labeled, US$8 wine from Lodi. Robust standard errors reported in parentheses. Errors clustered by individual. Marginal effects reported. Omitted variables: eco-label: age, male, spends nothing, informed, heard, tasted, LCV score, income missing, LCV missing. Buy none: constant and full set of individual characteristics. Product characteristics: Rutherfields, Challoner, Louis Devere. LCV = League of Conservation Voters.

[a]P high = 1 (Price = 22 or Price = 29).

[b]No statistical difference between coefficients on organic and made with organic grapes.

*Significant at 10%. **Significant at 5%. ***Significant at 1%.

disappears in Model 2, when individual-level controls are included. Only those respondents who buy a high proportion of organic already and/or who are members of environmental organizations prefer eco-labeled over non-eco-labeled wine. This is illustrated graphically in Figure 2, which shows the predicted probability of purchase if a consumer was offered a choice from among all of the bottles of wine in each graph. Note that the probabilities do not sum to 100% because of the option of choosing to purchase none of the wines. Both Models 1 and 2 show that consumers prefer wine from Napa and wine priced at US$15. Interestingly, those respondents who are wealthier, better educated, spend more on wine, and drink wine frequently are less likely to choose eco-labeled wines.

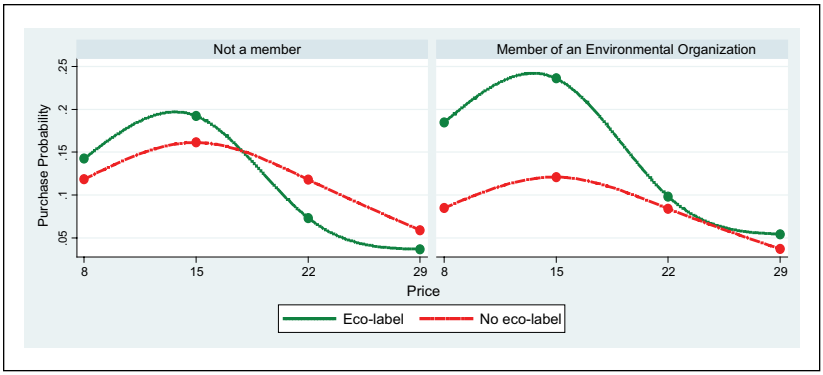

Figure 2. Absolute Preference over Eco-labeled versus Non-eco-labeled Wine (Table 3, Model 2).

Note. The fitted curves are non-linear interpolations over discrete price points. Each discrete price point shows the predicted probability that a consumer would buy that particular bottle of wine if offered a selection of all eight wines in the graph. Purchase probabilities do not sum to 100% because of the option of choosing not to purchase a bottle of wine.

In Model 3, the eco-label is interacted with other quality signals to see whether the preference for eco-labeled products decreases with other quality signals (Hypotheses 2 and 3). The eco-label is interacted with a dummy for a higher price (price = 22 or price = 29) and a dummy for Napa. Model 3 shows that consumers are 14.6% more likely to buy an eco-labeled than non-eco-labeled wine, when the price is lower and the wine is from Lodi. However, when the price is higher and the wine comes from Napa, this relative preference reverses, with consumers being 13.1% more likely to buy a *non*-eco-labeled wine over an eco-labeled wine. The same results hold with the inclusion of individual characteristics in Model 4. All of the individual characteristics have the same sign and magnitude as in Model 2. The price penalty of eco-labels is illustrated graphically in Figure 3.

