Consumers' choice behavior for cisgenic food: exploring the role of time preferences

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Abstract

This paper aims at extending current knowledge on consumer choice behavior on food produced through the application of NBT. We explore whether consumer time preferences and socio-economic factors may have a role in affecting choice behavior involving cisgenic and conventional products. To this purpose we designed a hypothetical CE and used cisgenic apples as a case study. The results indicate that both time preferences and socio-economic variables contribute to explain heterogeneity in preference for food products obtained through the application of biotechnologies and provide insight that could be relevant for both the agri-biotech industry and for policy makers.

1. Introduction

European consumers' rejection towards genetically modified (GM) food is well-known and documented in the literature (Magnusson and Hursti, 2002; Gaskell et al., 2010; Rollin et al., 2011; Verneau et al., 2014; Delwaide et al., 2015; Pakseresht et al., 2017). Numerous factors have been identified as possible determinants of this strong negative attitude. Among others, limited perceived benefits and high perceived risks, a scarce level of knowledge, a general lack of trust in the food industry, as well as misinformation, individual characteristics, and socio-demographic factors (Lusk et al., 2005; Siegrist, 2008; Rollin et al., 2011; Lusk et al., 2014; Terpstra et al., 2014; Ventura et al., 2017) seem to play a relevant role. Moreover, GM food products are perceived as the unnatural result of human manipulation, which raises ethical concerns (Miskja, 2006; Siegrist, 2008; Frewer et al., 2011; Mielby et al., 2013; Lusk et al., 2014). Over the past two decades European (EU) consumers' rejection of GM food products has represented a barrier to their development and commercialization (McFadden and Lusk, 2016). As a consequence, possible welfare gains deriving from biotechnology applications in food production were not exploited. In fact, genetic engineering may represent a valuable tool to increase the productivity of yield crops, to develop varieties with desirable traits (e.g., drought resistance), and to improve their nutritional profile (Espinoza et al., 2013; Delwaide et al., 2015), thus contributing to a more sustainable food production system, with consequent welfare gains for the society. However, to reach this goal consumers' acceptance of GM products is essential.

In this direction, the so-called new breeding techniques (NBTs) may represent a successful alternative to meet the preferences of the wide public, thus opening the doors to new market perspectives. NBTs differentiate from the forerunner genetic modification in that they avoid transgenic manipulations. In practice, they allow improving plant traits without crossing genes belonging to different species, conferring them a more natural character (Miskia, 2006; Mielby et al., 2013).
NBTs include diverse approaches, some of which have particularly emerged in the past years such as CRISPR, RNAi, and cisgenesis (Shouten et al. 2006; Doudna and Charpentier, 2014; Shew et al., 2017) the latter constituting the case study of this paper.
Within this context, the aim of this study is to extend current knowledge regarding consumer acceptance of food produced through the application of NBTs (NBT-food), exploring the role of individual characteristics in affecting choice behavior. In detail, using a hypothetical choice experiment we analyze consumer preferences for NBT-food products, meanwhile investigating the role of individual time preferences and the main socio-economic characteristics of the respondents. Cisgenic apples were used as a case study to investigate how consumers would behave in a choice situation involving trade-offs between NBT- and conventional food products.
Indeed, while the main determinants of the GM food acceptance/rejection have been extensively studied in the past (Lusk et al., 2005; Miskja, 2006; Siegrist, 2008; Frewer et al., 2011; Rollin et al., 2011; Mielby et al., 2013; Lusk et al., 2014; Terpstra et al., 2014; Ventura et al., 2017), less is known with regard to NBT-food. Although evidence in this regard are still relatively scant, past studies suggest that consumers tend to be more favorable towards cisgenic (CIS) food compared to transgenic food, which seems to be mostly attributable to the higher perceived naturalness of these products (Miskia, 2006; Mielby et al., 2013; Delwaide et al., 2015; Edenbrandt et al., 2017; Rousselière and Rousselière, 2017; Rousselière and Rousselière, 2017a; Edenbrandt et al., 2018). However, there are many unexplored factors that could contribute to gain a more comprehensive understanding of how consumers would behave in a market environment where CIS as well as other NBT products are present. Among these factors, we focused our attention on time preferences.
Time preference can be described as the extent to which individuals expect or prefer present gratification over future benefits (Chisholm, 1998; Frederick et al., 2002). Individuals with high time

preference tend to be more concerned about the immediate consequences of their actions, while those with low time preference tend to attach greater importance to distant outcomes (Strathman et al., 1994; Chisholm, 1998; Frederick et al., 2002). This individual characteristic is demonstrated to significantly affect intertemporal decisions, namely all decisions in which a present action is likely to have distant outcomes (Chisholm, 1998; Strathman et al., 1994; Frederick et al., 2002; Joireman et al., 2012). Given this definition, it is straightforward to understand why time preferences could be inherently related to the use of biotechnologies in agricultural production. Their application, indeed, carries future positive/negative consequences (being them concrete or just perceived by consumers), that necessarily imply intertemporal trade-offs. In other words, individuals may differently value the possible present and future impacts of biotechnology adoption depending on their time preferences, which would be reflected in different preferences for foods produced via NBTs.

Furthermore, to more extensively explore choice behavior and preferences for cisgenic food we also consider the main socio-economic factors, namely gender, age, education, and income. This additional step builds on previous findings suggesting the existence of an association between some socio-economic and individual preferences for GM food in general, as well as for cisgenic alternatives (McCluskey et al., 2006; Roussèliere and Rousselière, 2017).

To our knowledge, this is the first study that analyses choice behavior for NBT food while simultaneously exploring the role of time preferences, additionally accounting for individual characteristics. In essence, our main contribution is to provide evidence on whether time preferences and/or socio-economic factors are related to preferences towards food produced through the use of NBTs. If heterogeneity in preferences for NBT-food is explained (at least in part) by individual time preferences, then this has relevant implications at least from two main standpoints. Firstly, the results would be of help for the agri-biotech industry to develop products that could more favorably meet preferences of consumers accounting for how they value the future. Similarly, the results would provide insights for policy makers to develop effective communication strategies and education campaigns specifically targeted to people with high/low time preferences aimed at promoting NBT-food. This may potentially open new horizons on the market. Indeed, consumers exert a strong demand-pull on the market and if they have positive preferences towards these product categories, their success on the market can be considerably enhanced. Secondly, given the current lack of studies regarding consumer acceptance of NBT-foods, the results would provide guidance for future studies geared at extending this field of research broadening knowledge on consumer acceptance of these new generation of breeding techniques applied to food.

