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Different Tubers for Different Consumers: Heterogeneity in Human Values and Willingness to Pay for Social Outcomes of Potato Credence Attributes

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ABSTRACT

This paper investigates heterogeneity in consumers' human values and willingness to pay (WTP) for social outcomes of credence process attributes that might have some positive social impact on purchases of early potatoes in Italy and Germany. Consumers' identification with cross-cultural human values is measured according to the Schwartz' Portrait Values Questionnaire; the distribution of preferences for product attributes that claim a positive social impact among respondents with different human values is modeled using mixed logit analysis. Parallel survey studies were conducted in each country with the intention of comparing the impact of human values using the Schwartz Values framework on willingness to pay for early potatoes with several credence process attributes that may signal a positive social outcome as a result of purchase (price, country of origin, carbon footprint certification, ethical certification, and method of production). This paper aims to help clarify the role, if any, that pro-social consumer values have in influencing the willingness to pay for specific food credence process attributes that claim to have a social impact. To the best of our knowledge this is one of the first paper to focus on the role human values have in influencing the willingness to pay for specific extrinsic food attributes.

Keywords: *Potato; Schwartz Values; Mixed logit; Choice model*

1 Introduction

For decades, research has suggested that consumer decisions are not exclusively rational and self-regarding (Camerer and Fehr, 2006), that consumers within demographic classes have widely varying preferences that are not fully explained by basic demographic profiles (Bruno et al., 1972; Worlsey and Lea, 2008), and that preferences for product attributes measured in choice experiments may not be complete and stable (Lusk and Briggeman, 2009). Consumer choices for credence process attributes may be influenced by other-regarding preferences or bounded rationality, or they may represent an intermediate stage of decision making. Credence process quality attributes of products indicate "the characteristics of the processes used to produce them," for which consumers are unable to judge the quality of the product, even after they have inspected, purchased, and used the product (Caswell, 1998). Consumers who purchase products with credence process product attributes that signify social outcomes provide a context to test the hypothesis that some consumer purchases are motivated by other-regarding preferences, given that the attributes expressly indicate that the purchase has an impact on public goods.

Consumers might consider some process attributes to increase individual welfare while simultaneously creating positive social outcomes (Hughner, et al., 2007; Lusk, et al., 2006a). For example, consumers might benefit individually from the characteristics of processes used to produce food products: food produced organically or locally might be perceived as fresher, more nutritious, or safer (Lusk, 2006b). At the same time, consumers might also believe that organic or local foods benefit others, in addition to benefiting themselves, by reducing environmental impacts or making a positive contribution to the consumer's regional economy (Caswell, 1998). Other process attributes, such as "fair trade" or "low carbon emissions" labeling, are less likely to have a distinct and noticeable impact on a given individual's welfare. Instead, these process attributes are intended to promote social values of equitable treatment of labor, and environmentalism. Individuals who make choices to promote social values are likely motivated by something in addition to gains in individual welfare, and researchers may be able to identify those motivations, beyond simply attributing the motivation to a "warm glow" (Andreoni, 1990).

To help clarify the role that values have in influencing willingness to pay (WTP) for specific credence process attributes that promote social outcomes, we use the Schwartz Portrait Values Questionnaire (PVQ) to provide a conceptual and empirical framework to measure human values and relate consumers' WTP for social outcome attributes to their human values profile (Schwartz et al., 2001). Our results suggest that there is an empirical relationship between Schwartz Human values and a stated preference for credence process product attributes that promote values-related social outcomes for a potato product. Consumers in both Italy and Germany who value the environment and social equitability have a higher WTP for product attributes that promote environmental, labor, etc. and consumers who value self-gratification, personal success, and social power have a lower WTP for these product attributes, all else equal.

Consumers' affinities for products with credence process attributes that promote social outcomes such as environmentalism, social equitability, or ethnocentrism, are more likely to be based on consumers' values than their demographic characteristics. An emerging body of economic literature seeks to identify and measure the role that these previously unobserved consumer values have on influencing consumers' WTP for product attributes, in general.

In this paper, we suggest that the concept of food quality extends from food characteristics that benefit the purchaser to social outcomes that result from purchase. We identify and measure the relationship between human values and consumers' choices for products that claim a social outcome by labeling products as possessing credence process attributes (Bond et al., 2007; Lusk and Briggeman, 2009). Therefore, we try to examine whether individuals' values explain product choices with attribute claims for social outcomes. We use a robust cross-cultural survey tool, the PVQ, to identify consumer heterogeneity in WTP for a potato product with attributes that promote social outcomes based on human values. We apply the tool to consumers in Germany and Italy and analyze the results using a mixed logit model to capture additional heterogeneity by allowing coefficients to have a distribution. Instead of imposing the *a priori* framework of Schwartz Human Values, we allow our econometric models to identify significant relationships in the data, and find that these relationships confirm the Schwartz Values framework, suggesting that the PVQ has promise as a tool for identifying future relationships between consumers' heterogeneous values and valuations for credence process attributes.

The paper is organized as follows: Section 2 reviews the literature on the relationship between human values and consumer decision-making; Section 3 describes the data collection methodology; Section 4 describes the model applied to uncover the effect of human values on consumer decision making in the two new potato markets; Section 5 presents the results of our analysis, and Section 6 concludes.

2 Human values and Willingness to pay for food attributes

Consumer demand analyses have focused on a wide range of credence attributes. Food safety, nutrition information, and product traceability have been widely shown to be important to consumers (Hobbs, 2003; Golan et al., 2004; Verbeke & Ward, 2006; Van Rijswijk et al., 2008; Lusk & Briggeman, 2009; Ubilava & Foster, 2009; Louriero, et al., 2007). Food safety, nutrition, and traceability attributes are primarily vertically differentiated, but consumers have heterogeneous preferences for many process attributes. Consumers may interpret process attributes as important signals of other types of attributes that we would expect all consumers to value. For example, consumers may perceive that products grown near to the point of purchase are fresher, more nutritious, taste better, and are safer (Boyle, 2004; Scarpa and Del Giudice, 2004; Feldmann and Hamm, 2015; Cavallo and Piqueras-Fiszman, 2017). On the other hand, the growth in "conscious consumerism" suggests that consumers who value process attributes beyond the utility given by consumption of the product may not be solely motivated by self-interest (Mainieri et al., 1997). Examples of credence process attributes that a "conscious consumer" might purchase include credence process attributes like environmental production and protection, sustainable development, assurances towards worker protections, and equal labor remuneration.