These results indicate that respondents obtain some warm glow value from eco-labeled wine, but may also interpret it as a signal of lower quality. If respondents made no inferences over wine quality, they would always prefer an eco-labeled wine over an otherwise identical non-eco-labeled wine, regardless of other attributes. Instead, the results show that preferences over eco-labeled wine vary with these other attributes. One interpretation of the data is that when respondents have already inferred that a wine is lower quality from price and other attributes, then the additional lower quality signal from the eco-label is unimportant, and respondents receive just the warm glow of eco-consumption. However, as price and other quality signals increase, the

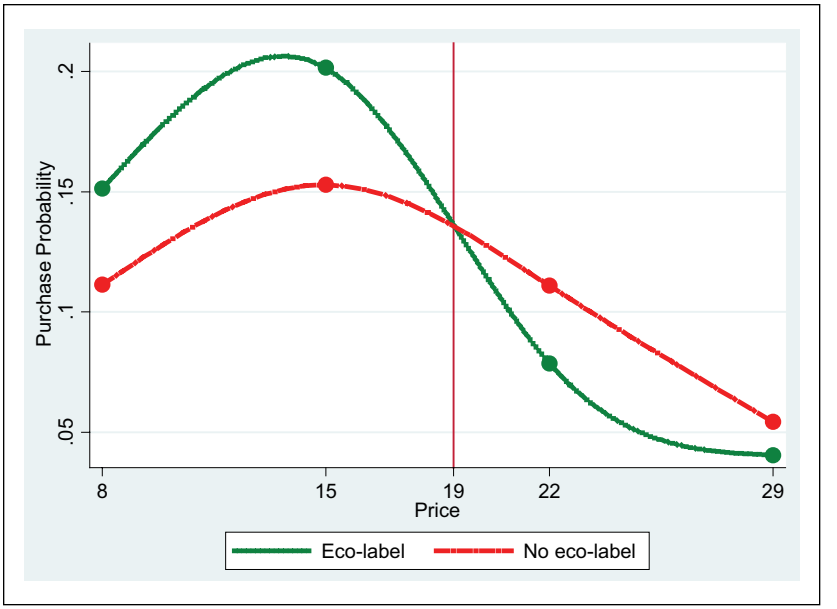

Figure 3. Relative Preference over Eco-labeled versus Non-eco-labeled wine (Table 3, Model 4).
Note. The fitted curves are non-linear interpolations over discrete price points. Each discrete price point shows the predicted probability that a consumer would buy that particular bottle of wine if offered a selection of all eight wines in the graph. Purchase probabilities do not sum to 100% because of the option of choosing not to purchase a bottle of wine.

eco-label quality signal becomes more pertinent and outweighs the warm glow of eco-consumption, shifting preferences toward non-eco-labeled wine. A similar but alternative argument is that as the wine's price increases, the quality signal becomes relatively more important. At the same time, consumer uncertainty over the production costs of eco-labeled wine means that they are less certain about what this signal actually means. The increased price could result from the increased quality or the higher costs of environmentally friendly production. Risk-averse consumers will therefore avoid this uncertainty with wines that are higher priced. In this explanation, the eco-label is not seen as inferior, but instead increases the uncertainty of the price signal.

Reputation and Brand Name

Because brand names may be a strong quality signal that can overcome the quality trade-off that eco-labels present, effects of wine region were introduced.

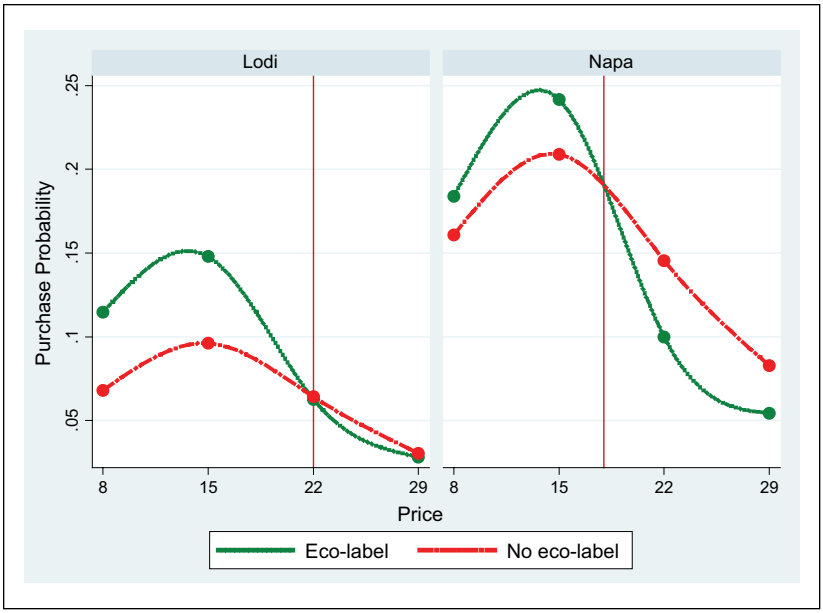

Figure 4. Relative Preference over Eco-labeled versus Non-eco-labeled Wine by Region (Table 3, Model 4).