After providing an extensive literature review on time preferences in the next sub-section, we describe the experimental procedures and the main measures used for the analysis (section 2); section 3 describes the main steps of the empirical analysis and illustrates the econometric model adopted; the results are presented and discussed in section 4. The paper concludes with section 5 related to the main policy implications of our study.

1.2 Time preferences: literature background

Time preference can be described as the extent to which individuals (consciously or not) expect or prefer present gratification (e.g., rewards, positive present consequences of an action) over future benefits. This concept has received increasing attention from the early '90s (Samuelson, 1937) assuming a key role in the conceptualization of the well-known human capital theory and the health capital theory (Becker, 1964; Grossman, 1972). In these models time preferences assume a crucial role as the underlying factor that determines the motivation for and the extent to which people allocate their time to different activities, based on the importance they attach to the expected outcomes. The concept of time preference is known also under different names, such as discount rate, impatience, impulsiveness, ability to delay gratification, and time orientation[1], which are often used interchangeably (Strathman et al., 1994; Chisholm, 1998; Frederick et al., 2002; Andreoni and Sprenger, 2012; Joireman et al., 2012). The reason why time preferences have become so important in economics is due to their demonstrated effects on human behaviors. Time preference comes into play in all intertemporal decisions, namely all choices that involve tradeoffs between costs and benefits occurring at different points in time. In such situations individuals need to weigh the immediate over the future consequences of an action and then decide according to their own preference/priority scale.

[1] In this paper, the terms 'time preference' and 'time orientation' are used interchangeably.

Such decisions are ubiquitous in our everyday life and involve the most disparate domains (Frederick et al., 2002). In order to explain how people tend to behave according to their time preferences, it is common to refer to high and low time preference levels. People with high time preference tend to underestimate future consequences of present actions (i.e., they are present-oriented). They are mostly concerned about maximizing immediate utility at the expense of potential benefits that could possibly occur only later in time. On the opposite, individuals with low time preference (i.e. future oriented) tend to outweigh future consequences of present actions. They are more prone to defer gratification and value future outcomes to a greater extent (i.e., they are future oriented) (Strathman et al., 1994; Chisholm, 1998; Frederick et al., 2002; Joireman et al., 2012).

The role of time preferences in decision making has been studied in several domains. For example, people decide whether to save money, to subscribe insurances, and to invest in education depending on how they value the future. On the same grounds people also decide whether to invest in health (van der Pol and Cairns, 2001; Chapman et al., 2005; van der Pol, 2011), for instance practicing physical activity (Adams and Nettle, 2009), avoiding smoking (Sharff and Viscusi, 2011), and maintaining a healthy diet (van Beek et al., 2013; Cavaliere et al., 2014; Dassen et al., 2015; Cavaliere et al., 2016). Tòrtora and Ares (2018), found that individuals who value future outcomes more than present utility tend to make more healthful food choices, privileging more nutritious food alternatives. In addition, De Marchi et al. (2016) showed that time preferences also have a role in affecting consumer evaluation of specific food product attributes, with future oriented individuals showing a stronger preference for low calorie and organic products. The effects of time orientation have been related also to the extent to which individuals are willing to engage in pro-environmental behaviors, such as recycling, energy saving, and investing in energy-efficient technologies (McCollough, 2010; Allcott and Greenestone, 2012; Carmi and Arnon 2014).

Overall, these results suggest that, independently from the specific context in which intertemporal decisions are made, time preference may lead individuals to inefficient decisions (Cairns, 1992; Allcott and Greenestone, 2012; Bradford et al., 2017). Such inefficient decisions may impact on the society causing negative externalities and, therefore, provide potential ground for government interventions (Bradford et al., 2017). This could be the case of NBT food.

To explain, NBT food consumption (i.e. cisgenic food consumption in the specific context of this paper)comprises all the characteristics of an intertemporal decision, in which individuals are called to weigh immediate over future consequences of biotechnology applications in food production, even though these latter may not be concretely evaluable by consumers. In fact, biotechnology application to food has been described as both a temporal and social dilemma. The temporal dilemma is related to the weigh that individual place on possible future consequences of present actions (Joireman, 2005; Wittman and Sircova, 2018). The social can be described as a situation in which short-term individual and long-term collective interests are at odds (Messik and Brewer, 1983; Komorita and Parks, 1994; Joireman, 2005). As such, when evaluating whether or not to buy and consume cisgenic products, time preferences are expected to considerably influence consumer preferences and decision making.

2. Experimental procedures and measures

2.1 Experimental procedure

The data collection was carried out during spring 2017 in Italy. The survey was based on face-to-face interviews collected following a random sampling approach on 611 adult consumers. Only apple consumers older than 18 years old were considered eligible for the survey. The final sample, after excluding questionnaires with missing data, resulted in 570 complete interviews. The survey included a section aimed at eliciting time orientation through the Consideration of Future Consequences 14-items scale (CFC), a section consisting in a Choice Experiment (CE) on apples, and a section related to the main socio-demographic and economic characteristics of the respondents. Additionally, the questionnaire included some items taken from the Eurobarometer survey on Europeans and biotechnology (Gaskell et al., 2010) that were used for a descriptive analysis to better characterize the sample. The section order was randomized across individuals to avoid potential ordering bias. All respondents were provided with a brief informative message on cisgenic apples before starting the CE to familiarize them with the technology before making their choices. Such information was aimed at providing an unbiased basic notion on what cisgenic apples are to clarify the choice context and to obtain more reliable responses from the choice experiment tasks. The information content was based on the definition of cisgenic apples used in the Eurobarometer survey (Gaskell et al., 2010) and was checked for scientific accuracy by a plant-biotech expert.

2.2 The Consideration of Future Consequences 14-item scale

There are several ways to elicit time preferences. A common approach in economics is based on the experimental elicitation of individual discount rates through Multiple Price List (MPL) tasks (Frederick et al., 2002; Andreoni and Sprenger, 2012). In MPL respondents are asked to make repeated choices between smaller sooner payments and larger delayed rewards. The interest rate increases monotonically in the price list, such that the point in which individuals switch their preferences from sooner to delayed payments provides the information on their time preferences (Frederick et al., 2002; Andreoni and Sprenger, 2012). Despite this method is effective in measuring time preferences, it is not suitable to be used in large sample surveys. Indeed, with MPL it is necessary to provide respondents with incentives to make them reveal their real preferences (Andreoni and Sprenger, 2012). Furthermore, individual time preferences may be subject to domain dependence. This means, for instance, that the importance that a person attaches to present/future financial outcomes may be different from the importance attributed to present/future outcomes related to the health domain (Chapman and Elstein, 1995). To overcome these issues in this paper we used the CFC 14-items scale as developed by Joreiman et al. (2012) (Table 1).