Economic studies that rely on demographic market segmentation alone are inadequate to account for consumer decisions that are motivated by other-regarding preferences (Bruno et al., 1972; Kamakura and Novak, 1992; Cicia, 1993; Camerer and Fehr, 2006; Lusk and Briggeman, 2009; Cicia et al., 2010; Naspetti and Zanoli, 2011; Cembalo et al., 2016; Caracciolo et al., 2016; Roselli et al., 2018). These studies tend to predict consumers' choices based on food attributes and consumers' observable demographic characteristics. Little research is available on the influence of personal values on consumer's purchasing decisions, though values and beliefs are likely pivotal predictors of food consumption (Cicia, et al., 2002; Rigby and Burton 2003; Alfnes, 2004; Scarpa and Del Giudice, 2004; Michaelidou and Hassan, 2008; Lusk et al., 2006a; Ubilava and Foster, 2009).

To address this gap, an emerging body of economic and other social science research investigates how values and beliefs likely affect consumers' food choices for vegetarian diets, organic production, environmental outcomes, food safety, country-of-origin labeling and preferences for domestic or local products (Allen and Baines, 2002; Umberger et al., 2003; Lea and Worsley, 2005; Lusk,et al., 2006b; Spash and Vatn, 2006). Many of the economic studies have used ad hoc mechanisms to identify the values and beliefs that drive decision making, but there is progress in linking the measurement tools economists use with more robust tools from other disciplines that measure values and beliefs. Prominent social psychologists such as Rokeach (1973); Ajzen (1985); Inglehart et al. (1998); Schwartz (1994) have developed different conceptual frameworks to identify how individuals' values and beliefs influence choices. The conceptual frameworks include both theoretical mechanisms by which values are filtered through intermediate stages of decision making, and decision-making contexts and tools based on these frameworks to identify and measure stable values that persist in individuals over time. These tools have been extended to apply to individuals' economic choices in different circumstances, and additional tools such Food Values (Lusk and Briggeman, 2009) have further extended the application of social psychologists modeling of values-based decision making to the sphere of food decisions. Behavioral economists have also used experimental tools, for example, Ultimatum and Dictator Games and BDM mechanism to measure individual consumers' preferences for pro-social outcomes, like altruism and fairness (ref).

The Food Values (FV) tool developed by Lusk and Briggeman (2009) eliminates the malleability of stated and revealed preferences for food attributes by determining consumers' food values systems. Lusk and Briggeman point out that consumer choices for unfamiliar food attributes may not be complete and stable representations of preferences. Instead, choices reflect decisions made as trial and error, and within the context of a decision task; the choices made, then, represent an intermediate stage of decision making and not an absolute, time-invariant statement of preference. To address this, Lusk and Briggeman designed the FV tool to identify and measure abstract attributes, consequences, and end states (186) of food consumption that may be able to explain consumers' choices between food products, referred to as "food values". Lusk and Briggeman applied the FV tool to consumers' preferences for organic food. They found that, on average, consumers placed the most importance on price, food safety, nutrition, and taste, as expected, but also that there is significant heterogeneity across consumers. Respondents who ranked naturalness, fairness, and the environment as very important were more likely to have purchased organic food in the past, and stated higher willingness to pay for organic food. Consumers for whom price was the highest ranked food value were the least likely to have purchased organic food, and expressed the lowest willingness to pay. The authors also found interesting relationships between FV – for example, people who placed high importance on fairness place lower importance on self-centered values of price, taste,

convenience and appearance. Results from additional applications of the FV tool reinforce these findings (Lusk, 2011; Pappalardo and Lusk, 2016; Lee et al., 2014).

Finally, the Schwartz Human Values tool has been used to demonstrate how an underlying set of stable human values influences individuals' choices, primarily in the public health and psychological literature. Schwartz (2007) proposed that humans across cultures share a core set of relatively stable "value orientations". Schwartz distinguishes these underlying values from their expression as attitudes, norms, opinions, and actions that are commonly measured in social sciences. The underlying values "*guide the selection or evaluation of actions, policies, people and events*" (Schwartz, 2007, p. 297), and remain stable for individuals throughout their lives.

Ten universal human values are identified by Schwartz: Self-Direction, Stimulation, Hedonism, Achievement, Power, Security, Conformity, Tradition, Universalism and Benevolence. Descriptions of these values are provided in Table 1. Each value relates to the others either appositionally or complementarily. For example, an individual whose values are positively correlated with Tradition would express values that were negatively correlated with Hedonism, but positively correlated with Conformity. As such, Schwartz grouped the ten human values into opposite meta-values, organizing them in a circular-spatial manner. The meta-values and their respective individual values are shown in Figure 1: *Openness to chang*e (stimulation, self-direction and hedonism) versus *Conservation* (security, conformity and tradition); *Self-transcendence* (benevolence and universalism) versus *Self-enhancement* (hedonism, achievement and power). In the theoretical Schwartz framework, hedonism can either stand-alone or can be a part of *Openness to change* or *Self-enhancement meta-values* (Caracciolo et al., 2016).