Note. The fitted curves are non-linear interpolations over discrete price points. Each discrete price point shows the predicted probability that a consumer would buy that particular bottle of wine if offered a selection of all eight wines in the graph. Purchase probabilities do not sum to 100% because of the option of choosing not to purchase a bottle of wine.

Wine regions can act as a meta-brand for wines, signifying common quality levels for all producers (Benjamin & Podolny, 1999). If a quality brand were sufficient to overcome quality concerns for eco-labeled wines, then we would expect the interaction between brand and eco-label to be weakly positive. However, the interaction between the meta-brand Napa and eco-labels in Table 3 shows a negative coefficient, implying that the higher quality signal given by region is insufficient to override the lower quality signal given by eco-label. Relative demand by region is displayed graphically in Figure 4.

Individual winemakers seem to be aware of this relationship, with a number of higher quality wine makers producing eco-certified wine, without labeling it as such (Delmas & Grant, 2014). For example, the Fetzer winery in Napa Valley, one of the early pioneers in growing grapes organically in the United States, decided in 1992 to develop a separate name brand "Bonterra" for their line of wines made with organically grown grapes rather than use the Fetzer brand for these wines.

Clarity and Quality Across Eco-Label Types

Model 5 displays consumer preferences over the two different USDA eco-labels: "Organic" and "Made With Organic Grapes." The "Organic" label more clearly communicates its environmental attribute and may be preferred by consumers as it is simpler (Hypothesis 4). However, organic wine also undergoes a different production process than non-organic wine, which may result in inferior quality. The same is not true for wine made with organic grapes. Thus, consumers may prefer wine made with organically grown grapes over organic wine. Again, comparisons are made with respect to a non-eco-labeled wine from Lodi, priced at US$8. The regression specification is the same as that of Model 4, except that the two eco-labels are identified separately. As the coefficients on individual characteristics are specific to each eco-label, we only show those coefficients that are both significant and significantly different from each other for the organic and made with organic grapes eco-label. The results show that consumers prefer the organic eco-label over the made with organic grapes eco-label at lower prices, while they are both equally disliked at higher prices. This relationship is illustrated graphically in Figure 5.

One possible explanation is that the "Organic" label communicates a clearer message and is easier to relate to environmental objectives than the more obscure "Made With Organic Grapes." This conjecture is supported by the fact that members of environmental organizations prefer organic wine to wine made with organic grapes. No other significant individual characteristics are significantly different for the two eco-label types.

We had hypothesized that consumers would prefer wines made with organic grapes to organic wines because of quality concerns associated with the latter. Surprisingly, we found that informed consumers, who know the difference between the two eco-labels, were indifferent between them on average.[14] To test whether consumers informed about the difference between the two labels had different preferences for these wines at different price points, we estimated separate coefficients for the eco-label price penalty for those who are informed of the difference and those who are not.[15] The results are portrayed in Figure 6. They indicate that those who are informed of these eco-labels value the two eco-labels equally at lower price points. Those who are not informed prefer organic wine at lower price points. More importantly, informed consumers do place a price penalty on organic wine, but no price penalty on wine made from organic grapes.[16] At higher price points, they consider wine made with organically grown grapes identical to conventional wine and prefer it to organic wine.