[Please insert here Table 1]

This scale has been previously applied in a number of studies dealing with food-related behaviors (Houston and Finke, 2003; Joireman, et al., 2012; Lawless, et al., 2013; De Marchi et al., 2016).
These studies consistently provided evidence that individual time orientation measured through the CFC construct can help explain differences in how people behave in food choice contexts.
The CFC 14-item scale is made of 14 items aimed at capturing the extent to which individuals value the future outcomes of present actions, and the extent to which they are affected by these possible outcomes (Joireman et al., 2012).

Respondents are simply asked to assign to each statement of the scale a score (from 1=not at all like you, to 7=very much like you) according to how much the statement content reflects their way of thinking/behaving. Seven items are aimed at identifying present oriented individuals (i.e., individuals with high time preference) and together they constitute the CFC-Immediate (CFC-I) subscale; the remaining seven items are mainly characteristic of future oriented individuals (i.e., with low time preference). These items together constitute the CFC-Future (CFC-F) subscale. Besides avoiding the need of incentives and domain dependence issues, the CFC construct and its instructions are easily understood by respondents, which makes the scale suitable to be used with large consumer samples.

A previous version of this scale was conceptualized in 1994 by Strathman and colleagues (Strathman et al., 1994). Their construct differed from the more recent version of Joireman et al. (2012) in that it contained 12-items instead of 14, respectively 7 items related to the CFC-I subscale, and 5 items to the CFC-F subscale. Strathman et al. (1994) proposed to treat the CFC construct as a unidimensional scale, that is using the average or the sum of the CFC-F items and the reverse-coded of the CFC-I items. According to Strathman et al. (1994), in fact, even though the scale contains statements specifically aimed at capturing present and future orientation respectively, it is not really possible to make an absolute distinction between these two. Instead, according to Strathman et al. (1994) time preferences should be seen as continuum, where people are compared with others (either individually or in aggregate) based on their behaviors.

However, consequent studies demonstrated that a two-factor approach best explains individual stated responses to the scale (Petrocelli, 2003; Joireman et al., 2008; Rappange et al., 2009; Toepoel, 2010; Adams, 2012). Building on this proposed method, Joireman et al. (2012) modified the original CFC construct by adding two more items to the CFC-F subscale, which allowed to improve the reliability of the scale and resulted in the CFC 14-items adopted in this paper. A key advantage of the two-factor method, which is the one followed in this paper, consists in the possibility of determining whether specified behaviors have to be attributable to one's present or future orientation (Joireman et al., 2012).

It is worth mentioning that some previous works have proposed alternative versions of the CFC scale, explicitly adapted to analyze food behaviors (van Beek et al., 2013; Dassen et al., 2015; Tortora and

Ares, 2018). However, we are not interested how time preferences affect eating habits overall. Rather, we aim at exploring whether present/future orientation is related to different preferences for the way in which food products are produced (i.e., conventionally or through NBTs). For this reason, the original CFC 14-item construct was considered more appropriate for this paper.

2.3 Choice Experiment: attributes description and design

In CE respondents are asked to indicate their preferred product among a sequence of experimentally designed sets of alternatives. Each alternative profile is thereby characterized by a specific combination of attribute levels.

In this work, the CE was based on apples characterized by the following attributes, which were selected to make the hypothetical choice context as similar as possible to a real market situation: price, 4 levels set to reflect the average market price for 1 kg of apples; production technology, 2 levels respectively conventional or cisgenic breeding; brand, 2 levels corresponding to 'no brand' or 'Melinda' a popular apple brand in Italy; and, finally, the country of origin (COO), 3 levels indicating Italy and, additionally, Germany and China, which are among the biggest apple producers in the world (Table 2).

[Please insert here Table 2]

Apples were chosen as the product of interest for several reasons. Firstly, most people consume this fruit during the whole year as it is not affected by seasonality. Secondly, apples are modestly priced, which makes this product available to a wide public. Furthermore, apples are among the few food products that have been proposed for enhancement through cisgenic breeding, both for nutrition and pesticide resistance purposes.

The allocation of the attributes and levels across alternatives was made using Ngene version 1.1.2. We performed a Bayesian design, firstly introduced in the CE design literature by Sándor and Wedel (2001).

As explained in Bliemer and Collins (2016), the priors to construct Bayesian efficient designs can be obtained from multiple sources, following different approaches.

The preferred option is to rely on priors deriving from pilot studies on small samples of the population. This procedure, however, is both costly and time consuming and sometimes the analyst is unable to collect pilot data, as in our case. In such situation, alternative approaches can be adopted. For instance, priors can be found in the existing literature or the researcher, as an expert, can determine the priors for the attributes at issue (Bliemer and Collins, 2016). Another viable alternative, which is the one adopted in this paper, is to set priors based on the assumption of equal contributions to the utility function, setting values starting from the average attribute level range (Bliemer and Collins, 2016). The design was also constrained in order to avoid that the brand attribute 'Melinda' (that is an exclusively Italian brand) could be associated with Germany or China as COO.

The final design (D_b-error=0.26, S-estimate=31.41) was constituted by 24 choice tasks divided in 3 different blocks each consisting in 8 choice tasks. Each block was evenly presented and randomly assigned to respondents and the task order was also randomized within each block to avoid any possible bias due to ordering effect. The single choice tasks were composed by two buying alternatives and an opt-out option, included to make the choice context as similar as possible to a real purchasing situation (Figure 1).

[Please insert here Figure 1]

Furthermore, given the hypothetical context of the CE tasks, a cheap talk script was shown to all respondents right before starting the experiment.

The cheap talk, as proposed by Cummings and Taylor in 1999, consists in a brief text geared at leading respondents to reveal their true preferences by informing them about the existence of the hypothetical bias (Appendix 1). As demonstrated in previous works, this procedure is effective in reducing the hypothetical bias (Cummings and Taylor, 1999; Lusk, 2003; Carlsson et al., 2005; Silva et al., 2011; Tonsor and Shupp, 2011)

3. Empirical analysis and econometric models

To address the main objective of the paper, that is to explore whether different time preferences may result in different preferences for conventional vs cisgenic food alternatives, we followed a stepwise approach in the data analysis.