Table 1.
Schwartz values and defining goals

Table 1 - Schwartz values and defining goals

VALUES	DEFINING GOALS
SELF-DIRECTION	Independent thought and action-choosing, creating, exploring (creativity, freedom, independent, curious, choosing own goals, self-respect, intelligent, privacy)
STIMULATION	Excitement, novelty, and challenge in life (a varied life, an exciting life, daring)
HEDONISM	Pleasure and sensuous gratification for oneself (pleasure, enjoying life, self-indulgent)
ACHIEVEMENT	Personal success through demonstrating competence according to social standards (successful, capable, ambitious, influential, intelligent, self-respect, social recognition)
POWER	Social status and prestige, control or dominance over people and resources (social power, authority, wealth, preserving my public image, social recognition)
SECURITY	Safety, harmony and stability of society and of relationships (family security, national security, social order, clean, reciprocation of favors, healthy, moderate, sense of belonging)
CONFORMITY	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms (obedient, self-discipline, politeness, honoring parents and elders, loyal, responsible)
TRADITION	Respect, commitment, and acceptance of the customs and ideas that one's culture or religion provides (respect for tradition, humble, devout, accepting my portion in life, moderate, spiritual life)
BENEVOLENCE	Preserving and enhancing the welfare of those with whom one is in frequent personal contact [the 'in-group'] (helpful, honest, forgiving, responsible, loyal, true friendship, mature love, sense of belonging, meaning in life, a spiritual life)
UNIVERSALISM	Understanding, appreciation, tolerance and protection for the welfare of all people and for nature (broadminded, social justice, equality, world at peace, world of beauty, unity with nature, wisdom, protecting the environment, inner harmony, a spiritual life)

Source: *Caracciolo et al., 2016*

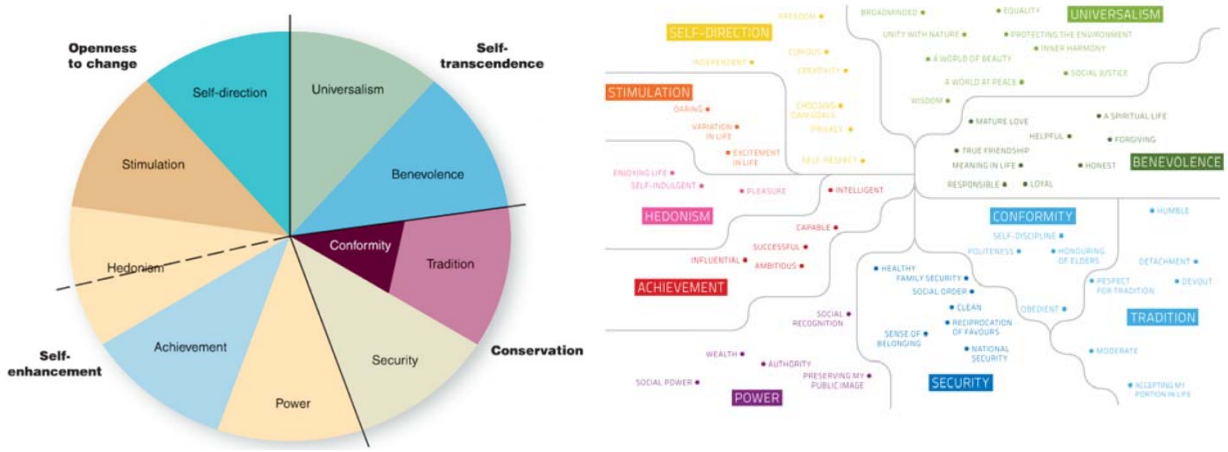

Figure 1. Schwartz Human Values
Source: *Schwartz (2006) and Holmes et al. (2011*

)

How consumers identify themselves in relation to these values is unveiled through the Schwartz 21-item Portrait Value Questionnaire (PVQ). Each of the 21 items in the PVQ addresses one of the ten human values. The survey provides respondents with statements that describe an unknown person's profile, such as "*she thinks it is important that every person in the world be treated equally. She believes everyone should have equal opportunities in life*", and it asks respondents to rank the extent to which they identify with this person, using a six-point scale, where one indicates a low level of identification (*not like me at all*) and 6 ranks a high level of identification (*very much like me*).

The Schwartz Human Values (SHV) tool has been used in a handful of economic studies on consumer food choices. Lombardi and colleagues (2015) used food related lifestyle (FRL) and SHV to identify consumer participation in a Solidarity Purchasing Group (SPG) in Italy, which is a consumer cooperative that works directly with regional farmers to source products for its members with the intention of supporting local economies. Caracciolo et al. (2016) analyzed the relationship between consumers' preferences for sustainable pig farming practices and SHV in five different European countries. This study (n=2437) suggested a strong relationship between consumers who valued protection of welfare and nature, and an increased valuation of product attributes that promoted environmentally cleaner pork production systems; while consumers who valued self-gratification, personal success, and social power demonstrated a decreased valuation for these product attributes.

Our paper extends this research by identifying and measuring human values to explain willingness to pay for credence process attributes for early potatoes. We chose the SHV framework to identify human values and the PVQ tool to measure these values for a number of reasons. The SHV framework is well-established in the choice literature, and has been shown to be valid across cultures, which is particularly valuable as we seek to compare consumers in different countries. The PVQ tool, with only 21 scale questions, places a low burden on respondents, which reduces fatigue and increases the reliability of results. The simplicity of the PVQ also reduces the variability in researcher subjectivity that burdens other approaches, such as means-end laddering. There are, of course, critiques of the SHV framework and PVQ tool that we take into consideration in our analyses. SHV do not include measures that might provide insight into consumers' relative preferences for a credence attribute that signals both social outcomes and fundamentally important product attributes, such as food safety, nutrition, convenience, or appearance (Lusk and Briggeman, 2009) and we are not able to separate consumers' beliefs regarding the meanings of attributes claims and their preferences for those claims (Costanigro and Lusk, 2014). Therefore, we are not able to empirically disaggregate respondents' preferences for social impacts versus their preferences for increased individual welfare. However, we feel comfortable interpreting our results as upper bound preferences for social impacts, as food safety in Italian and German produce markets is likely considered to be adequately addressed by government regulation (Groulleau and Caswell, 2006) and we believe that product nutrition, convenience, and appearance for a potato product would be equivalent across the product attributes that we do vary in our study. We also focus our interpretation on product attributes that are less likely to bundle personal and social benefits.

3 Methods

3.1 Human values and product attributes measurement

Our analysis explicitly considered consumers' human values using the framework proposed by Shalom H. Schwartz (1992) and the 21-item Schwartz Portrait Values Questionnaire (Schwartz, et al., 2001).

