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Pseudo panels as an alternative study design

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ABSTRACT

Marketing academics and practitioners increasingly recognise the importance of studying the dynamic nature of consumer attitudes and behaviour. However, recent works highlight a dearth of longitudinal studies into consumer dynamics published in marketing academic literature (Leonidou et al., 2010; Rindfleisch et al., 2008; Williams and Plouffe, 2007). In an attempt to address this gap, this article evaluates the ability of available research designs to meet various research objectives in the study of consumer dynamics. This evaluation highlights the need for a technique capable of modelling gross and individual level change using repeated cross-sectional data. The article proposes the use of pseudo panels to address this gap and advances the use of data fusion techniques for matching independent samples over multiple time periods to create these pseudo panels.

1. Introduction

The process of market evolution is central to marketing (Giesler, 2008). In an ever complex market environment where consumer preferences shift constantly, marketers must understand the nature of consumer change (Blackwell et al., 2001). Indeed, it has long been recognised that turnover tables showing the transitions between discrete states in behaviour provide important, basic tools for understanding processes of social change (Lazarsfeld and Rosenberg, 1955). Thus, consumer researchers do not merely aim to comprehend consumer behaviour at a single point in time but instead are interested in how individual consumers evolve in the long run.

It is generally purported that the best means for tracking and understanding consumer dynamics is to follow the movements of a group of consumers through time (Leeflang and Wittink, 2000; Smith and Lux, 1993). In market research, at least at the quantitative level, this is traditionally achieved through the conscription of a longitudinal panel. However, recent investigation into the types of studies conducted in the marketing academic literature demonstrate dearth of longitudinal panel research (Leonidou et al., 2010; Rindfleisch et al., 2008; Williams and Plouffe, 2007). The purpose of this article is to propose the use of pseudo panels to overcome many of the methodological difficulties faced by marketing practitioners and academics interested in studying the dynamic nature of consumer behaviour.

The article begins by briefly reviewing the various study designs available to researchers and outlines the ability of each study design to meet various objectives in the study of consumer dynamics. The overall benefits and limitations of different study designs are then highlighted. Existing econometric pseudo panel models that attempt to address the deficiencies of currently available study designs are introduced and critiqued. Finally, the article proposes a novel approach to address these issues in the form of pseudo panels which are developed using data fusion techniques. These pseudo panels allow the investigation of gross and individual level change using repeated cross-sectional data. It is argued that pseudo panels developed using data fusion are superior to econometric panels for studying consumer behaviour because they (1) use a larger number of variables to match individuals between time periods and therefore account for respondent heterogeneity and achieve matches with greater accuracy between time periods, (2) preclude the use of cohort averages, therefore securing greater detail at the individual level, (3) utilise 'live' rather than predicted or averaged respondent values and (4) are designed specifically for use with marketing data such as those collected in consumer panels.

2. Overview of study designs

Integrally involved in consumers' behaviour is the use and expenditure of time. Acquisition and consumption of both products and information regarding products are not cross-sectional events of short and unvarying duration. Rather, they are dynamic processes that occur over time and that may involve spans of time from one occasion and one individual to another (Jacoby et al., 1976). Hence, a long-term comprehension of consumer

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trends assists an understanding of change in consumer attitudes or preferences (at both the macro and micro level), provides knowledge of cyclical behaviour, and allows assessment of the full impact of marketing strategies (Mela et al., 1997). Such an understanding enables firms to create and monitor strategic plans and assists them in maintaining long-term profitability (Nauck et al., 2006).

The modelling of consumer behaviour can be broken down into three general categories: (1) cross-sectional studies, (2) longitudinal panel studies, and (3) some combination of longitudinal and cross-sectional designs. Each of these types of study has a variety of different executions. These are discussed further below.

2.1. Cross-sectional studies

At the broadest level, cross-sectional studies form a class of research methods that involve observation of some subset of a population all at the same time, in which groups can be compared with respect to variables of interest. Further distinction is made here between one-shot cross-sectional studies, which collect data at one time period only and repeated surveys which collect data on the same/similar variables from subsets of a population at distinct time intervals. Each of these designs is discussed further below.

One shot cross-sectional surveys[1] are the simplest and most common study design. They involve completion of a survey by respondents at a single point in time and provide a "snapshot" of the frequency and characteristics of a population at that particular point in time.

Repeated surveys are defined as a series of separate cross-sectional surveys conducted at different points in time. No effort is made to ensure that any of the same elements are sampled for the individual surveys (Kalton and Citro, 1995). The elements are sampled from a population defined in the same manner for each individual survey and many of the same questions are asked in each survey. A new sample is selected at each time point, so each cross-sectional survey is based on a probability sample of the population existing at the time of data collection (assuming that probability sampling procedures were adhered to).

