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## Microeconometric models of tourists' destination choice

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**Wirtschaftswissenschaftliche Fakultät  
der Eberhard-Karls-Universität Tübingen**

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tourists' destination choice

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# Microeconomic models of tourists' destination choice

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## Abstract

The focus of this paper is on the microeconomic analysis of spatial choice in a cross section. Nested multinomial logit models are used to analyze the determinants of individual choice among destinations and vacation activities. Cramer and Ridder's likelihood ratio test for pooled alternatives in multinomial logit models is sequentially applied in order to determine the adequate aggregation level of the mutually exclusive alternatives in the choice set. The specification test suggested by Chesher and Santos Silva (1992) is used to investigate whether or not the IIA proposition is fulfilled within the assumed choice subsets.

**JEL Classification:** D12, R12, C25

**Keywords:** Spatial choice, discrete choice models, aggregation, tourism demand

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# 1 Introduction

Empirical investigations of the demand of individuals or firms for location-specific characteristics have often been conducted at the level of closed, non-overlapping regions. The definition of regions has typically been dictated by the data source providing information with respect to the location-specific characteristics such as wage levels or price indices. In most cases, regions are equivalent to political entities, such as countries, provinces, counties, or cities.<sup>1</sup>

In spite of the stringent underlying assumptions, the multinomial logit model has typically been used to analyze the determinants of the choice among regions that are assumed to be mutually exclusive. The presence of unobserved geographical characteristics, which often cross political borders, however, implies that the validity of the IIA axiom appears as particularly doubtful. Various authors have argued that the (nested) multinomial logit model rests on too stringent assumptions to be used for spatial applications.<sup>2</sup> These authors have therefore suggested several types of universal logit models that aim to measure the unobserved “distance” between alternatives by approximating the covariance of the alternative-specific random terms.

It is the aim of the present paper to analyze the effects of various sources of misspecification of spatial choice models. Furthermore, the paper investigates whether comparatively easy-to-handle discrete choice models, which are compatible with stochastic utility maximization, can be used to analyze the determinants of individual destination choice.

The paper focuses upon regional aggregation and investigates whether increasing the aggregation level permits to mitigate the problem of unobserved similarity between alternatives. The paper also accounts for differences in the bundles of location-specific goods consumed by visitors of the same destination. Specification tests are used to determine the adequate aggregation level of composite alternatives in both the choice set of regions

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<sup>1</sup>Cf. Hansen (1987), Liaw and Ledent (1987), or Thomas (1993).

<sup>2</sup>Cf. e.g. Fotheringham (1983, 1988), Borgers and Timmermans (1987), Dubin (1995), or Ferguson and Kanaroglou (1995).

and of vacation purposes:

For a given set of socioeconomic variables, Cramer and Ridder's specification test for pooled alternatives in multinomial logit models is used to determine whether or not the alternative-specific coefficients assigned to these variables are significantly different from each other for any pair of alternatives. Simultaneously, a likelihood ratio test comparing pairs of universal and multinomial logit models is used to analyze whether the IIA assumption can be rejected for the respective sets of choice alternatives and socioeconomic variables.

The empirical analysis of the determinants of tourists' destination choice utilizes the results of the specification tests. The choice set covers regions, vacation purposes as well as the option not to spend vacation. The respective alternatives are defined in accordance with the results of Cramer and Ridder's specification test. The choice set comprises those (sub)sets of alternatives for which the IIA axiom cannot be rejected. Whereas the specification tests have to be applied to model specifications with exclusively socioeconomic explanatory variables, socioeconomic as well as alternative-specific explanatory variables are used for the empirical analysis of destination choice. For each of the regional alternatives comprised in the choice set, a price index is therefore constructed to measure the regional-specific price of a standard bundle of commodities typically consumed at the respective destination.

A nested multinomial logit model is used to analyze whether the assumed sequence of the decision process is adequate and to gain insight into the influence structure of price and socioeconomic characteristics, such as age, income, or the individuals' proficiency in foreign languages upon their choice among "purposes of vacation" and regions.

The example of tourism has been chosen as it permits to concentrate upon the consumption aspect of location choice and to neglect the "rivalry" of leisure- and work-related regional characteristics. Moreover, the underlying database appears as unique, since it distinguishes vacation areas within a relatively fine grid and provides detailed information with respect to the socioeconomic characteristics of tourists and with respect to their

vacation activities.