The early potato product was chosen because it conforms with many of the relevant process attributes in which we were interested. The early potato is differentiated, in Italy and Germany by regional and national origin, environmental production, ethical certification, and carbon footprint (Caracciolo et al. 2018?). In Italy, early potato cultivation is concentrated mainly in the southern regions, especially in pockets that have evolved to resemble informal "territorial districts" that bind their agricultural economy to this crop. Early potatoes grown in these regions are sold on the national market and are exported, mainly to Germany. Early potatoes from other Mediterranean countries are also widely available in Italy and Germany. Unlike storage potatoes, early potatoes are not stored prior to sale, and are considered to be a perishable product with a short window of freshness. Italian producers use conventional, organic or low-input cultivation methods to grow early potatoes. The product may be certified and branded as ethically produced in accordance with the SA8000 certification[1], and it may be certified as being a part of

1 SA8000 is an auditable certification standard that encourages organizations to develop, maintain, and apply socially acceptable practices in the workplace (Henkle, 2005)

a low-carbon emissions supply chain, featuring a carbon logo. The characteristics of early potato, like its production in specific territorial districts, freshness, the development of more sustainable cultivation methods, the increasing competition with potatoes from other countries, and its ethical and carbon-footprint certifications make it an interesting case to test this relationship in modern markets.

The set of potato attributes and attribute levels we chose to study are specific to the new potato product, and they were selected as a result of a multi-step process. We began with a literature review, based on which we conducted in-depth interviews with Italian and German stakeholders in the early potato supply chain. Next, we narrowed down the relative importance of different new potato attributes through focus groups held with consumers, allowing us to identify the most relevant different quality dimensions of early potatoes. This qualitative approach to content validity[2] (Yaghmale, 2009), allowed us to finalize the questionnaire and identify the attributes and levels used to analyze consumers preferences. The attributes that emerged as most important to consumers included local production in specific territorial districts, freshness, sustainable cultivation methods, the perception of an increase in undocumented migrants among agricultural workers, and competitive pressures from imported new potatoes. The credence attributes that we ultimately selected to model were those that indicated territorial origin, ethical certification, production method and carbon footprint certification.

We expect that consumers who exhibit meta-values that reflect outward looking, pro-social human values will have a higher WTP for credence process attributes that claim positive social impact, and consumers who exhibit meta-vales that reflect inward, self-interested human values will have a lower WTP for these attributes. In particular, we expect that consumers with "self-transcendent" Schwartz meta-values will be WTP more for product attributes that indicate social outcomes like environmentalism and equitability. We also expect that these consumers will be WTP more for environmental production methods, but our survey design does not allow us to disaggregate what part of this increased WTP is driven by self-interest for healthful, safe, fresh foods versus what part is driven by preferences for pro-social outcomes. We would expect that consumers who exhibit self-enhancement, conservative, or hedonistic meta-values will have lower WTP for product attributes that indicate social outcomes. Finally, we would expect that consumers who exhibit conservative meta-values would express higher WTP for ethnocentric attributes, like own-country of origin labeling.

3.2 Study participants

Our research compared heterogeneity in preferences and consumers' human values in Italy and Germany. We used a unique set of cross-sectional survey data from a representative sample of 1,009 German and 1,004 Italian consumers, conducted by a professional marketing company. People interviewed were responsible for household major food purchasing decisions. The sample has been selected and stratified by geographical area, city size, gender and age (table 2).

2 Content validity refers to the degree of coverage as regards the content, which the instrument is supposed to measure (Yaghmale, 2009). Special attention was paid to identify first the attributes and than the levels that define each attribute in order to define the specific quality dimension.

Table 2.
Socio-demographic characteristics of the sample

	Germany	**Italy**
Gender (%)		
Male	45,5	13,3
Female	54,5	86,7
Age (years)**:** mean and (st.dev)	42.4 (13.1)	52.5 (14.4)
Children<10 years old (%)		
Yes	20,60	18,30
No	79,40	81,70
Economic situation of the family (%)		
Poor	22,80	25,20
Moderate	39,30	36,90
Good	23,30	36,60
No answer	14,60	1,20
Highest qualification completed (%)		
High School	11,80	31,30
High School	22,50	40,40
University Degree	28,90	15,00
No answer	36,80	13,30
Sample Size	1.009	1.004

The first section of the questionnaire assessed the perception of the quality of fresh food products from consumers and their level of knowledge about product attributes through a set of exploratory questions. The second section focused on the early potato: respondents were introduced to the main characteristics of the new potato, and then were asked about past purchases of new potatoes, including frequency of consumption, the country of origin (if known), and the importance attached to the various attributes of early potatoes. In the third section, each respondent was asked to choose a preferred early potato product from a labeled hypothetical choice set containing four different early potato products, or to 'opt-out' and choose "none of these products". Each early potato product label featured a combination of five different extrinsic attributes and price. Each extrinsic attribute was varied between two or three "levels" of attribute-specific options. Attributes and levels included in the randomized questionnaire design are shown in Table 3. Each individual consumer faced five different choice sets, with four different products and the opt-out alternative. Each of the four products offered featured a different label showing the one level of each of the product attributes. The order of choice sets offered was randomized between respondents in order to avoid order bias. Choice sets were the result of a randomized CBC (Choice-Based Conjoint) advanced design with complete enumeration. The D-optimal coefficient of the experimental design was equal to 0.99.