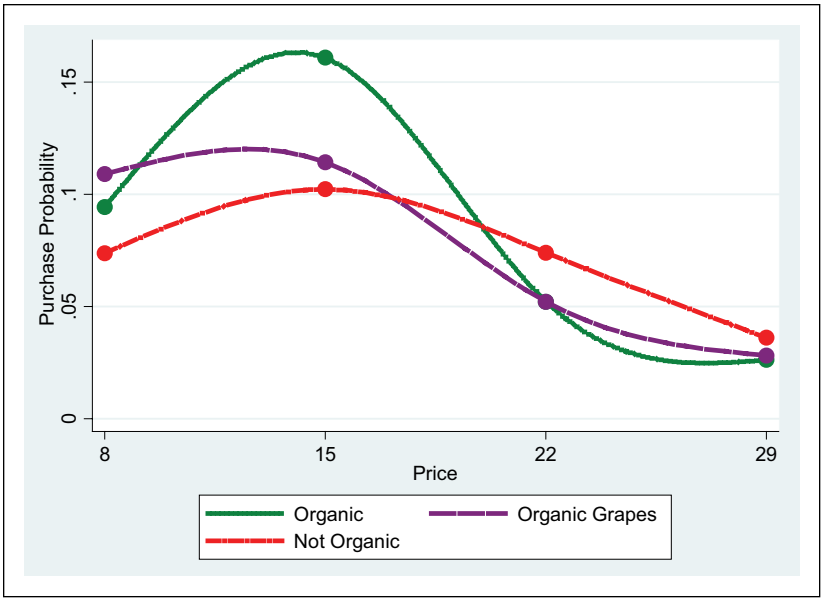

Figure 5. Relative Preference over Eco-label (Table 3, Model 5).
Note. The fitted curves are non-linear interpolations over discrete price points. Each discrete price point shows the predicted probability that a consumer would buy that particular bottle of wine if offered a selection of all 12 wines in the graph. Purchase probabilities do not sum to 100% because of the option of choosing not to purchase a bottle of wine.

These results can signify that consumers who know that wine made with organic grapes is produced in the same fashion as conventional wine do not put a quality penalty on wine made with organic grapes. Interestingly, while some wine makers argue that organic grapes are of higher quality and produce higher quality wine, these consumers do not place an absolute premium on this wine. However, consumers who are unaware of this difference tend to treat organic wine and wine made with organic grapes similarly, imposing a perceived quality penalty on both.

Discussion

The focus of the study was to examine the choices that consumers actually make (as far as this could be stimulated), rather than that which they think they would make. The results are consistent with a quality-price trade-off for eco-labels. However, conjectures about consumer perceptions of quality or their experiences of warm glow from eco-labels were not directly tested.

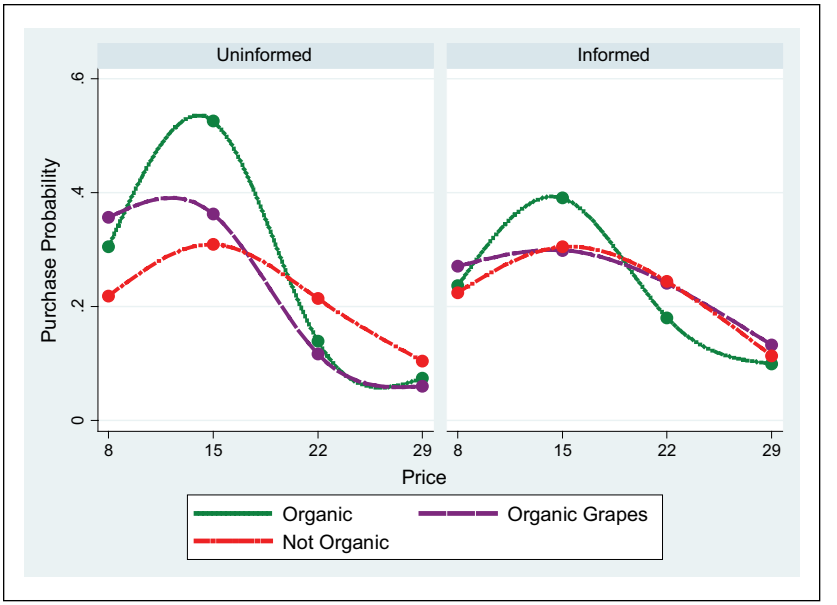

Figure 6. Relative Preference over Eco-label.
Note. The fitted curves are non-linear interpolations over discrete price points.