Firstly, we examined individual responses to the CFC scale in line with the procedure proposed by Joireman et al. (2012) consisting in a Principal Component Analysis (PCA) on the 14 items of the scale. This allows to obtain individual levels of present and future orientation (i.e., CFC-I and CFC-F). Secondly, we conducted a descriptive analysis using some questions included in the Eurobarometer survey aimed at capturing consumer perception of cisgenic technology application and cisgenic food consumption. As a third step we performed a set of Random Parameter Logit with Error Component models on our choice experiment data, incorporating the estimated individual values of CFC-I and CFC- and the socio-economic variables to better explain heterogeneity in preferences for the production technology attribute. All steps are described in detail in the following sections.

3.1 Time preference elicitation

To elicit individual time preferences, we followed the procedure adopted by Joireman et al. (2012) and performed a Principal Component Analysis (PCA) on the 14 items of the CFC scale. PCA is a statistical procedure that allows to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components, also referred to as factors. With regard to the CFC scale, the procedure allows obtaining individual values for present (i.e., CFC-I) and future (i.e., CFC-F) orientation respectively, thus making it possible to distinguish which of the two components best predicts a specific behavior or preference. Several studies, indeed, demonstrated that CFC-I and CFC-F may be differently related to a single behavior with one of the two best predicting the considered outcome (Adams and Nettle, 2009; Piko and Brassai, 2009; Joireman et al. 2012).

In practice, in the PCA the number of components to be retained is given by the number of Eigenvalues higher than one.

3.2 Exploratory analysis on individual attitudes towards cisgenesis

In order to better characterize the sample and explore whether different time orientation could be related to different attitudes towards the cisgenic technology *per se* and towards cisgenic food consumption we analyzed the responses to 8 items included in the questionnaire based on the 2010 Eurobarometer survey. Respondents were asked to indicate their level of agreement/disagreement with each statement on a 9-point scale ranging from 1 (=strongly disagree) to 9 (=strongly agree) (Table 3). Responses to the 8 items were analyzed through a set of t-tests to detect differences in mean response values between respondents with high and low time preference.

3.3 Econometric models

According to the random utility theory (McFadden, 1974), in CEs individuals choose a specific product profile over others when the perceived utility of that profile exceeds the utility that could be derived from the other alternatives. The utility of consumer *n* in choosing alternative *j* in the choice situation *t* can be expressed as:

$$U_{njt} = \beta'_n X_{njt} + \varepsilon_{njt} \tag{1}$$

where x_{njt} represents a vector of observable variables related to the individual *n* choosing alternative *j* in choice situation *t*; β_n is the vector of preference parameters related to the attributes; and ε_{njt} is the unobservable component of the utility function, i.i.d distributed, independent from β and X.

Within this framework, there are several assumptions that can be made about consumer preferences, which imply different assumptions on the distribution and composition of the unobserved portion of the utility function. This ultimately allows for different random utility model specifications. In the Multinomial Logit Model (MNL), for instance, preferences are assumed to be homogeneous across individuals. However, as demonstrated in previous studies, this assumption is likely to produce biased coefficient estimates in that respondents may actually differ in terms of taste intensities (Train, 2003). To account for this heterogeneity Random Parameter Logit (RPL) models can be used to allow for random taste variation estimating individual-specific parameters. Furthermore, the presence of an opt-out option in the experimental design may cause systematic effects related to the status-quo and to correlated random effects across the utilities of the two buying alternatives of the choice set (Scarpa and Alberini 2005; Scarpa et al., 2007). Indeed, the buying alternatives and the opt-out option are intrinsically different, with the former being characterized by diverse combinations of attribute levels that are not present in the opt-out. For this reason, the buying alternatives are likely to be correlated between themselves and not with the opt-out. This can be accounted for by adding an additional error term to the utility function in (1), such that:

$$U_{njt} = \beta'_n X_{njt} + \eta_{it} + \varepsilon_{njt} \tag{2}$$

where η_{it} represents the individual specific additional error component (EC) that is associated with the alternatives that portray purchasing options in the choice set, and not with the opt-out. The deriving model is called Error Component Random Parameter Logit (RPL-EC).

Transferring the general equation in (2) to our specific choice context, the utility function assumes the following form:

$$U_{njt} = \beta_0 * \text{opt-out}_{njt} + \beta_1 * \text{price}_{njt} + \beta_2 * \text{tech}_{njt} + \beta_3 * \text{brand}_{njt} + \beta_4 * \text{COO}_{\text{GER}njt} + \beta_5 * \text{COO}_{\text{CHINA}njt} + \eta_{it} + \varepsilon_{njt} \tag{3}$$

where n= 1,. . . ,n indicates the n^{th} respondent, t refers to the choice task, and j respectively to alternatives A, B, or C, with C representing the opt-out option specified as an alternative-specific dummy variable that assumes value 1 when the opt out is chosen and value 0 when either A or B are selected. β_0 is the alternative-specific constant associated with the opt-out alternative. Price_{njt} is treated as a continuous variable expressing price for one kg of apples, while the other parameters refer respectively to the attributes production technology, brand, and COO. For the three latter attributes we used effects coding to account for non-linear effects and to avoid potential confounding effects with the opt-out alternative specific constant (i.e., avoid correlation with the intercept β_0) (Bech and Gyrd-Hansen, 2005). $\text{COO}_{\text{GER}njt}$ and $\text{COO}_{\text{CHINA}njt}$ in the utility function represent the two effects coded variables created with respect to the reference attribute level (i.e., Italy). The utility function in

(3) represents our baseline model (Model 1) used to elicit the main effects for each attribute, that is the impact that each attribute has on respondents' choices, independently of all other attribute effects (Hensher et al., 2006).

A second model specification (Model 2) was then used to specifically investigate the role of individual time orientation in explaining heterogeneity in preferences for cisgenic vs conventional apples. In detail, the effect of time preferences was accounted for by means of two interaction terms, respectively between the elicited individual values of CFC-I and CFC-F and the technology attribute. Accordingly, Model 2 is specified as:

$$U_{njt} = \beta_0{*}\text{opt-out}_{njt} + \beta_1{*}\text{price}_{njt} + \beta_2{*}\text{tech}_{njt} + \beta_3{*}\text{brand}_{njt} + \beta_4{*}\text{COO}_{\text{GER}njt} + \beta_5{*}\ \text{COO}_{\text{CHINA}njt} + \gamma^{\text{CFC-I}}\ \text{CFC-I}{*}\text{tech}_{njt} + \gamma^{\text{CFC-F}}\ \text{CFC-F}{*}\text{tech}_{njt} + \eta_{it} + \varepsilon_{njt} \quad (4)$$

Where $\gamma^{\text{CFC-I}}$ and $\gamma^{\text{CFC-F}}$ represent the coefficients of the interaction terms described above, which measure the extent to which present/future orientation respectively impact on consumer preferences for the technology attribute (see also Bazzani et al., 2017; Lin et al., 2019 for similar approaches).