Table 3.
Attributes and levels

Attributes	Levels	Attributes	Levels
Production Method		Country of Origin	
	Organic		Italy/Germany
	Environmental Friendly		Non-Domestic product (but COO known)
	No information		No information
Carbon Footprint		Price (Euro/kg)	
	Carbon footprint logo		0,60
	No information		0,80
			1,00
			1,40
Ethical certification			
	SA8000 certification		
	No information		

4 Model and Analysis

We modeled previously unobserved heterogeneity in consumers' preferences for product attributes of new potatoes both by explicitly estimating consumers' preferences according to their SHV profiles, and by modeling the distribution of those consumers' preference profiles using a mixed logit, or random parameters logit, model. We first evaluated the reliability of the PVQ results. Upon satisfactory reliability, we conducted a Principal Components Analysis (PCA) with varimax rotation to reduce the number of variables and identify human values, principal component weights to create value profiles for respondents. We, then, used the principal component weights for individual level human values profiles and extrinsic product attributes in a mixed logit model (ML) to determine preference heterogeneity within different Schwartz values profiles. The ML model also allowed us to avoid the assumption that observations from a given individual are independent of one another, which is a shortcoming of the standard logit model (Revelt and Train, 1998; McFadden and Train, 2000).

4.1 Values Reliability

To determine reliability of the Schwartz Portrait Value results, we computed Cronbach's alpha scores for each of the 10 Schwartz Values. For nine out of the ten Schwartz Values, reliability was a function of responses to two of the PVQ questions; for the Schwartz Value "Universalism," the reliability was calculated as a function of the responses to three questions (Brunsø et al., 2004; Schwartz et al.,, 2001).

Alpha scores for the Italian and German data sets are reported below in Table 4. According to the literature, alpha scores of above 0.5 are generally considered to indicate moderate/high reliability[3]. All of the Values, except "tradition" in the Italian data set, meet this standard. We retained this value, however, because retention of this variable had negligible impact on subsequent analyses.

[3] "*There is much debate among researchers as to where the appropriate cut-off points are for reliability. A good guide is: 0.9 and above shows excellent reliability; 0.7 to 0.9 shows high reliability; 0.5 to 0.7 shows moderate reliability; 0.5 and below shows low reliability* " (Hinton et al., 2014, p. 364)

Table 4.
Reliability of the 2-3 item Portrait Values Questionnaire scores (Cronbach's alpha)

	German data	Italian Data
Values	C. alpha	C. alpha
Power	0,64	0,63
Achievement	0,76	0,81
Hedonism	0,66	0,61
Stimulation	0,57	0,71
Self-Direction	0,56	0,56
Universalism	0,59	0,68
Benevolence	0,72	0,62
Tradition	0,50	0,35
Conformity	0,59	0,54
Security	0,72	0,57

4.2 Principal Component Analysis

To reduce the number of variables and obtain principal components weights to be used as regressors in our ML model, we conducted a PCA of the 21 PVQ scores, using varimax rotation. These components represent the relative weight of each observation on the composition of components. The orthogonality conditions of the varimax rotation are critical in this analysis because of the oppositional tension inherent in the Schwartz value design (Cembalo et al., 2016). Kaiser-Meyer-Olkin tests (KMO) verify the validity of the initial data applied to the model. According to the Schwartz Human Values literature, we would expect the ten human values to be reduced to five principal components corresponding to the meta-values described above. Our analysis identified three explained principal components for the Italian data and four explained components for the German data, a significant reduction from the original 21 questions. The resulting primary components align with the meta-value categories described above, and have been consistent with the SHV framework although they fell along slightly different boundaries due to the smaller number of components. We refer to these components as “values profiles”.

The three values profiles identified from the Italian PCA and included as regressors in the mixed logit model below are therefore: “Self-Transcendence/ Openness-to-Change,” “Self-Enhancement/ Openness-to-Change,” and “Conservation”. The component analysis results for Italy are presented below in Tables 5.

Table 5.
Italian Principle Component Analysis results

Values	Meta-Values			*Unexplained*
	Self-Enhancement/ Openness-to -Change	**Self-Transcendence/ Openness-to- Change**	**Conservation**	
Achievement	**0,52**	-0,08	0,03	0,23
Hedonism	**0,44**	0,05	0,05	0,33
Power	**0,51**	-0,15	0,11	0,27
Stimulation	**0,45**	0,17	-0,12	0,27
Benevolence	-0,09	**0,55**	0,11	0,23
Self-direction	0,25	**0,49**	-0,23	0,30
Universalism	-0,09	**0,61**	0,05	0,19
Conformity	0,05	-0,01	**0,60**	0,30
Security	-0,01	0,17	**0,45**	0,37
Tradition	0,01	-0,03	**0,59**	0,38

Variance explained : 71.5%

The four values profiles resulting from the German PCA consisted of four meta-values, including "Self-Transcendence/ Openness-to-Change," "Self-Enhancement," Conservation," and "Hedonism." The component analysis results for Germany are presented below in Table 6.

Table 6.
German Principle Components Analysis results

Values	Meta-Values				*Unexplained*
	Conservation	**Self-Transcendence/ Openness-to-Change**	**Self Enhancement**	**Hedonism**	
Conformity	**0,53**	0,05	0,23	-0,14	0,30
Security	**0,53**	-0,16	-0,13	0,40	0,19
Tradition	**0,54**	0,09	0,06	-0,14	0,30
Benevolence	0,24	**0,32**	-0,26	0,23	0,25
Self-direction	-0,15	**0,60**	0,07	0,04	0,30
Stimulation	-0,19	**0,33**	0,20	0,32	0,28
Universalism	0,14	**0,61**	-0,09	-0,17	0,23
Achievement	-0,03	0,06	**0,60**	0,07	0,21
Power	0,08	-0,06	**0,67**	0,00	0,17
Hedonism	-0,02	-0,03	0,03	**0,78**	0,15

Variation explained: 76.47%

4.3 Mixed Logit Analysis Results

4.3.1 Mixed Logit Model

The values profiles were included in our Mixed Logit model analysis as observable consumer attributes. The mixed logit model has been then used to estimate the posterior probability of Italian and German consumers' selection, and their WTP for different credence process attributes of the new potato in both willingness to pay and preference space. The mixed logit discrete choice model addressed two of the most critical concerns associated with the traditional logit model. The model accounted for additional unobserved consumer heterogeneity by allowing parameters to vary randomly (Revelt and Train, 1998). As a result, our model did not suffer from the inappropriate imposition of IIA. In addition, the mixed logit model allowed unobserved utility to be correlated over individuals in our panel (Revelt and Train, 1998). The mixed logit model has been widely used for food and consumer choice research (ref?).