The outline of the paper is as follows: The second section focuses on the microeconomic analysis of spatial choice and describes the employed discrete choice models and specification tests in detail. The subsequent two sections focus on the empirical analysis of West German tourists' destination choice: The third section sketches the course of the empirical analysis and describes data, variable definitions, and model specifications. Estimation results are presented in the fourth section. The fifth section concludes the paper.

## 2 Model specification

Due to its computational ease and its relative robustness with respect to general misspecification, the multinomial logit model has been used for many empirical studies of destination choice in spite of its stringent underlying assumptions.<sup>3</sup> Various extensions of the multinomial logit model have been proposed that aim to alleviate the stringent assumption of i.i.d. Gumbel type I distributed random utility terms.<sup>4</sup>

In the following, two alternative extensions to the multinomial logit model will be sketched. Two specification tests are then described that permit to investigate whether or not the IIA axiom is fulfilled for a given dataset and which aggregation level is adequate for the choice alternatives. If applied sequentially, these specification tests permit to investigate whether the spatial choice model can be restructured/ simplified so that an easy-to-handle microeconomic model can be applied in order to empirically analyze the determinants of individual destination choice.

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<sup>3</sup>Cf. Liaw and Ledent (1987) or Thomas (1993).

<sup>4</sup>Sen and Smith (1995) give a detailed survey of the literature.

## 2.1 Choice models

### 2.1.1 Nested multinomial logit model

The most prominent among the extensions to the multinomial logit model is the nested multinomial logit model. This model, which bases on the assumption that the *marginal* distribution of the alternative-specific random utility terms is Gumbel type I distributed, is comparatively easy to apply and consistent with stochastic utility maximization.<sup>5</sup> In contrast to the multinomial logit model, it is assumed that the scale parameter of the marginal distribution is not identical for all alternatives in the choice set. Instead it is assumed that the alternative-specific scale parameters are identical within *subsets* of alternatives, yet vary across subsets up to a proportionality factor. In other words, the IIA proposition is assumed to be valid within choice subsets; the assumption is relieved for alternatives assigned to varying choice subsets. While the assignment of alternatives to choice subsets must be assumed beforehand, the extent of the dissimilarity of any two alternatives assigned to different choice subsets is measured by the estimates of the “dissimilarity parameters”. The latter parameters approximate one minus the correlation of alternative-specific random terms within choice subsets.<sup>6</sup>

The nested multinomial logit model has been popular for applications, for which individual choice can be modeled as a hierarchical decision process among several aspects of a heterogeneous, indivisible good, such as the individual choice among alternative types of dwellings in various residential areas.<sup>7</sup> If there is no “evident” hierarchy among the characteristics of a heterogeneous good, it is by no means clear whether and which alternatives can be grouped to subsets within which the IIA axiom is valid. A battery of specification tests have to be applied in order to investigate whether the IIA axiom is fulfilled within choice subsets and whether the assumed nesting structure is adequate to the dataset.

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<sup>5</sup>Cf. McFadden (1978, 1981).

<sup>6</sup>Cf. Maddala (1983), p. 71.

<sup>7</sup>Cf. e.g. Quigley (1985) or Börsch-Supan (1987).



### 2.1.2 The extended multinomial logit model

Various types of easy-to-handle universal logit models have been proposed<sup>8</sup> that aim to approximate discrete choice models with *arbitrary* covariance structures for the alternative-specific random utility terms. While these models are both computationally easy to handle and less restrictive than the nested multinomial logit model, they are generally inconsistent with the proposition of stochastic utility maximization. The estimates of coefficients that are to approximate the unobserved dissimilarity (or distance) between alternatives are, moreover, difficult to interpret since they cannot be interpreted as covariance or scale parameters of the underlying distribution.

The extended multinomial logit model, which has been suggested by Chesher and Santos Silva (1992) for the single purpose of specification testing, explicitly recognizes the impact of “irrelevant” third alternatives upon the individuals’ choice among any two alternatives. In contrast to other universal logit models, highly non-linear functions of both the observed socioeconomic characteristics of the individual and the observed alternative-specific characteristics of all alternatives approximate the impact of unobserved variables. The coefficients assigned to these terms measure the degree of similarity between the alternatives in the choice set and thus approximate the covariance of the respective alternative-specific characteristics. The extended multinomial logit model reduces to the multinomial logit model if the covariance parameters are set equal to zero.