We then explored the role of the main socio-demographic and economic factors of our respondents to gather a more in depth understanding of what concurs to determine differences in preference for cisgenic food products. To this purpose, we estimated Model 3, which is specified as Model 1 with the addition of four interaction terms respectively between the technology attribute and each of the socio-economic variables considered in this study, as described in equation (5).

$$U_{njt} = \beta_0{*}\text{opt-out}_{njt} + \beta_1{*}\text{price}_{njt} + \beta_2{*}\text{tech}_{njt} + \beta_3{*}\text{brand}_{njt} + \beta_4{*}\text{COO}_{\text{GER}njt} + \beta_5{*}\ \text{COO}_{\text{CHINA}njt} + \gamma^{\text{age}}\ \text{age}{*}\text{tech}_{njt} + \gamma^{\text{gen}}\ \text{gender}{*}\text{tech}_{njt} + \gamma^{\text{edu}}\ \text{education}{*}\text{tech}_{njt} + \gamma^{\text{inc}}\ \text{income}{*}\text{tech}_{njt} + \eta_{it} + \varepsilon_{njt} \quad (5)$$

with γ^{age}, γ^{gen}, γ^{edu}, and γ^{inc} representing the coefficients of the interaction terms between the technology attribute levels respectively with age (continuous variable), gender (dummy variable assuming value 1 for females and 0 otherwise), education (assuming values from 1= elementary school to 5=post degree), and income (from 1= less than 800 euros per month to 5= more than 5000 euros per month) (a detailed description of these variables is reported in table 5).

The comparison between Models 2 and 3 allows to verify which individual characteristic (i.e., time preferences and/or socio-demographic and economic factors) best explain different preferences for the Tech attribute.

Lastly, we run Model 4 including all the interaction terms that were separately included in Models 2 and 3, as follows:

$$U_{njt} = \beta_0 * \text{opt-out}_{njt} + \beta_1 * \text{price}_{njt} + \beta_2 * \text{tech}_{njt} + \beta_3 * \text{brand}_{njt} + \beta_4 * \text{COO}_{GERnjt} + \beta_5 * \text{COO}_{CHINAnjt} + \gamma^{CFC\text{-}I}\ \text{CFC-I} * \text{tech}_{njt} + \gamma^{CFC\text{-}F}\ \text{CFC-F} * \text{tech}_{njt} + \gamma^{age}\ \text{age} * \text{tech}_{njt} + \gamma^{gen}\ \text{gender} * \text{tech}_{njt} + \gamma^{edu}\ \text{education} * \text{tech}_{njt} + \gamma^{inc}\ \text{income} * \text{tech}_{njt} + \eta_{it} + \varepsilon_{njt} \quad (6)$$

4. Results and dicussion

4.1 PCA

The results of the PCA revealed the presence of two eigenvalues higher than one, as illustrated in the scree plot in Figure 2.

[Please insert here Figure 2]

In detail, in line with the results of Joireman et al. (2012) the PCA on the 14 items of the CFC scale resulted in two factors, respectively identifying the individual values of CFC-I and CFC-F. These two factors account for 47.64% of the variance explained and the related factor loadings are reported in Table 3. After obtaining the factor loadings we checked for the internal consistency of the two subscales using Cronbach's statistics, that revealed high reliability of the CFC-I and CFC-F constructs (Cronbach's alpha= 0.82 and 0.79, respectively). Secondly, we examined the Kaiser–Meyer–Olkin (KMO) measure to test sampling adequacy. The value obtained, which is close to one (0.832), indicates that the PCA can act efficiently producing reliable results. As a third measure, we took into account the determinant of the correlation matrix (0.000) in order to rule out multicollinearity. Moreover, we performed the Bartlett's test of sphericity, which indicates that the correlations between the items are acceptably high to guarantee the reliability of the results (χ^2=62450.22, p<0.000) (Joireman et al., 2012). These two factors account for 47.64% of the variance explained and the related factor loadings are reported in Table 3.

[Please insert here Table 3]

4.2 Individual attitudes towards cisgenesis and socio-economic characteristics

Using the Eurobarometer survey questions, we explored differences in respondents' attitudes towards the cisgenic technology and towards cisgenic food consumption based on their time preference levels. Specifically, through a set of t-tests we explored differences in response means between individuals with high (i.e., CFC-I value higher than CFC-F value) and low time preference (i.e., CFC-F higher than CFC-I) respectively.

The results of the descriptive analysis (Table 4) overall highlight significant differences in mean response values between the two groups, for all the 8 items considered. More in detail, present oriented individuals seem to have more positive attitudes towards cisgenesis and seem to be less concerned about its application to food. As revealed by the results, indeed, compared to respondents with low time preference they seem consider this technology a promising idea, which will be useful in the future.

[Please insert here Table 4]

On average, they also believe that its application should be encouraged and feel safe in consuming cisgenic food products. On the opposite, more future oriented people seem to have a less favorable attitudes. Their responses indicate higher environmental concern with regard to cisgenesis use. Moreover, on average they perceive the technology as something unnatural that makes them feel uneasy and believe that cisgenic food consumption may be risky.

This exploratory analysis highlights that consumers evaluate the technology adoption quite differently depending on their time preferences. On the one hand, present oriented people seem to be more prone to accept the technology. This likely finds explanation in the fact that, as it is amply demonstrated in the literature, these individuals tend to attach less importance to the future, favoring the immediate utility that can be derived from an action (Strathman et al., 1994; Frederick et al., 2002; Joireman et al., 2012; Lawless et al., 2013). On the other hand, individuals with low time preference show a more prudent evaluation of this issue. These people, indeed, typically tend to carefully consider the possible long-term impact of present events. Accordingly, this may lead them to assume a more 'conservative' attitude towards the use of biotechnology, accounting for the impossibility to evaluate and weigh possible distant outcomes.

As for the socio-economic characteristics of the sample, the descriptive statistics are reported in table 5.

