Food Quality and Preference 41 (2015) 1–11

Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

Relative importance of price in forming individuals' decisions toward sustainable food: A calibrated auction-conjoint experiment

Jessica Avitia [a], Montserrat Costa-Font [a,*], José M. Gil [a], Jayson L. Lusk [b]

[a] Centre de Recerca en Economia i Desenvolupament Agroalimentari (CREDA-UPC-IRTA), C/Esteve Terrades, 8, 08860 Castelldefels, Barcelona, Spain
[b] Department of Agricultural Economics, Oklahoma State University, United States

ARTICLE INFO

Article history:
Received 13 April 2014
Received in revised form 28 October 2014
Accepted 29 October 2014
Available online 8 November 2014

Keywords:
Calibrated Auction-Conjoint Valuation
Willingness-to-pay
Sustainable farming
Apples

ABSTRACT

This paper explores the importance of pricing information in dealing with sustainable food preferences. It employs the Calibrated Auction-Conjoint Valuation Method (CACM), by comparing non-adjusted values from a self-explicated (hypothetical) conjoint method to the final calibrated values entered into an adjusted (real) auction. We found consumers significantly reduced their WTP when moving from the initial stage of the CACM (hypothetical self-explicated conjoint method) to the final stage (real auction), primarily by placing more importance on product prices, implying that WTP values from a self-explicated conjoint method used alone would likely lead to overstated estimates of WTP.

Introduction

During the last century European agriculture has intensified its production practices, which are partially financed by the European Common Agricultural Policy (CAP) (Gardner, 1992, 2002; Rude, 2001). This strategy responds to technological development incentives and profit maximization policies among other reasons, implying greater focus on continuous farming systems, increasing the use of farm inputs as well as irrigated lands or employing highly productive varieties. As a result, yields have been increased with some environmental side effects such as contamination of surface and ground water and loss of biodiversity due to the reduction of natural habitats, among other costs. These externalities arising from the intensification of conventional agriculture did have important effects on human health, animal welfare, and especially on the environment.

The growing interests of European consumers in the environmental effects of conventional agriculture have raised interest in sustainability (Chen, 2007). Consequently, consumers are increasing their interest in alternative farming practices such as organic agriculture, placing sustainable agriculture as an interesting alternative for consumption (Chen, 2007). Consumer preferences for sustainability are related to how the goods are produced and how consumers value pollution emissions, use of chemical fertilizers, etc. (Hamilton & Zilberman, 2006).

Sustainable agriculture is often described as a food production system that causes less degradation of the ecological system compared to conventional production systems (Quenum, 2010). There are two main sustainable farming production systems: integrated (IF) and organic farming (OF). See Table 1 for a summary of the main differences between conventional farming, IF and OF.

Worldwide land devoted to OF has experienced a growth during the last decade. In 2003, worldwide land devoted to organic agriculture was estimated at 23 million ha (Yussefi & Willer, 2003). In 2006, nearly 31 million ha were devoted to OF (Willer & Yussefi, 2006). More recently, Willer and Yussefi (2014) reported that worldwide about 37.5 million ha were devoted to OF in 2012, which constitutes approximately 0.9% of global agricultural land. In contrast, no international reliable data on IF is available since is not considered by any international or European regulation; therefore each member state has its own regulation, resulting in consequent differences among countries.

The geographical areas with larger amounts of land allocated to OF in 2012 were Oceania, Europe and Latin America. Within Europe, Spain is the country with a higher number of hectares allocated to OF (Willer & Yussefi, 2014). Moreover, it is the 6th largest area of organic agricultural land in the world. In 2012, Spain had 1.6 million ha devoted to organic farming (78% was qualified as organic farming, 8% was qualified as "in conversion" to organic farming and the remaining 14% were qualified as "in the first year

* Corresponding author. Tel.: +32 935521206.
E-mail address: montserrat.costa-font@upc.edu (M. Costa-Font).

http://dx.doi.org/10.1016/j.foodqual.2014.10.008
0950-3293/

of practices") (MAGRAMA, 2013a). In Spain there are just 803,408 ha of IF (MAGRAMA, 2013b). Therefore, there are few products in Spain produced simultaneously under Conventional OF and IF. One of these is apples, covering 7% of Spanish total integrated area.

World production of apples, according to FAO statistics, achieved 76.3 million tons in 2012. China leads the world's apple production (48%), followed by the United States (5.4%), Turkey (3.8%), Poland (3.8%), India (2.8%) and Italy (2.6%). Only about 10.7% of world apple production is traded on international markets, and is controlled by six export countries: China, Poland, Italy, the United States, Chile and France (WAPA, n.d.). Spain takes the 15th place with 128.281 tons of exported apples. Consumption of apples in Spain is 590.89 million kg, from which 557.26 million kg were consumed at home, that is about 12 kg of apples per person (Martín, 2011).