The choice probabilities of the extended multinomial logit model are given as follows:

$$P_{jl}^{\text{EMNL}} = \frac{\exp\left(\alpha_j + X_{jl}\beta + Y_l\gamma_j + \omega_{jj}\left(0.5 - P_{jl}^{\text{MNL}}\right) - \sum_{q \in Q, q \neq j} \omega_{jq} P_{ql}^{\text{MNL}}\right)}{\sum_{k \in Q} \exp\left(\alpha_k + X_{kl}\beta + Y_l\gamma_k + \omega_{kk}\left(0.5 - P_{kl}^{\text{MNL}}\right) - \sum_{p \in Q, p \neq k} \omega_{kp} P_{pl}^{\text{MNL}}\right)} \quad (2-1)$$

where  $P_{jl}^{\text{MNL}}$  is individual  $l$ ’s probability of choosing alternative  $j$  as determined by a multinomial logit model,  $Q$  is the choice set, and  $X_{jl}$  and  $Y_{jl}$  are vectors of alternative-specific and individual-specific variables, respectively. The parameters  $\omega_{jk}$  denote the elements of the (constrained) covariance matrix of the individual-specific random effect.

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<sup>8</sup>Cf. e.g. Fotheringham (1983, 1988), Borgeers and Timmermans (1987), or Chesher and Santos Silva (1992).

Chesher and Santos Silva (1992) show that the extended multinomial logit model approximates a random-coefficient multinomial logit model if the deviations from the IIA proposition are not too large. In contrast to the universal logit models suggested by Fotheringham (1983, 1988) or Borgers and Timmermans (1987), the extended multinomial logit model not only permits to approximate varying degrees of substitutability between composite alternatives yet also permits to account for unobserved individual-specific heterogeneity. This property is particularly attractive for spatial applications for which unobserved regional-specific characteristics may be shared by several alternatives and for which the perception of “distance” or dissimilarity may be strongly influenced by unobserved individual-specific characteristics. Unlike corresponding measures used in other universal logit models, the estimated measure of unobserved distance between arbitrary pairs of alternatives is straightforward to interpret.

## 2.2 Specification tests

### 2.2.1 Choice set formation

Cramer and Ridder (1991) seem to have been the first to recognize that aggregating elemental alternatives may improve rather than reduce the explanatory power of model specifications for discrete choice models. They have proposed an easy-to-apply likelihood ratio test that allows to discriminate between two multinomial logit models with identical sets of (exclusively) individual-specific explanatory variables, yet differing aggregation level of the choice alternatives.

The test statistic

$$\xi_{\text{CR}} = -2 \left( L(\hat{\theta}^r) - L(\hat{\theta}) \right) \quad . \quad (2-2)$$

indicates whether or not the null hypothesis of identical alternative-specific coefficients is rejected for a given multinomial logit model.  $\xi_{\text{CR}}$  is asymptotically  $\chi^2$ -distributed with  $K$  degrees of freedom,  $K$  being the number of parameter constraints.  $\hat{\theta}$  denotes the ML estimator of the parameter vector,  $L(\hat{\theta})$  is the loglikelihood of a multinomial logit model

for separate alternatives, and  $L(\hat{\theta}^r)$  is the loglikelihood of a multinomial logit model for which the alternative-specific parameters corresponding to a subset of alternatives are constrained to take identical values across these alternatives.

Cramer and Ridder have shown that the specification test is most convenient to apply if  $L(\hat{\theta}^r)$  is transformed as follows:

$$L(\hat{\theta}^r) = \sum_{j \in D} n_j \ln n_j - \left( \sum_{j \in D} n_j \right) \ln \left( \sum_{j \in D} n_j \right) + L(\hat{\theta}^p) \quad . \quad (2-3)$$

The loglikelihood value  $L(\hat{\theta}^p)$  is obtained by estimating a multinomial logit model for which all alternatives of the respective choice subset  $D \subset Q$  have been aggregated to a single alternative.

Cramer's and Ridder's result appears as particularly relevant for regional applications for which the definition of "elemental" alternatives has almost always been based on arbitrary criteria and for which alternative-specific variables usually take the form of artificially constructed indices rather than representing location-specific observations.

### 2.2.2 Independence from irrelevant alternatives

Several specification tests have been suggested that permit to investigate whether the IIA proposition is fulfilled within choice (sub)sets of the (nested) multinomial logit model<sup>9</sup> or whether the assumed nesting structure is appropriate.<sup>10</sup> Also, the estimates for the dissimilarity parameters assigned to the various choice subsets of a nested multinomial logit model indicate whether or not the IIA axiom is fulfilled across choice subsets. These estimates can therefore be used to discriminate between multinomial logit models and nested multinomial logit models.

The approach suggested by Chesher and Santos Silva (1992) appears as particularly

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<sup>9</sup>Cf. Hausman and McFadden (1984) or McFadden (1987), who utilize the (in)sensitivity of coefficient estimates with respect to irrelevant third alternatives.