[Please insert here Table 5]

The age class including individuals between 25 and 34 years old is overrepresented in our sample compared to the other age classes, while only a small percentage of respondents is older than 65. Males and females are almost evenly represented and the majority of the sample population (41.1%) has a degree and a slightly lower percentage of respondents (38.6%) has a high-school diploma. As for income, the data reveal that the average household income is between 1,500 and 3,000 euros per month. A considerable portion of the sample (almost 28%) has declared monthly income levels lower than the average, whilst only 18.1% exceeds this value.

4.3 Random Parameter Logit with Error Component

As described in section 3.3, the CE data were analyzed through a set of 4 RPL-EC models: Model 1, that only includes the main effects for the four attributes chosen in this CE to characterize the apple alternatives; Model 2, that adds to Model 1 specification the interaction terms between the technology attribute and the individual CFC-I and CFC-F factors respectively; Model 3, with interaction terms between the tech attribute and the socio-economic factors, and finally Model 4 comprising both interaction terms with CFC-I and CFC-F and with the socio-economic variables. This analytical strategy allowed us to explore whether heterogeneity in consumer preferences for NBT over conventional food can be explained by time preferences and/or socio-economic factors.

All models are based on 4560 observations, that is 570 individuals completing a total 8 choice tasks each.

Overall, it is possible to observe that the coefficient attributes are significant in all models, indicating that all of the selected characteristics are important for consumers while choosing apple products. In all models, the standard deviations of the estimated random parameters are significant, which confirms the existence of preference heterogeneity across respondents. Moreover, the EC is significantly different from zero in all Models, corroborating the appropriateness of the RPL-EC model specifications. As expected, the opt-out parameter estimate is negative and significant in all model specifications indicating that respondents' utility is higher when choosing one of the two proposed buying profiles rather than the opt-out. This further stresses that the selected attributes are relevant for consumers in making choices across different apple products. Furthermore, in line with the economic theory, the price coefficient is negative and significant in all Models, meaning that respondents have higher preferences for lower priced alternatives compared to more expensive ones. As for the non-price attributes, the main effects in Model 1 reveal that the production technology is a fundamental variable while choosing across different apple alternatives, with respondents overall preferring conventional fruits compared to CIS ones. This result is line with previous studies showing that, despite CIS products are more favorably accepted compared to the older transgenic, people still tend to prefer conventionally produced food (Gaskell, 2010; Rousselière and Rousselière 2017; Edenbrandt et al., 2018). The COO is a key feature that consumers consider when selecting across apple alternatives, with Chinese products being remarkably dispreferred by consumers, and with Italian options being favored. This result goes in the direction of previous findings highlighting that individuals tend to appreciate more favorably and/or to overestimate the characteristics of domestic products over extra-domestic ones (Chryssochoidis et al., 2007). This aspect may be particularly manifest in Italian consumers due to the strong positive reputation of both the Italian food products and the Italian food industry, also at international level (Banterle et al., 2016).

As it can be observed in Table 6, the results of the main effects are consistent across the four model specifications. As such, from now on we will focus on the interaction terms respectively added to Models 2, 3, and 4. Looking at the interaction terms of technology respectively with the individual elicited CFC-I and CFC-F it is possible to notice that only the latter is significant at 0.001 level (-0.343). This indicates that future orientation significantly contributes to explain heterogeneity around the mean for the technology attribute. Specifically, the negative coefficient reflects the negative preferences of future oriented people towards products obtained through NBT.

[Please insert here Table 6]

Although the coefficient $\gamma^{CFC\text{-}I}$ is not significant, it is worth highlighting that it has an opposite sign with respect to $\gamma^{CFC\text{-}F}$, which indicates that present and future orientation respectively (i.e., high and low time preferences) seem to have an opposite impact on consumer preferences for NBT over conventional food: people with low time preferences derive lower utility from cisgenic apples compared to individuals with high time preferences. This result is in accordance with the results we obtained through the descriptive analysis on the Eurobarometer question presented in section 4.2 showing that future-oriented people tend to have more negative attitudes towards both the cisgenic technology adoption and cisgenic food products.

Model 3 includes the interaction terms between the production technology and the socio-economic factors (i.e., gender, age, education, and income). As shown by the results all interaction effects are significant, except for gender. In particular, we find that younger population segments seem to be more open to the technology application compared to older segments. Indeed, younger respondents obtained higher utility from cisgenic apples relative to older segments of the sample population (-0.169). We also find a significant interaction effect of technology with education, with highly educated individuals being more likely to select cisgenic alternatives (-0.001). Even if education and income are generally positively correlated, in this case we notice an opposite pattern of signs of the two interaction terms.

Contrary to education, the interaction term for income is negative suggesting that people with lower average household income prefer cisgenic alternatives more than affluent people (-0.375). Although the studies on cisgenic food that include socio-economic factors are very limited, our results seem to be in line with those reported by Rousselière and Rousselière (2017), at least with regard to gender, age and education. In their analysis based on the 2010 Eurobarometer data, they report that European females generally feel more uneasy with regard to cisgenic food, which they consider unnatural, risky, and not useful (European Commission, 2010). In line with our results, Rousselière and Rousselière (2017) also found that young adults tend to have more positive attitudes towards cisgenic food, as well as people that are more educated. Younger generations are much more familiar with the technology in general as they grew up in a society where technologies are progressively and widely applied in many different fields (Cavaliere and Ventura, 2018). This may contribute to make them feel more confident in biotechnology applications, including genetic manipulation in food. At the same time, younger individuals are more sensitive to sustainability issues (Vicente-Molina et al., 2013; Zsoka et al., 2013). For this reason, they may perceive the use of biotechnology as a possible way to respond to the needs of future generations. As for the highly educated, it is reasonable that these individuals, due to their high general knowledge, are facilitated in evaluating more objectively the technology issue and to more positively perceive and understand the main advantages that could be derived from their application. This goes in the same direction of the results found by McCluskey et al. (2006) reporting that education can positively affect consumer willingness to buy GM food. No previous evidence, instead, were found with regard to income and further investigations are need to better understand the role of this variable in affecting preferences for cisgenic food.