2.2. Longitudinal panel studies

A longitudinal panel, in the broadest definition, is when the movements of a group of individuals are tracked through time. The types of movements followed, the recording device, and the variables collected differ greatly across panel types. Panels can be broadly categorised into two general categories, these being scanner panels and consumer diary panels. Each of these panels is further described below.

Consumer diary panels are defined as being diaries or reporting devices, for use particularly in surveys, where each member of a continuing panel reports attitudes, activities, purchases, opinions or the like during repetitive unit periods of time (US Patent No. 4,000,915, 1977). Consumer diary panels have been used by marketers since the early 1940s. They have been useful for examining a variety of individual level changes including brand switching (Womer, 1944) and changes in consumer attitudes and behaviour (for example, The Nielsen Company's HomeScan Panel Views Survey). Consumer panels were traditionally in the form of consumer diaries in which a sample of consumers would regularly record relevant attitudinal characteristics and behaviour in paper diaries. More recently, many consumer panels are conducted online.[2]

Scanner panels typically involve a panel member using some type of hand-held scanner to record product use. Much of the empirical research utilising scanner data focuses on predicting brand or product choice on the basis of variables such as loyalty and loyalty programmes (e.g., Labeaga et al., 2007; Meyer-Waarden, 2008; Sharp and Sharp, 1997), advertising and promotional strategies (e.g., Gönül and Srinivasan, 1996; Mela et al., 1997; Steenkamp and Gielens, 2003) or other marketing mix variables (e.g., Han et al., 2001; Kusum et al., 2001). As such, most current use of scanner panel data tilts towards developing models, both aggregate and disaggregate, of the effects of marketing mix variables on consumer choice (Andrews and Currim, 2005; Malhotra et al., 1999; Winer et al., 1994).

2.3. Combination survey designs

In an attempt to exploit the advantages of both cross-sectional and longitudinal panel data, some survey designs utilise a combination of these two survey designs. These designs include overlapping, rotating, repeated and split panel designs, which differ in terms of the panel and cross-sectional components and the manner in which they are updated. Each of these designs is discussed further below.

Overlapping surveys, like repeated surveys, are a series of cross-sectional surveys conducted at different points in time. However, repeated surveys do not attempt to secure any sample overlap in the survey from one point in time to the next, while an overlapping survey is designed to provide such overlap. Thus, the aim may be to maximise the degree of overlap while taking into account both the changes desired in selection probabilities for sample elements that remain in the survey population and changes in population composition over time (Kalton and Citro, 1995).

Repeated panel surveys are made up of a series of panel surveys each of any given duration. There may or may not be overlap between the time periods covered by the individual panels. Statistics New Zealand's Quarterly Employment Survey (QES) is an example of a repeated panel survey with overlap. Derived quarterly from approximately 18,000 surveyed business locations in a range of industries and regions throughout New Zealand, all businesses in the sample are surveyed in each quarter until the sample is reselected or redesigned (approximately every five to six years) when some businesses are rotated out of the panel. Repeated panel surveys with overlap have a focus on longitudinal measures (for example, durations of periods of brand usage). In consequence, repeated panel surveys tend to have longer durations and fewer panels in operation at any given time than rotating panel surveys (Kalton and Citro, 1995).

Rotating panel surveys[3] are equivalent to repeated panel surveys with overlap. That is, sample elements have a restricted panel life – as they leave the panel, new entrants are added. However, the distinction between the two is made because these two designs have different objectives. Rotating panel surveys are widely used to provide a series of cross-sectional estimates and estimates of net change

[1] Also referred to as *cross-sectional studies* (Rindfleisch et al., 2008).

[2] While many consumer panels are conducted online, the term 'consumer panels' is not to be confused with the term 'online panels'. Consumer panels refer to situation where panel members self-report attitudes, behaviour or the like during repetitive unit periods of time (US Patent No. 4000,915, 1977). As such, consumer panels represent a distinct type longitudinal study design. Conversely, online panels are defined as pre-recruited groups of people willing to participate in online marketing research events such surveys (McDevitt and Small, 2002). This definition of online panels demonstrates that online panels are a database of respondents or sampling frame from which to select a sample rather than a type of study design. As such, online panels are not discussed as a type of study design.

[3] Also referred to as *sampling on successive occasions with partial replacement of units* (Patterson, 1950) *and sampling for a time series* (Hansen et al., 1953).