Further investigation into consumer perceptions over the quality of eco-labeled wines is warranted, as well as how these perceptions vary with prices.

One limitation of the study's construction is that the wine labels are limited to four attributes. This limitation allows us to study interactions between attributes, but may overemphasize the importance of attributes like the eco-label. Studies by Gao and Schroeder (2009) and Islam, Louviere, and Burke (2007) showed that willingness to pay for a particular attribute varies with the total number of attributes. By excluding potentially relevant attributes, some of the key impacts may be overstated or understated, depending on the relationship between the omitted and included attributes. Potentially important label attributes that may not be accounted for are label images, color, and back-label information (Mueller & Szolnoki, 2010; Mueller Loose & Szolnoki, 2012). It is not immediately apparent how these would interact with our attributes of interest. It should also be noted that two different colors of label were included (blue and yellow alternatively), which were included to make it easier for respondents to distinguish between the four wine choices. Results show that respondents preferred the blue wine label, but its inclusion in the regressions has no effect on any of our variables of interest. As this was

completely randomly distributed with respect to the other attributes, it was excluded from the regression analysis.

Apart from potentially missing label attributes, the way that the decision choice was framed may also influence the impacts estimated from wine attributes. The respondents were presented with a scenario where they had to choose a bottle of wine for a seated dinner. It is possible that consumers would have different attitudes to eco-labeled wine in a private consumption scenario. One could imagine two competing hypotheses. First, consumption in a public setting means that the consumers get to conspicuously display their "green bona fides" leading to an increase in the probability of purchasing an eco-labeled wine over that in a private setting. Second, consumption in a public setting means that the consumer is more concerned about the quality signal that the wine sends out to others, resulting in a lower probability of purchase of eco-labeled wine in the public setting. These hypotheses are worthy of future research.

Conclusion

Eco-labels are a type of information disclosure policy that is used as a policy tool to provide consumers with otherwise unavailable information on a product's environmental/sustainability characteristics. By filling these information gaps, socially and environmentally aware consumers can make informed purchasing decisions that help the planet.

Eco-labels are often developed by government agencies and non-governmental organizations, which are separate to the industries that produce and sell the eco-product. The goal of these agencies is to reduce the information asymmetry between producers and consumers over the environmental attributes of a good. If an eco-label is effective, it will command a premium among environmentally minded consumers and thus allow manufacturers to recoup the additional costs of cleaner manufacturing practices. However, by focusing on the information asymmetry between producers and consumers, rather than how the label meets consumer needs, agencies may develop eco-labels that send an irrelevant, confusing, or detrimental message to consumers. Whereas some labels achieve widespread recognition, credibility, and demand, others are associated with greenwashing, confusion, and compromised product quality.

The authors' research contributes to the literature on information disclosure policies by highlighting the potential interactions between product attributes and the environmental signal associated with the label. We hypothesized that consumer understanding and awareness as well as willingness to pay were important conditions for successful eco-labels. Furthermore, we

argued that product and consumer characteristics might interact with the signal of the label whether enhancing or diminishing its appeal. For example, while green consumers might receive a "warm glow" from eco-consumption, they might also view the eco-label as a signal of lower quality, therefore limiting their willingness to pay a premium for such an eco-labeled product.