Finally, Model 4 reports the results of the RPL-EC model estimated with all interaction terms, namely those with time preferences and the socio-economic factors. Differently from Model 2, in this last specification both the interaction terms of the technology attribute with CFC-I ($\gamma^{CFC\text{-}I} = 0.226$) and CFC-F ($\gamma^{CFC\text{-}F} = -0.275$) are significant, respectively at 0.05 and 0.001 levels. It is also possible to notice the same pattern of opposite signs of the two interactions that was observed in Model 2. This result strengthens the importance of accounting for time preferences to explain choice behavior for NBT vs conventional foods. In detail, while future oriented individuals have more negative preferences towards CIS alternatives, present oriented people show an opposed judgement of these products. This could be due to the fact that these people likely tend to ignore possible long-term consequences of present decision, and therefore their preferences for NBT food could be mainly determined by their perceived immediate impact, rather than by an attentive evaluation of possible long-term consequences (Sweitzer et al., 2008). This concept, typical of present oriented individuals, has been also described in the literature as 'temporal myopia', which leads them to attach only little importance to whatever may happen further away in time (Kim and Zauberman, 2009; Wittmann and Paulus, 2009). The same favorable attitude of high time preference individuals towards CIS food also emerges from the Eurobarometer questions, that highlights that present-oriented respondents believe that the cisgenic technology should be encouraged.

Furthermore, in model 4, also the interaction between gender and technology is significant, with females having more negative preferences towards CIS alernatives. This is in line with prevous evidence indicating that females tend to be more attentive towards food issues, mothers above all (European Commission, 2010), and this may explain their more skeptic and prudent evaluation of cisgenesis application to food.

Taken together these findings indicate that consumer choice behavior for NBT-food should not be examined in isolation, as both time preferences and socio-economic factors help explain heterogeneity in preferences for conventional over NBT food alternatives. This is also confirmed by the model fit, as Models 2, 3 and 4 show lower values of Log-Likelihood function, Bayesian information criterion (BIC and BIC/N) and Akaike information criterion (AIC) with respect to Model 1. That is to say that accounting for time preferences and socio-economic factors improves the model estimates. Furthermore, a key insight emerges when looking at Model 2, showing the lower model fit across all model specifications. This suggests that time preferences contribute to explain choice behavior for NBT over conventional food to a greater extent relative to socio-economic factors.

This study has some caveats that need to be acknowledged. Firstly, in our sample the age category represented by adults aged between 25-34 is overrepresented compared to others. Even if it is not well-understood how time preferences change with age and not univocal findings were found in the literature, the analysis should be replicated with a more homogeneous sample in order to ascertain the robustness of our results (Green et al., 1994; 1996; Read and Read, 2004). However, the analysis should be replicated with a more homogeneous sample in order to ascertain the robustness of our findings. Secondly, although the CE is hypothetical and, despite the fact that we used a cheap talk to reduce hypothetical bias, it is still possible that stated preferences and choices differ from those that consumers would show in a real-purchasing context. This may be particularly evident in the specific context of this study, involving an unfamiliar and controversial product attribute. Moreover, it is well known that consumer acceptance of technology application to food is product specific (Cavaliere and Ventura, 2018) and therefore it is reasonable to expect different results when repeating the same survey with different product categories.

Future studies on consumer preferences for NBT food alternatives should extend the analysis to NBTs different from cisgensis (e.g., gene editing) also considering comparison with transgenic products. This would allow to verify whether our findings can be extended to other breeding methods and to confirm that NBTs are more favorably perceived by consumers than older GM.

5. Conclusion and policy implications

The results of this paper indicate that socio-economic factors and especially time preferences have a role in explaining heterogeneity in preferences for NBT-foods with implications from both a market and food policy standpoint. Overall, these findings provide evidence that can be of help to more effectively target specific population segments both in terms of product development and policy formulation. Firstly, the results can be relevant for the agri-biotech industry to develop products that could more favorably meet the preferences of consumers. Individuals with low time preferences tend to be more negative towards NBT-food, likely due to the weigh they attach to possible future outcomes. However, within the specific domain of biotechnology applications, consumers are objectively unable to derive meaningful conclusions on the delayed impact of the technology use, which likely implies high caution. In this regard, the development of improved crops carrying significant benefits for the people such as reduced environmental impact or improved nutritional traits might point plant breeders at best towards a promising direction.

Secondly, the results provide insights for policy makers. The model estimates provide evidence on both socio-economic factors and time preferences that could be relevant to develop communication strategies and education campaigns targeted to specific population segments. This would allow designing interventions that could be effective in promoting NBT-food acceptance and consumption. For instance, our results indicate that those who value the future more (i.e., those with low time preference) tend to value NBTs less. This could be a signal that future oriented people do not see much benefits to having these technologies and may need to be convinced that they will not have be harmful consequences and can benefit the humankind in the long run. In this direction, targeted communication strategies and education campaigns may play a relevant role. In fact, to reverse consumer negative preferences towards NBT-foods would have relevant implications for their future development and commercialization, especially in the EU context. Given that consumers exert a strong demand-pull on the market, it is crucial that they have positive preferences towards these product categories, because their success on the market can be considerably enhanced. If so, several welfare gains could be exploited (e.g., increased productivity, reduced pesticide use, improved nutritional profiles), with consequent positive effects on the society.

In this context, although this is not the focus of our analysis, we believe that a comment is worth with regard to the current EU regulatory framework that disciplines NBTs. Indeed, recently the European Court of Justice established that NBTs should fall under the same Directive that disciplines transgenesis, which implies the same labeling rules. This means that consumers would be practically unable to distinguish transgenic products from NBT-foods. The claimed concern is that even though consumers will develop more positive attitudes towards these new generation of foods with improved traits, their success on the market may be limited due to a lack of market transparency. Reflections are needed in this regard and further studies on consumer preferences for NBT-foods and its main determinants are crucial to gain a more in depth understanding of this complex issue.

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Appendix 1

Cheap Talk Script

The results of previous similar studies have demonstrated that sometimes people give a certain answer to a specific question or task, but in reality, they behave differently. A possible explanation is that being in a hypothetical choice context could induce individuals to attach less importance to their choices because these do not have a concrete impact on their everyday life. Instead, when consumers are in a real buying situation, they have to take into account their budget constraint because they really have to pay for the product they decide to buy. In the following task, we ask you to behave exactly as if you were in a real store, getting groceries for yourself or your family, and to give real responses. Please, keep this in mind while answering.

Appendix 2

A cisgenic apple is bred using a process in which genes are transferred between crossable organisms that belong to the same species (like for instance wild apple varieties) or closely related species.

FIGURE LEGENDS

Figure 1 legend: Example of choice-set

Figure 2 legend: Scree plot of the PCA

TABLES

Table 1. Consideration of Future Consequences (CFC) 14 Item Scale.

