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Vacation behaviour under high travel cost conditions – A stated preference of revealed preference approach

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HIGHLIGHTS

- Vacationers exhibit substantial diminishing marginal disutility of travel costs.
- The impacts of a substantial increase in travel costs extend well beyond the transportation side of tourism demand.
- Proposes a generalization of the recently proposed SP-off-RP estimation procedure.
- The Generalized SP-off-RP estimation procedure significantly improves model fit.

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ABSTRACT

This paper investigates vacation behaviour under high travel cost conditions. We estimate discrete portfolio vacation choice models on data obtained in a novel free format Stated Preference of Revealed Preference (SP-off-RP) choice experiment. The substantive contribution of this paper is that we develop new insights into vacation behaviour under high travel cost conditions. We find that vacationers exhibit considerable diminishing marginal disutility of vacation travel costs. Furthermore, we have identified significant interactions effects across the following vacation choice dimensions: destination, length of stay, accommodation type and mode of transport. Therefore, a substantial increase in travel costs is likely to have marked consequences for the tourism industry – reaching beyond the transportation side of tourism. Methodological contributions of this paper are twofold: 1) it proposes a choice experiment in which SP alternatives are constructed by pivoting of late consideration set alternatives, rather than only of a chosen alternative, and 2) it proposes, and illustrates the use of, a generalization of a recently proposed SP-off-RP estimation procedure.

1. Introduction

Tourism forecasts are known to be highly uncertain (Dubois, Peeters, Ceron, & Gössling, 2010; Wilkinson, 2009). One reason for this uncertainty is that tourism, and in particular long-haul tourism, relies heavily on the availability of affordable transport connections with tourist source markets (Becken, 2008; Yeoman et al., 2007), while on the horizon various substantial changes loom that could jeopardize future affordable mobility (Van Cranenburgh, Chorus, & Van Wee, 2012). The most often cited potential substantial change in this regard is probably a peak oil event (e.g. Aftabuzzaman & Mazloumi, 2011; Becken, 2008, 2011; Becken & Lennox, 2012; Curtis, 2009; Krumdieck, Page, & Dantas, 2010; Van Cranenburgh, Chorus, & Van Wee, in press; Yeoman et al., 2007). In a peak oil event the demand for fossil fuels exceeds supply capacity causing considerably higher fuel prices and hence a substantial increase in travel costs (Hubbert, 1956). Besides a peak oil event however, various other – far from unimaginable – scenarios are likely to result in substantially increased travel costs impairing affordable transport. Notable examples are political instability in large oil exporting countries or regions and fierce climate change mitigation measures such as high aviation carbon taxes (see e.g. Dwyer, Edwards, Mistilis, Roman, & Scott, 2009; Sgouridis, Bonnefoy, & Hansman, 2011).

Several studies have recently addressed the potential impacts of high travel costs on the tourism industry (Becken, 2007, 2008, 2011; Becken & Lennox, 2012; Ringbeck, Gautam, & Pietsch, 2009; Yeoman et al., 2007). For instance, Ringbeck et al. (2009) assess the vulnerability of economies around the world for high oil prices by looking at the share of long-haul inbound tourism, and the

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importance of the tourism industry for the economy. They conclude that particularly, remote island nations (Cape Verde, St Lucia, Fiji, etc.) are most vulnerable for changes in oil prices. A similar, but more detailed, study conducted by Becken (2008) explores the exposure of New Zealand's tourism industry to an increase of travel costs by assessing the oil-intensities of tourism of its top 10 tourist source markets. This study shows that the energy use of the travel component for all of New Zealand's top 10 tourist source markets is above 90%. A different approach is taken by Becken and Lennox (2012). They use a general equilibrium model to explore the impacts of high oil prices on New Zealand's tourism industry. Thereby, they are able to account for concomitants in other parts of the economy e.g. prices of other commodities, exchange rates, and incomes. It is found that in response to a 100% increase in oil prices the reduction in demand for tourism in New Zealand differs substantially across tourism segments.

However, remarkably, despite this recent interest in the potential impacts of a substantial increase in travel costs on tourism strikingly little research attention is given to the idea that vacation behaviour may change in the context of a substantial increase in travel costs, and in fact is likely to change. To the best of the authors' knowledge there are no recent studies that have investigated the effects of high travel costs on vacation behaviour. Yet, it is important to understand how vacation behaviour may change if high travel cost conditions are to occur. For instance, to the extent that (cross-) elasticities of demand are found to change substantially, this may imply that existing tourism demand models are less appropriate to assess the impacts of a substantial increase in travel costs on the tourism industry.