For the purpose of this research, we compare conventional, integrated and organic apple production systems to determine consumers' evaluations of, and WTP for, agro-ecosystems preservation. During the past decade, results from hypothetical valuation methods have been criticized because of the observation that consumers tend to overstate their WTP as compared to what happens in experiments with real economic incentives (e.g., List & Gallet, 2001). One of the most popular valuation methods is conjoint analysis (Green & Rao, 1971). However, conjoint methods typically do not offer immediate financial consequences. Another interesting method is the discrete choice method, widely used in previous research (Ding, Grewal, & Liechty, 2005; Janssen & Hamm, 2012; Louviere & Street, 2000; Lusk & Schroeder, 2004). Discrete choice does allow a financial estimation but is often limited in the number of attributes that can be feasibly studied.

This study reports on an attempt to overcome both of these weaknesses of traditional valuation methods in an application involving a complex, multi-attribute good: agro ecosystem preservation. The present study utilized the Calibrated Auction-Conjoint Valuation Method (CACM) introduced by Norwood and Lusk (2011) to determine both consumer preferences for sustainable farming (organic and integrated versus conventional) and to understand the relative importance of price in forming individuals' decisions on sustainable food. Moreover, in addition to linking the auction bids with the conjoint rating to investigate consumer preferences for sustainable farming, we compare the non-adjusted values (obtained from the hypothetical self-explicated conjoint method) to the final calibrated values entered into an auction to explore the internal consistency of people's behaviors and the relevance of the price attribute versus agro-ecosystems' preservation in the market for apples. This has not been done previously by Norwood and Lusk (2011) and therefore is a contribution of the present study to the literature. Therefore, the paper contribution deals with both empirical findings on consumers' behavior toward sustainable produced food and method testing.

The next section outlines the background. Data and experiment implementation section is devoted to the description of the data and experiment implementation. The results section reports the results. Conclusion section contains the concluding remarks.

Background

Incentive-compatible elicitation mechanisms can be categorized into two general categories: experimental auctions and non-hypothetical discrete choice experiments (Corrigan, Dinah, Rodolfo, Ximing, & Tiffany, 2009; Lusk & Schroeder, 2004; Lusk & Shogren, 2007). Experimental auctions are defined as a market institution for determining prices and assigning goods. Auctions try to simulate a real purchasing situation where real products are offered to participants, who make the decision to purchase, allowing for exchanging real money. The set of rules established in the auction determines, according to the bids presented by the participants, who the winner of the auctioned good is and what is the price to be paid. In this way, the participant may incur real costs if (s)he deviates from their equilibrium strategy (Lusk & Hudson, 2004).

One of the main advantages of experimental auctions is that they place subjects in an active market environment where they can learn and adjust to market conditions. Moreover, bids provide researchers an explicit estimate for each participant's WTP without the need to estimate an econometric model.

Experimental auctions have become a rather popular elicitation method. Lusk and Shogren (2007) already referred to over 100 academic studies that had utilized experimental auctions to examine consumers' valuation of different products. Applications of experimental auctions in food products have been focused on the valuation of food safety and health attributes (e.g., Dickinson & Bailey, 2002; Fox, Hayes, & Shogren, 2002; Shaw, Nayga, & Silva, 2006); or on the willingness to pay for new food products (e.g., Alfnes, 2007; Kassardjian, Gamble, Gunson, & Jaeger, 2005; Rousu, Monchuk, Shogren, & Kosa, 2005). Most of this literature is focused on ex-ante decisions, that is, when consumers are evaluating alternative purchasing choices. However, more recently, authors have used experimental auctions to evaluate post purchasing decisions, that is, after tasting the product (Combris, Bazoche, Giraud-Héraud, & Issanchou, 2009; Poole, Martínez-Carrasco, & Fernando, 2007), showing the importance of experience attributes on individuals' quality perception of food and on the final food choice.

Non-hypothetical choice experiments incorporate incentives into the traditional conjoint method by randomly selecting one of the several repeated choices between competing product profiles as the binding. The participant purchases the product indicated as most preferred in the randomly selected choice set

Table 1
Description of agricultural production systems.

Systems	Descriptions
Conventional	In these production systems were promoted intensive irrigation systems in wide open plains, monoculture plantations and expensive external inputs. Although they have a random control, the conventional systems allow the use of fertilizers, pesticides and herbicides. No need for an associated certification for the plant material and do not have any kind of certification. It allows the use of any postharvest treatment according to law. These systems do not explicitly consider the environmental impact but simply follow the existing general regulations
Integrated	In these productions exists a mandatory control. They allow the use of fertilizers but differ from the conventional systems in that the integrated systems enhance the applications of natural fertilizers and reduce the use of mineral and chemical synthesis fertilizers. Allows the use of pesticides (synthetic chemicals), as long as it is a rational application, and the use of certain herbicides in some conditions. Both have to precede the biological methods. A certification is needed for the plant material. The uses of postharvest treatments are authorized if they are technically justified. Priority is given to physical methods. Integrated systems have a certification and the produce respects the environment and minimizes environment impact
Organic	The organic production has a mandatory control. It allows the uses of natural extractive mineral and organic fertilizers. The uses of mineral and chemical fertilizers are prohibited. The pesticides and herbicides (synthetic chemical products) are prohibited. For the plant material, it is necessary to use organic plant material, certified or from authorized producers. The postharvest treatment is prohibited, unless it is natural like the use of hot water. All the products have a certification and the produce supports biodiversity, respecting the environment and minimizing environmental impact