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Organic food choices and Protection Motivation Theory: Addressing the psychological sources of heterogeneity

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ABSTRACT

Addressing generic preference heterogeneity for foods has been shown to improve statistical model fit, but it is relatively poor in terms of insights as to the sources of heterogeneity. The study presents various results from latent class analysis of stated choice data of food choice using carrots as a prototype. We evaluate the coherence of the underlying preference structure using as criteria the psychological constructs used in Protection Motivation Theory (PMT) (Rogers, 1975) elicted by means of attitudinal responses. We estimate latent classes based on such responses using both simultaneous and two-stage procedures. The latter performs a segmentation more in line with expectations derived from PMT, in terms of both the number of classes and their preference structures. While simultaneous estimation improves the statistical fit it yields class structures that appear less reasonable.

1. Introduction

The investigation of specific causes for consumer preference heterogeneity in food choice is becoming increasingly important. This is part of a broader effort in dissecting the well accepted evidence based on the observation that accounting for heterogeneity in choice modeling widely improves the statistical model fit. The contribution of this paper is to be found in this type of literature which explores the causes of preference heterogeneity in food choice modeling. In other words, in the literature that explores how individuals vary in their choice of consumption items. In particular, we wish to identify and focus on the psychological sources of such heterogeneity in a special category of food, organic food. This is because such food engenders expectation of improved health on consumers. It is hence amenable to psychological theories that have been proven successful in health decisions.

The analysis of discrete choice models are most often framed around the random utility paradigm. In such models preference heterogeneity takes the form of randomness in the utility coefficients, which is modeled either with continuous or with discrete distributions. Several authors have discussed the interpretational advantages that discrete random parameters have over their continuous counter parts by advocating the use of latent class modeling in discrete choice (Pouta, Heikkiläa, Forsman-Hugga, & Mäkeläb, 2010; Wedel & Kamakura, 2000). We follow this approach and present various results from latent class analysis of stated preference data of organic food choice. In particular, we tackle two typical issues in this analytical approach. The first is the selection of the ideal number of classes with homogeneous preferences. The second, more conceptually salient in our endeavor, is the coherence of such preference classes with the specific predictions from Protection Motivation Theory (henceforth PMT) (Rogers, 1975), which is well- and long-established in the psychology of health choice, from which we borrow the protocols to derive specific and functional psychological constructs to operationalize this theory in the context of organic food choice.

The issue of the correct determination of the number of classes in latent class analysis remains unclear in applied studies using this methodology to address heterogeneous preferences. While statistical information criteria—such a Akaike I.C. and its variants, Bayesian I.C. and entropy criteria—have been widely assessed (Andrews & Currim, 2003), their use in applied research often leads analysts to select models that are of difficult or less defendable interpretation than models with other classes (Hynes, Hanley, & Scarpa, 2008; Ruto, Garrod, & Scarpa, 2008). In this context external validation via enhanced coherence of the results with the expectation grounded on a pre-existing and widely accepted theory, such as PMT, is a compelling argument. This leads to the second issue addressed in this paper, which enriches the paradigms brought so far to bear on the literature of choice modeling of organic food.

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The relationship of man with food has well-established and deep psychological basis. We do not claim here that PMT, as an analytical framework to examine health fears, is driving food preferences. We do, however, expect that organic food choice correlates systematically with PMT constructs, thereby adding another dimension for validation and interpretation of choice modeling results focussed on preference heterogeneity. It is by now a well established fact in the literature that health concerns rank prominently amongst the drivers of organic food choice (e.g. Davies, Titterington, & Cochrane, 1995; Michaelidou & Hassan, 2008; Schifferstein & Ophuis, 1998, amongst many others). Yet, no much effort has been made in drawing from health-based psychological theories to explain the structure of preference heterogeneity of organic choice. We intend to work towards filling this gap with our present study.

On the technical side we suggest a strategy that might be of wider interest to the literature of preference heterogeneity, which is currently much used in transport choice modeling, market research as well as various areas of applied economics (food, environment, health and tourism). Mixed logit random utility models of food selection that incorporate preference heterogeneity have become common place in this literature. Particularly in food choice they are much used to investigate stated intention of purchase (e.g. Alfnes, 2004; Carlsson, Frykblom, & Lagerkvist, 2007; Hu, Hünnemeyer, Veeman, Adamowicz, & Srivastava, 2004; Jaeger & Rose, 2008; Rigby & Burton, 2005). Discrete choice response models of this type represent powerful and more realistic investigative tools of consumer preferences than their fixed-parameter predecessors, which dominated the literature between 1974 and the mid 90's.