In the discrete choice model, consumers n = 1,…,N maximize utility $U_{njt} = \beta_n' x_{njt} + \varepsilon_{njt}$, where β_n is a vector of individual-specific coefficients, x_{njt} is a vector of observed attributes relating to individual n and alternative j on choice occasion t, and ε_{njt} is a random term that is assumed to be an independently and identically distributed extreme value. The density for β is denoted as $f(\beta|\theta)$, where θ are the parameters of the distribution. Conditional on knowing β_n , the probability of respondent n choosing alternative i on choice occasion t is given by the conditional logit formula (McFadden, 1974):

$$L_{njt}(\beta_n) = \frac{\exp(\beta'_n x_{nit})}{\sum_{j=1}^{J} \exp(\beta'_n x_{njt})} \quad (0.0)$$

Where *j = 1,…, J* denotes the product alternatives, and *t = 1,…,T* denotes the choice sets. The vector of observed variables includes all of the product attributes for the alternative offered to the consumer:

$$S_n(\beta_n) = \prod_{t=1}^{T} L_{ni(n,t)t}(\beta_n) \quad (0.0)$$

Where $i(n,t)$ is the alternative chosen by individual n on choice occasion t. The unconditional probability of the sequence of choices that are observed is the conditional probability integrated over the distribution of β :

$$P_n(\theta) = \int S_n(\beta_n) f(\beta \mid \theta) d\beta \quad (0.0)$$

This is a weighted average of a product of logit formulas evaluated at different values of β, with the weights provided by the density f .

The goal has been to estimate the mean and covariance of β_n, or the population parameters θ. Since we suggested that there is consumer heterogeneity, the population parameters provided us with the distribution of individual parameters. The probability estimation had to be approximated by simulation, as the integral 1.3 does not exist in closed form and cannot be calculated analytically. Details on the simulation procedure are provided by Hole (2007).

4.3.2 Model Specifications

credence attributes for early potatoes. We interacted these attributes variables with values profiles to create variables that captured heterogeneity in preferences for attributes based on human values. The Italian model included interactions between Self-Transcendence/ Openness-to-Change and attribute variables, and Self-Enhancement/ Openness-to-Change and attribute variables; the base, or omitted, case is Conservation. The German model includes interactions between Self-Transcendence/ Openness-to-Change and attribute variables, Self-Enhancement and attribute variables; and Conservation and attribute variables; the base, or omitted, case is Hedonism[4].

Following Hole (2007; 2008) we tested a number of different model specifications to identify which coefficients to vary or to leave as fixed, and which distributions (normal or log normal) these coefficients should have followed[5]. As a result, the models estimated for the Italian and German data sets vary slightly, in order to best fit the respective data. In both cases, we found that allowing normal price variables to vary, improved model fit (Hole, 2008; Meijer and Rouwendal, 2006). In both data sets, we tested whether coefficients were independently distributed, and finding that they were not, we followed Hole (2007) and Train (2009) to estimate the parameters in the covariance matrices[6] and allowed for correlated normal coefficients.

4.3.3 Mixed Logit Model Results

Given the results of the PCA, we expected that Italian and German consumers whose values profiles align principally with Self-Transcendence/ Openness-to-Change would have demonstrate a coefficient with positive effects for process attributes that may promote a social outcome, including potatoes that are labeled to indicate ethical labor practices, and low carbon impact. We would also expected these coefficients to be positive for sustainable production methods, such as Organic or Environmental Production, but we were not able to disaggregate these effects from preferences for increased individual welfare. We expected that Italian and German consumers who expressed the meta-value of Self-

[4] The models were tested with different base cases. These specifications fit the data best.
[5] If we had found that the log-normal distribution fit best, it may not have been the case that coefficients were correlated.
[6] Not estimated directly, but through the lower-triangular matrix L, where covariance matrix is LL'

Enhancement would have demonstrated a decreased willingness to pay for potatoes that do not confer an individual benefit, including ethical certification and carbon logo. Mean coefficient estimates and standard deviations for the ML model have been reported in Tables 7 and 8. We focused our analysis on the statistically significant parameters. We do not have strong priors about the effects of COOL. On one hand, we might expect that a person who exhibits a Self-Enhancement values profile might indicate an ethnocentric perspective, giving Own-Country origin labeling a positive effect, but Other-country Origin labeling a negative effect. On the other hand, a truly self-regarding values profile might indicate a disregard for anyone other than oneself, resulting in a negative effect.

Table 7.
Models estimation (Italy)

			Italian Logit		Italian Mixed Logit			
Attributes		Values	Coefficients		Coefficients		Standard Deviations	
			Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Price			**-1,05**	0,06	**-0,94**	0,10	**1,45**	0,14
	X	Self Enhancement	**0,15**	0,03	**0,15**	0,06	**0,36**	0,13
	X	Self Transcendence	**-0,10**	0,03	0,06	0,08	**0,47**	0,16
Production								
	Environmentally friendly		**0,16**	0,05	**0,32**	0,05		
	X	Self Enhancement	-0,03	0,03	**-0,12**	0,04		
	X	Self Transcendence	0,05	0,03	**0,13**	0,04		
	Organic		0,01	0,05	**0,29**	0,06		
	X	Self Enhancement	0,00	0,03	**-0,13**	0,04		
	X	Self Transcendence	**0,07**	0,03	**0,18**	0,04		
Carbon Logo			**0,40**	0,04	**0,40**	0,04	**0,43**	0,10
	X	Self Enhancement	-0,03	0,02	-0,06	0,03	**0,18**	0,05
	X	Self Transcendence	0,05	0,03	0,07	0,04	**0,21**	0,06
Origin								
	Labeled Italian		**2,25**	0,05	**2,50**	0,11	**1,54**	0,12
	X	Self Enhancement	**-0,18**	0,03	**-0,39**	0,07	**0,42**	0,10
	X	Self Transcendence	**0,11**	0,03	**0,29**	0,08	**0,40**	0,11
	Labeled Not Italian		**0,66**	0,06	**0,66**	0,10	**1,08**	0,11
	X	Self Enhancement	0,01	0,03	-0,11	0,06		
	X	Self Transcendence	-0,06	0,04	0,07	0,07		
SA8000 Certification			**0,32**	0,04	**0,45**	0,05		
	X	Self Enhancement	**-0,07**	0,02	**-0,16**	0,04	**0,24**	0,06
	X	Self Transcendence	0,05	0,03	**0,13**	0,04	**0,21**	0,07
Opt-Out			**-1,07**	0,10	**-4,74**	0,59	**4,26**	0,41
	X	Self Enhancement	**0,16**	0,04	0,23	0,29	**0,87**	0,24
	X	Self Transcendence	**-0,20**	0,04	**0,94**	0,31	**1,77**	0,30
Constant			**-1,81**	0,08				