We tested this possibility empirically with an online discrete choice experiment focused on choices over eco-labeled wines. This methodology is widely used in the marketing literature, as it allows for the research to create realistic choices between simulated products. In the United States, there are two government-certified eco-labels for wine. One label is associated with potentially lower quality production techniques, whereas the other is not. The majority of the 830 participants in our experiment were unaware of the difference between these two labels. We found that respondents preferred eco-labeled wines over otherwise identical counterparts, when the price was lower and the wine was from a lower quality region. However, these relative preferences were reversed if the wine was expensive and from a higher quality region. These results indicate that respondents not only obtain some warm glow value from eco-labeled wine but also possibly interpret it as a signal of lower quality. If respondents made no inferences over wine quality, they would always prefer an eco-labeled wine over an otherwise identical non-eco-labeled wine, regardless of other attributes. One interpretation of these results is that when respondents have already inferred that a wine is lower quality from price and other attributes, then the additional lower quality signals from the eco-label are unimportant, and respondents receive just the warm glow of eco-consumption. However, as price and other quality signals increase, the eco-labels quality signal becomes more pertinent and outweighs the warm glow of eco-consumption, shifting preferences toward non-eco-labeled wine. This eco-quality penalty holds for both types of eco-labels, even though it should only apply to the eco-label associated with quality concerns.

By ignoring potential quality signals from eco-labels, the market for eco-labeled wine has been severely limited. Government-certified eco-labeled grapes constituted just 4% of the overall grapes produced in the United States in 2011 (USDA, 2013). This lack of market penetration combined with consumer confusion has opened up the door to a number of other unregulated eco-labels, which may be less green than government-certified eco-labels. These eco-labels may create further confusion and erode credibility in the eco-wine market.

The lessons from the wine industry and for other eco-labeling initiatives are clear. An eco-label premium is essential for an eco-industry to sustainably

exist. Thus, any eco-labeling initiative needs to ensure that it will deliver such premiums. Focusing purely on information asymmetries will not necessarily create eco-labels that align eco-products with the needs of consumers. Instead, eco-label organizations need to work with producers and marketers to ensure that eco-labels provide information that clearly communicates their value proposition to consumers, without creating further confusion, or additional unintended product signals.

Several elements that are important to design effective eco-labels were identified. These include consumer awareness and understanding of the eco-label and consumer willingness to pay for an eco-labeled product. It was argued that consumers will prefer eco-labels with messages that are simple, easy to understand, and relate the product to their core values. Although this argument seems an obvious requirement, the development of competing labels has created enough confusion in the mind of consumers to potentially hinder the adoption of these information policies. Second, it was argued that consumers are more likely to purchase green products if the certified practices provide them with additional private benefits. If the number of true green consumers who would support eco-labels consistently is limited, managers of eco-labels who would like to increase market adoption should consider mixing the public good (environmental of social benefit of the program) with some private benefits such as increased quality of the product or health benefits.

As the number of eco-labels grows rapidly, the problems of competing/confusing eco-labels present in the wine industry may become more pervasive in other contexts. It is unclear whether eco-labels reinforce each other in "greening" the food market, or whether the existence of competing eco-labels creates confusion that discredit eco-labels as a whole. More research is needed in this direction. One of the challenges associated with the study of the empirical effectiveness of information disclosure programs lies in the difficulty to understand the exact attributes that consumers value in eco-labels and to disentangle them from the attributes of the product carrying the eco-label. For example, if eco- or organic-labeled products gain market share, it is difficult to establish whether consumers are expressing preferences for environmental improvement or whether they perceive other differences in product quality (like health, safety, and taste). Are consumers valuing the public good related to green products (i.e., reduce environmental impact) or only the private benefit associated with these products (improved health or quality of the product)? Again, more research is needed along these lines.

Although scholars in the management literature have recognized the importance of market pressures as a driver of the adoption of innovative environmental management practices by firms, there remains very limited research in management about how information about green practices can be

used by firms to influence consumers. Firms can use eco-labels to achieve economic goals by, for example, differentiating their products, mitigating regulatory scrutiny, and gaining access to lucrative green procurement practices. Adoption of eco-labels has, thus, also become an important strategic consideration for managers. We have demonstrated that tools developed in marketing can be helpful to management researchers to understand how consumers respond to information about green practices. Further research should investigate how firm can strategically use eco-labels and develop a framework to evaluate the efficacy of labeling options. In particular, researchers and marketing/policy practitioners need to focus on how to retain the credibility that comes from third-party certification, while ensuring that eco-labels meet the marketing objectives of firms.