We note that, in this context, panel data estimates are particularly informative. This because conditional estimates of preference parameters can be derived for each pattern of responses collected from a single individual. This leads to a sample representation of preference diversity with important repercussions in the evaluation of policy alternatives. This paper moves along the lines of enriching these models and the assessment of their estimates with psychological criteria, following the lead of earlier seminal work.

Quite early on—and in a much general context – McFadden (2001) highlighted how conceptually important psychological, emotional, perceptional and attitudinal factors are in choice decision protocols. DiClemente and Hantula (2003) provide a review of the literature of consumer psychology from a behavioral perspective. Spash (2002) underlines the role of psychological constructs on decision process in environmental valuation and Georgantzis and Navarro-Martinez (2010) use them to explain the WTA–WTP gap. Perceptional and sensory characteristics also play an important role (Stefani, Romano, & Cavicchi, 2006). An area of food choice that is naturally susceptible of benefitting from addressing these infrequently explored factors is that of the determinants of selection of foods produced with environment-friendly methods. It is well known that long term health concerns for self and others, or more broadly for environmental consequences, loom large in the motivation behind such selection. Recent empirical research investigating the determinants of preferences motivating the purchase of organic meat have highlighted the role of emotions (Verhoef, 2005). In the context of the role played by beliefs in the attractiveness of choice options, the laddering method may be used to elicit beliefs for a choice between conventional and organic pork (Grunert & Bech-Larsen, 2005). Bamberg (2002) investigates how motivational factors influence the formation process of goal intention, particularly the process of enacting a new goal intention to purchase organically produced food instead of conventionally produced food. Conceptual work exploring the links between food safety and food quality under the framework of the Total Food Quality Model (Grunert, 2005) suggests that health risk can be amplified with respect to other forms of risk linked to food consumption. Thus emotions and risk perceptions emerge as intuitive determinants of unobserved preference heterogeneity in food choice. However, little work has been done to systematically incorporate these consumer-specific factors in empirical works based on discrete choice models for food type selection. In health economics (Araña, Lèon, & Hanemann, 2008) and environmental economics (Menzel & Scarpa, 2005), instead, there exists promising applications.

The objective of this study is to make a first step at filling this gap. As an empirical example we investigate consumer preference heterogeneity for carrots produced in an Alpine valley in Italy. We used a food type generally characterized by a low cognitive effort in consumer choice so as to enhance the role of production attributes, especially the role of environment' friendly processes. In particular, we propose what we think is an empirically convenient method to build into the preference heterogeneity structure of a discrete choice model attitudinal responses designed to measure some psychological constructs. We anchor the derivation of these constructs on a well-established psychological theory of health protection: PMT (Rogers, 1975). The underlying belief is that these constructs are better determinants of preference groups than observed choice alone when choice is motivated by appeal to fear of one's own future health. While we make use of this theory, future research may focus on other psychological theories depending on what is of interest in the case at hand. However, the method we propose is general and can be used in any application of this sort.

The rest of the paper is organized as follows. In Section 2 we illustrate the PMT and its relevance in structuring risk evaluation and preferences. In Section 3 we present the econometric methods to derive latent groups from homogeneous response patterns from multinomial discrete choice data. The survey and the data we use for the comparison are described in Section 4, while the results are presented in Section 5. Sections 7 and 6 draw some conclusion and discusses potentially interesting developments of this research programme.

2. Protection Motivation Theory in food choice and its constructs

Food safety and the way it affects health have become a growing concern in most of the world. An international survey shows that the majority of people in 19 out of 35 countries feel their food is less safe than it was 10 years ago (Ipsos-Reid, 2000). Recent threatening events as the Bovine Spongiform Encephalopathy (BSE) epidemic highly contributed to enhance risk perception (Setbon, Raude, Fischler, & Flahault, 2005). Pesticides residues in food and contamination of drinking water have been found to generate the highest level of perceived risk, while Genetically Modified Organisms (GMO) seems to be perceived as less risky (Tucker, Whaley, & Sharp, 2006).

The modeling of perception, valuation and behavior around food safety and its link to health still represent a big challenge to empirical economists. Despite strong evidence that socioeconomic variables are strong determinants of risk perception (Dosman, Adamowicz, & Hrudey, 2001), consumer's perception of food related risks are complex and deals with social, political, psychological and attitudinal aspects. We focus on the latter because of their special relevance in explaining consumer behavior and preference heterogeneity.

The task of presenting a psychological theory to food specialists represents a great challenge. This is likely to be exacerbated by the fact that the theory itself does not have clear implications contrasting those derived from other more formal theories but only for choice of model specification. It is hence nearly unavoidable to