Values in bold denote statistical significance at the 5% level

Table 8.
Models estimation (Germany)

			German Logit		German Mixed Logit			
Attributes		Values	Coefficients		Coefficients		Standard Deviations	
			Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Price			**-2,12**	0,06	**-3,07**	0,17	**2,77**	0,21
	X	Self Enhancement	**0,30**	0,04	**0,26**	0,12	**1,25**	0,19
	X	Self Transcendence	0,07	0,04	**0,49**	0,15	**2,02**	0,25
	X	Conservation	-0,06	0,04	-0,15	0,13	**0,77**	0,17
Production								
	Environmentally friendly		**0,18**	0,05	**0,58**	0,07		
	X	Self Enhancement	0,01	0,04	**-0,26**	0,06	**0,62**	0,09
	X	Self Transcendence	**-0,12**	0,03	**0,16**	0,07	**0,56**	0,09
	X	Conservation	**0,06**	0,04	0,09	0,06		
	Organic		**0,25**	0,05	**0,73**	0,07		
	X	Self Enhancement	**-0,09**	0,03	**-0,27**	0,06	**0,60**	0,09
	X	Self Transcendence	0,03	0,04	**0,20**	0,07	**0,54**	0,08
	X	Conservation	0,03	0,04	0,11	0,06		
Carbon Logo			**0,31**	0,04	**0,38**	0,05		
	X	Self Enhancement	**-0,06**	0,03	**-0,13**	0,04	**0,29**	0,07
	X	Self Transcendence	0,02	0,03	**0,11**	0,05	**0,51**	0,08
	X	Conservation	-0,02	0,03	-0,02	0,04		
Origin								
	Labeled German		**1,73**	0,05	**2,00**	0,08		
	X	Self Enhancement	**-0,17**	0,03	**-0,36**	0,06		
	X	Self Transcendence	**-0,14**	0,04	0,07	0,09	**1,44**	0,11
	X	Conservation	**0,14**	0,04	**0,23**	0,06		
	Labeled Not German		**0,53**	0,05	0,16	0,08		
	X	Self Enhancement	0,00	0,04	**-0,17**	0,07	**0,60**	0,09
	X	Self Transcendence	**-0,16**	0,04	0,09	0,08		
	X	Conservation	-0,04	0,04	-0,11	0,07		
SA8000 Certification			**0,49**	0,04	**0,81**	0,06	**0,49**	0,09
	X	Self Enhancement	**-0,17**	0,03	**-0,30**	0,05	**0,53**	0,07
	X	Self Transcendence	**0,07**	0,03	**0,20**	0,06	**0,46**	0,09
	X	Conservation	0,01	0,03	0,08	0,05	**0,18**	0,08
Opt-Out			**-2,16**	0,09	**-6,40**	0,60	**5,20**	0,38
	X	Self Enhancement	**-0,10**	0,05	**-1,02**	0,27	**1,20**	0,32
	X	Self Transcendence	-0,07	0,05	**0,90**	0,31	**2,47**	0,35
	X	Conservation	**-0,15**	0,05	-0,10	0,26		
Constant			**-0,63**	0,07				

Values in bold denote statistical significance at the 5% level

We created interaction variables between the values profiles discussed above and product attributes. Several of these interactions were statistically significant, and, additionally, conformed to the hypotheses regarding how human values affected consumer preferences for extrinsic credence attributes. For the Italian model, the interactions between *Self-Transcendence/ Openness-to-Change* and the process attributes *Organic* and *Environmental Friendly* production, *Italian Origin*, and *Ethical Certification* have been significant and positive. The interactions between *Self-Enhancement* and the process attributes *Organic* and *Environmental Friendly* production, *Italian Origin*, and *Ethical Certification* have been significant and negative. The likelihood ratio for the model indicated a good fit.

Italian and German consumers, as a whole, value process attributes as one would expect, based on prior research. In the ML model, the random coefficients have been expected to vary across individuals; this variation has been indicated by the estimated standard deviations of the coefficients. The random coefficients in both Italian and German ML models included *Price, COOL* (Country of Origin Labeling), *Italian/ German Origin, Carbon Logo,* and *Ethical Certification.* Each of these has been statistically significant. The *Organic* and *Environmentally Friendly* production methods attributes were also random, significant, and positive in the German model; while they were not random in the Italian model, they were significant and positive. *Price* effects and the

"*Opt-Out*" were random, significant and negative for both Italian and German consumers, as expected.