Because credibility of eco-labels is a public good (owing to consumer confusion between similar labels), the whole system may be undermined by labels that do not deliver on their promises. More specifically, one should be mindful of the risks of "greenwashing" associated with the strategic use of eco-labels. Greenwashing is the act of misleading consumers regarding the environmental practices of a company (firm-level greenwashing) or the environmental benefits of a product or service (product-level greenwashing). With limited consumer understanding about the differences between the various eco-labels, firms have the incentive to stamp products with their own supposed eco-labels or with logos similar to existing third-party eco-labels and to engage in greenwashing (Delmas & Burbano, 2011). In this article, we put the emphasis on message clarity and consumer willingness to pay, but credibility of the eco-labeling process is also important to facilitate consumer confidence in eco-labels and their purchase of green products as greenwashing can have profound negative effects on consumer confidence in green products. Firms should choose eco-labels that are accepted by stakeholders, transparent, non-deceptive, free from conflicts or interests and based on a reliable assessment.

The authors hope this research can be helpful to help policy makers design more effective eco-labels and managers choose those that are most likely to be chosen by consumers. Smart eco-label design and choice will help take us back to our (green) roots of informing customers about the eco-attributes of the products they consume.

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Notes

1. www.ecolabelindex.com
2. http://www.thegrocer.co.uk/companies/supermarkets/tesco/frustrated-tesco-ditches-eco-labels/225502.article
3. The U.S. Food and Drug Administration (FDA) is also highly involved in food labeling, particularly when these pertain to health.
4. http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/led_advantage.pdf
5. http://www.organicfacts.net/organic-animal-products/organic-milk/health-benefits-of-organic-milk.html
6. The U.S. National Organic Standards law was passed in 2001. Regulations require organic products and operations to be certified by a U.S. Department of Agriculture (USDA)–accredited entity to assure consumers that products marketed as organic meet consistent, uniform minimum standards.
7. Some of the environmental impact of wine production include groundwater depletion, water pollution, effluent run-off, toxicity of pesticides, fungicides and herbicides, habitat destruction, and loss of natural biodiversity (Warner, 2007).
8. Delmas and Grant (2014) found that the average selling price of a Californian wine reviewed by the *Wine Spectator*, was US$35, far above the average U.S. selling price of a California wine at US$8.
9. Discrete price levels were used partly to make our study similar to other discrete wine choice experiments (Lockshin, Jarvis, d'Hauteville, & Perrouty, 2006; Mtimet & Albisu, 2006; Mueller, Lockshin, Saltman, & Blanford, 2010) and partly because we had to generate the graphical label images ourselves and this was easier with a discrete set of prices.
10. Foreign respondents were removed as it is uncertain what the dollar purchase prices mean to them.
11. The same Gallup poll reported that 65% of Americans consumed *some* alcoholic beverage in the past week, which is comparable with the 65% of our sample who report drinking wine at least once a week.
12. Each year, the League of Conservation Voters (LCV) selects environmental issues that constitute the environmental agenda with a panel comprising the main U.S. environmental groups. The organization then creates an index by counting the number of times that each representative or senator in Congress votes in favor of the "environmental agenda" (e.g., against logging in national forests or for proper mining waste disposal). The index ranges from 0 to 100, with

100 representing a record of voting with the environmental agenda in all cases (Delmas & Montes-Sancho, 2010, 2011).

13. This benchmark is to illustrate the incremental probability of purchase due to higher prices, the more prestigious region (Napa) and the eco-labels, compared with the lower price, less-prestigious region (Lodi) and no eco-label. The option of choosing none is included in the econometric estimation and implicitly included in these comparisons.
14. This result is not shown in the regression table as neither of the coefficients on informed for organic wines and wines made with organic grapes are statistically significant. Moreover, the two coefficients are not significantly different from each other.
15. Results are available upon request from the authors. The specification with these three interactions was conducted without individual controls as the inclusion of individual controls resulted in unstable coefficients.
16. These coefficients are significantly different from each other (Prob > χ^2 = .0374).

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