	CFC 14-item scale	Sub-scale
1	I consider how things might be in the future, and try to influence those things with my day-to-day behavior.	CFC-F[a]
2	Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.	CFC-F
3	I only act to satisfy immediate concerns, figuring the future will take care of itself.	CFC-I[b]
4	My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.	CFC-I
5	My convenience is a big factor in the decisions I make or the actions I take.	CFC-I
6	I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.	CFC-F
7	I think it is important to take warnings about negative outcomes seriously, even if the negative outcome will not occur for many years.	CFC-F
8	I think it is more important to perform a behavior with important distant consequences than a behavior with less important immediate consequences.	CFC-F
9	I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis-level.	CFC-I
10	I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.	CFC-I
11	I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.	CFC-I
12	Since my day-to-day work has specific outcomes, it is more important to me than behavior that has distant outcomes.	CFC-I
13	When I make a decision, I think about how it might affect me in the future.	CFC-F
14	My behavior is generally influenced by future consequences.	CFC-F

Source: Joreiman et al. (2012)

[a] States for CFC-Future subscale (i.e., future orientation)

[b] States for CFC-Immediate subscale (i.e., present orientation)

CFC 14-item scale instructions: For each of the statements shown, please indicate whether the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a “1” in the space provided to the right of the statement. If the statement is extremely characteristic of you (very much like you), please write a “7” in the space provided. Of course, use the numbers in the middle if you fall between the extremes.

Table 2. CE attributes and levels

Attributes	Levels
Price (Euro/kg)	€0.95
	€1.35
	€1.75
	€2.15
Production technology (Tech)	Cisgenic breeding
	Conventional
Brand	Absent
	Melinda
Country of origin (COO)	Italy
	Germany
	China

Table 3. Factor loadings

Items	CFC-I factor	CFC-F factor
CFC-item 3 (I)	0.702	-0.219
CFC-item 4 (I)	0.738	-0.150
CFC-item 5 (I)	0.541	-0.027
CFC-item 9 (I)	0.602	-0.089
CFC-item 10 (I)	0.726	-0.020
CFC-item 11 (I)	0.801	-0.221
CFC-item 12 (I)	0.690	-0.126
CFC-item 1 (F)	-0.109	0.712
CFC-item 2 (F)	-0.046	0.695
CFC-item 6 (F)	-0.038	0.550
CFC-item 7 (F)	-0.096	0.717
CFC-item 8 (F)	-0.166	0.651
CFC-item 13 (F)	-0.217	0.606
CFC-item 14 (F)	-0.120	0.691

Table 4. Questions on attitudes towards cisgenic technology and cisgenic food consumption

		Response mean		
Item	**Question**	**Low time preference**	**High time preference**	**p-value**
1	It is a promising idea	4.806	4.656	0.001
2	It will be useful in the future	5.178	5.075	0.003
3	It will harm the environment	4.578	4.478	0.003
4	It is fundamentally unnatural	5.154	4.801	0.001
5	It should be encouraged	4.304	4.625	0.001
6	It makes you feel uneasy	4.354	3.903	0.001
7	Eating apples produced using cisgenesis will be safe	4.629	4.961	0.001
8	Eating apples produced using cisgenesis will be risky	4.616	4.285	0.001

Table 5. Socio-demographic and economic characteristics of the sample

Socio-demographic and economic characteristics		*% of total (n =570)*
Age	18-24 years	15.3
	25-34 years	39.5
	35-44 years	13.7
	45-54 years	12.3
	55-64 years	13.9
	>65 years	5.3
Gender	Male	48.8
	Females	51.2
Education	Primary School	1.9
	Secondary School	11.1
	High school	38.6
	Degree	41.1
	Master Degree	7.4
Monthly household income	<800 €	6.9
	800-1,500 €	27.65
	1,500-3,000 €	41.6
	3,000-5,000 €	18.1
	>5,000€	5.8

Table 6. RPL-EC model estimates

		Model 1	Model 2	Model 3	Model 4
Main Effects					
Tech	Mean	-1.291 ***	-1.289 ***	-1.215 *	-1.098 **
		(0.188)[1]	*(0.130)*[1]	*(0.182)*[1]	*(0.530)*[1]
	St. Dev.	2.277 ***	2.294 ***	2.242 ***	2.092 ***
		(0.146)	*(0. 151)*	*(0. 144)*	*(0. 141)*
Brand	Mean	0.389 ***	0.386 ***	0.392 ***	0.395 ***
		(0.069)	*(0.071)*	*(0. 071)*	*(0.070)*
	St. Dev.	0.696 ***	0.720 ***	0.768 ***	0.723 ***
		(0.085)	*(0. 097)*	*(0.010)*	*(0.010)*
COO_{GER}	Mean	0.711 ***	0.741 ***	0.819 ***	0.554 ***
		(0.154)	*(0.133)*	*(0. 151)*	*(0.136)*
	St. Dev.	0.919 ***	0.911 ***	0.826 ***	1.060 ***
		(0.187)	*(0.181)*	*(0. 189)*	*(0.179)*
COO_{CHINA}	Mean	-5.126 ***	-5.399 ***	-5.319 ***	-4.851 ***
		(0.367)	*(0.335)*	*(0. 341)*	*(0.310)*
	St. Dev.	2.302 ***	2.285 ***	2.572 ***	1.980 ***
		(0.228)	*(0.168)*	*(0. 171)*	*(0.160)*
Price		-1.291 ***	-1.272 ***	-1.289 ***	-1.209 ***
Opt-out		-1.397 ***	-1.597 ***	-1.218 ***	-1.845 ***
Error Component		3.494 ***	3.440 ***	3.805 ***	3.673 ***
Interaction Effects					
Tech*CFC-I	Mean		0.134		0.226 **
			(0.105)		*(0.097)*
Tech*CFC-F	Mean		-0.343 ***		-0.275 ***
			(0.099)		*(0.098)*
Tech*Gender	Mean			-0.169	-0.398 **
				(0.215)	*(0.200)*
Tech*Age	Mean			-0.001 *	-0.001 *
				(0.001)	*(0.001)*
Tech*Education	Mean			0.290 **	0.274 **
				(0.128)	*(0.121)*
Tech*Income	Mean			-0.375 ***	-0.307 ***
				(0.118)	*(0.106)*
Model fit					
LL		-2502.5	-2487.8	-2493.4	-2491.8
BIC[a]		5097.8	5085.2	5113.1	5126.9
BIC/N		1.118	1.115	1.121	1.124
AIC[b]		5027.1	5001.6	5016.8	5017.6
N=4560 obs.					

Notes: *, **, and *** indicate significance at the 0.05, 0.01, and 0.001 levels respectively.

[a] BIC: Bayesian information criterion

[b] AIC: Akaike information criterion