Table 9.
WTP estimate for Mixed Logit Italia

Attributes		Values	Coefficients		Standard Deviations	
Production			Coef.	Std. Err.	Coef.	Std. Err.
	Environmentally friendly		**0,36**	0,04		
	X	Self Enhancement	**-0,06**	0,03		
	X	Self Transcendence	**0,11**	0,03		
	Organic		**0,34**	0,04		
	X	Self Enhancement	-0,03	0,03		
	X	Self Transcendence	**0,13**	0,03		
Carbon Logo			**0,31**	0,03		
	X	Self Enhancement	-0,02	0,02	0,06	0,05
	X	Self Transcendence	**0,05**	0,02	0,00	0,06
Origin						
	Labeled Italian		**2,10**	0,14	**0,90**	0,10
	X	Self Enhancement	**-0,23**	0,05	**0,23**	0,05
	X	Self Transcendence	**0,22**	0,06	**0,29**	0,06
	Labeled Not Italian		**0,71**	0,08	**-0,39**	0,09
	X	Self Enhancement	-0,05	0,04		
	X	Self Transcendence	0,07	0,05		
SA8000 Certification			**0,35**	0,04	**0,29**	0,10
	X	Self Enhancement	**-0,08**	0,03	**-0,12**	0,06
	X	Self Transcendence	**0,10**	0,03	**-0,14**	0,05
Opt-Out			**-6,45**	0,88	**4,46**	0,54
	X	Self Enhancement	0,07	0,09	**0,62**	0,12
	X	Self Transcendence	0,15	0,11	**1,99**	0,26

Values in bold denote statistical significance at the 5% level

Table 10.
WTP estimate for Mixed Logit Germany

			German Mixed Logit			
Attributes		Values	Coefficients		Standard Deviations	
			Coef.	Std. Err.	Coef.	Std. Err.
Production						
	Environmentally friendly		**0,24**	0,02		
	X	Self Enhancement	**-0,07**	0,01	**-0,06**	0,01
	X	Self Transcendence	**0,06**	0,02	0,00	0,02
	X	Conservation	0,03	0,01		
	Organic		**0,25**	0,02		
	X	Self Enhancement	**-0,07**	0,01	**0,04**	0,01
	X	Self Transcendence	**0,07**	0,02	0,00	0,01
	X	Conservation	0,02	0,01		
Carbon Logo			**0,16**	0,01		
	X	Self Enhancement	-0,01	0,01	**0,05**	0,02
	X	Self Transcendence	0,01	0,01	**-0,05**	0,02
	X	Conservation	-0,01	0,01		
Origin						
	Labeled German		**0,66**	0,03		
	X	Self Enhancement	**-0,08**	0,02		
	X	Self Transcendence	0,01	0,02	**0,30**	0,03
	X	Conservation	0,02	0,02		
	Labeled Not German		**0,18**	0,03		
	X	Self Enhancement	-0,04	0,02	**0,16**	0,02
	X	Self Transcendence	0,01	0,02		
	X	Conservation	-0,03	0,02	-0,03	0,02
SA8000 Certification			**0,20**	0,01		
	X	Self Enhancement	**-0,06**	0,01	**-0,06**	0,02
	X	Self Transcendence	**0,05**	0,01	0,02	0,02
	X	Conservation	0,01	0,01	**0,03**	0,01
Opt-Out			**-3,61**	0,29	**2,10**	0,17
	X	Self Enhancement	**-0,27**	0,05	**0,60**	0,06
	X	Self Transcendence	**-1,33**	0,06	**0,39**	0,05
	X	Conservation	**-0,13**	0,05		

Values in bold denote statistical significance at the 5% level

To provide an intuitive interpretation of these coefficients, we calculated WTP estimates in willingness to pay space (Train and Weeks, 2005; Hole, 2007; 2008), reported in Tables 9 and 10. In general, both Italian and German consumers' mean WTP for product attributes *COOL* (Country of Origin Labeling), *Italian/ German Origin, Organic, Carbon Logo, EC* (Ethical Certification), and *Environmentally Friendly* (German) are positive and significant (WTP estimates are statistically significant at 5% or better if the calculated confidence intervals do not fall over zero).

However, these increased WTP varied importantly depending upon the values profiles held by the individual consumers. As hypothesized, Italian consumers with values profiles of Self-Transcendence/ Openness-to-Change had a positive and significant WTP for *Organic* (€/kg 0.13) and *EC* (€/kg 0.10) product attributes. Consumers with value profiles of Self-Enhancement/ Openness-to-change had significant and negative WTP for *Italian Origin* (€/kg -0.23) and *EC* (€/kg -0.08).

Similarly, German consumers with values profiles of Self-Transcendence/ Openness-to-Change had a positive and significant WTP for *Organic* (€/kg 0.07), *Environmentally Friendly* (€/kg 0.06) and *EC* (€/kg 0.05) product attributes. Consumers with values profiles of Self-Enhancement had significant and negative WTP for *German Origin* (€/kg -0.08) and *EC* (€/kg -0.06).

5 Conclusions

This paper compared how the human values of consumers in Italy and Germany impact a decision to purchase early potatoes that are differentiated by extrinsic credence attributes. Two online surveys were conducted in the two countries to investigate consumers human values, their preferences for early

potatoes with different extrinsic attributes, and basic demographic information. Several researches have focused in recent years their attention on the relationship between human values and food choice. However, to the best of our knowledge, this is one of the first to focus on the role human values have in influencing the willingness to pay for specific extrinsic food attributes. Results from this paper confirm not only the existence of a strong relationship between consumers' human values and food choices, but also show a clear influence of human values on willingness to pay for extrinsic credence attributes.

According to our results, the Schwartz Portrait Values Questionnaire identified the heterogeneity in consumers' Human Values and plausibly explained how pro-social values related to consumers' preferences for pro-social credence process attributes. This heterogeneity suggests that different consumers have different preferences for pro-social attributes. On the face of it, this conclusion seems trite – but from a policy perspective the implications are of considerable importance.

While other disciplines exhibit confidence in the external validity of the Schwartz Values framework, there is room to compare the stated preference results with revealed preferences, through scanner data or non-hypothetical experimental auctions. Our two populations were both European, and more robust cross-cultural studies might help interpret the role of equivalency bias.

Values appeared to play an important role in consumers' willingness to pay for credence process attributes. Italian and German consumers who expressed the meta-value of Self-Transcendence/ Openness-to-Change had a higher WTP for product attributes such as Organic and Ethical Certification, demonstrating concern for the wellbeing of others. Consumers who expressed the meta-value of Conservation had an increased WTP for product attributes such as Italian/ German Origin, and a decreased WTP for new concepts like Ethical Certification, demonstrating order, self-restriction, preservation of the past, and resistance to change.

The results are encouraging, but they also are limited. We were not able to disaggregate preferences for the individual welfare increasing aspects of double-duty attributes from the pro-social aspects.

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