In this paper we investigate vacation behaviour under high travel cost conditions. To do this we develop and estimate discrete portfolio vacation choice models. Our portfolio vacation choice models are geared to capture interaction effects between vacation choice dimensions which are expected to be relevant, such as destination, mode of transport, length of stay, and accommodation type. To obtain vacation data under high travel cost conditions we develop a novel so-called free format SP-of-RP choice experiment. This pivoted type of choice experiment consists of two parts: a Revealed Preference (RP) part and a Stated Preference (SP) part. The RP part aims to elicit respondents their late consideration set: respondents are asked to compose a number of vacation alternatives they consider for a coming vacation period, and to report the chosen alternative from that set. Next, in the SP part, hypothetical alternatives are constructed by pivoting of these self-reported vacation alternatives. Using this approach, we observe choice behaviour in an experimental setting which is relatively realistic for respondents. With this experimental design we: 1) aim to reduce hypothetical bias – which especially looms in our high travel cost context as respondents face hypothetical choice situations to which they are unfamiliar, and 2) avoid estimation bias caused by misspecification of the decision-makers' consideration sets by the analyst (Manski, 1977; Williams & Ortuzar, 1982). However, as a result of the adopted pivoted experimental design endogeneity may be present in our data. To accommodate for this potential source of bias of our model's estimates, we propose a generalization of the recently proposed SP-of-RP estimation procedure (Train & Wilson, 2008, 2009) and illustrate its merits.

In sum, the substantive contribution of this paper lies in that we develop new insights into vacation behaviour under high travel cost conditions. We, for example, show how cost and time elasticities of demand vary with cost and time levels. In addition, with our vacation choice model we highlight the presence of significant interaction effects between vacation attributes in the vacation choice. The methodological contribution of this paper is twofold. Firstly, whereas usually pivoted experimental designs are put forward to enhance realism as to reduce response error variance, in our experiment we also use pivoting as an approach to deal with the limited knowledge from the side of analyst concerning the decision-makers' consideration sets. Thereby, our choice experiment contributes to the growing body of literature on pivoted experimental designs (see e.g. Hensher & Rose, 2007; Hess & Rose, 2009). Secondly, we propose and empirically test a generalization of the SP-off-RP estimation procedure (Train & Wilson, 2008, 2009).

The remainder of this paper is arranged as follows. Section 2 discusses the methodology taken to model vacation choice behaviour. Next, Sections 3 and 4 present, respectively, the data collection and the Generalized SP-off-RP estimation procedure. Section 5 provides the model estimation and results. Lastly, Section 6 provides conclusions and a discussion.

Table 1
Vacation portfolio.

Attribute	Attribute labels	Attribute levels	
Destination	D1	dist. ≤ 200 km	"Domestic"
	D2	200 < dist. ≤ 700 km	"Near abroad"
	D3	700 < dist. ≤ 1500 km	"Intermediate abroad"
	D4	dist. > 1500 km	"Intercontinental"
Length of stay	L1	$D \leq 7$ days	
	L2	$7 < D \leq 14$ days	
	L3	$14 < D \leq 21$ days	
	L4	$D > 21$ days	
Type of accommodation	Acc1	Hotel, Hostel, Bed & Breakfast, apartment	
	Acc2	Vacation homes, vacation village, privately owned homes	
	Acc3	Tent	
	Acc4	Caravan, motor home, camper	
Principle mode of transport	M1	Car	
	M2	Train or bus	
	M3	Airplane	
Travel costs	x_c	Interval variable [euro]	
Travel time	x_t	Interval variable [hours]	

2. Methodology: the portfolio vacation choice model

To investigate vacation behaviour under high travel cost conditions we adopt the widely used discrete choice modelling approach (Ben-Akiva & Lerman, 1985; McFadden, 1974; Train, 2003). Following Lancaster (1966), we assume that a vacation choice can be conceived as a choice between bundles of attributes. From the literature we have identified the following generally applying attributes which we use to conceptualize a vacation alternative, see Table 1 (e.g. Dellaert, Borgers, & Timmermans, 1997; Grigolon, Kemperman, & Timmermans, 2012; Huybers, 2003; Morley, 1994). Accordingly, a vacation alternative is conceptualized to consist of a specific combination of Destination (D), Length of stay (L), Accommodation type (Acc), Mode of travel (M), and associated Travel cost and Travel time.

The attribute levels are listed in the third column of Table 1. We distinguish destinations based on their distance. Although distance is just one out of the many attributes of a destination, it is the only attribute[3] of a destination we can easily and objectively

[3] In this context it is interesting to note that in the model specification phase we also included local climate (or to be more precisely mean monthly temperature of a destination in the month of visit) as a destination attribute. We linked reported vacation destinations (i.e. GPS locations, see Section 3.2.1) to data of the nearest of 7800 weather stations worldwide (data source: Lawrimore et al., 2011. An overview of the Global Historical Climatology Network monthly mean temperature data set, version 3. *Journal of Geophysical Research-Atmospheres*, *116*). However, somewhat to our surprise, mean monthly temperature, and mean monthly temperature squared were both found to be insignificant explanatory variables of the vacation choice.