<sup>10</sup>Cf. Horowitz (1987), who measures the distance of the Hessian matrices obtained by alternative estimation methods for the same model specification.

noteworthy: Rather than comparing multinomial logit models to the (only slightly less restrictive) nested multinomial logit models, the authors suggest to use a Lagrange multiplier or likelihood ratio test in order to discriminate between multinomial logit models and corresponding extended multinomial logit models, which allow for arbitrary covariance elements. If the IIA proposition is rejected for a given choice set, the estimates of the (approximate) covariance parameters of the extended multinomial logit model may shed light on the correlation of the random utility terms assigned to *any* pair of alternatives within the choice set. Apart from being informative for an empirical researcher, the estimation results for the extended multinomial logit model can subsequently be used to form assumptions with respect to the nesting structure of a nested multinomial logit model.

### **2.2.3 Sensitivity of specification tests**

Cramer and Ridder's proposition implicitly bases on the assumption that the IIA axiom must be fulfilled for both model specifications. In other words, the scale parameter of the alternative-specific random terms is assumed to be identical for all elemental (and pooled) alternatives in the choice set. If this assumption is not fulfilled, Cramer's and Ridder's likelihood ratio test may indicate the presence of general misspecification, such as the inadequacy of the IIA assumption. It seems necessary to use a second specification test in order to investigate whether the IIA assumption must be rejected for any of the model specifications to which Cramer and Ridder's specification test is applied.

The issues of aggregation and IIA are not necessarily related. The IIA assumption may be adequate if the alternatives' aggregation level is inadequate and vice versa. The famous red- and blue-bus-example, however, suggests that the IIA axiom might be fulfilled after merging arbitrarily defined elemental alternatives. If a comparatively large set of socioeconomic variables, which represent the most binding constraints to which individuals are typically exposed, does not permit to explain the individuals' choice between a given subset of alternatives, it appears as plausible that the unobserved alternative-specific characteristics of these alternatives are in fact very similar. If the IIA assumption is

rejected for a given set of alternatives, increasing the aggregation level of alternatives may therefore help to ensure that the scale parameters of the distribution of the alternative-specific random terms tend towards the same value.

### 3 Empirical analysis

Tourism demand covers a large number of commodities and services, only some of which are location-specific or indivisible. Tourists can adjust their expenses by substituting between alternative destinations, adjusting the length of the vacation spell, or adjusting the quality and quantity of the goods consumed at a specific location. The present study concentrates on two aspects of tourism demand, i.e. the tourists' purpose of visit and their destination choice. Similarly to other empirical studies of spatial choice,<sup>11</sup> we distinguish alternative purposes of visit to account for differing consumption patterns of persons visiting the same destination. In contrast to most other studies of tourists' destination choice,<sup>12</sup> however, our analysis refers to regions rather than countries in order to ensure that the alternatives are homogeneous with respect to their characteristics such as climate or topography.

It is the aim of the study to empirically analyze within which boundaries locations are perceived as (almost) identically attractive by persons characterized by a given set of socioeconomic variables. The aggregation criterion used in this study therefore utilizes the difference between the alternative-specific coefficients assigned to the respective set of socioeconomic variables. These "taste parameters" are obtained by estimating a multinomial logit model of destination choice. Cramer and Ridder's likelihood ratio test is sequentially applied to various model specifications in order to find a set of alternatives for which the estimated alternative-specific coefficients are significantly different from each other.

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<sup>11</sup>Cf. Ben-Akiva and Watanatada (1981) or Thomas (1993).

<sup>12</sup>Cf. e.g. Schulmeister (1981), O'Hagan and Harrison (1984), or Bakkal (1991).

In order to investigate whether unobserved geographical characteristics, shared by a subset of alternatives, imply that the multinomial logit model is inadequate for the analysis, a likelihood ratio test is applied to discriminate between extended multinomial logit models and corresponding multinomial logit models. Since the number of covariance parameters of the extended multinomial logit model to be estimated is excessively large for the least disaggregated choice set, the latter had to be split into diverse subsamples, however.

We speculate that the IIA proposition must be rejected for choice sets for which Cramer and Ridder's likelihood ratio test indicates that a subset of alternatives should be pooled. Moreover, we speculate that increasing the aggregation level of composite alternatives could solve the IIA problem. The focus of the analysis is therefore on the mutual dependence of the specification tests. We use different aggregation "strategies" for given sets of "elemental" or composite alternatives in order to investigate whether or not the results of both specification tests are sensitive with respect to the chosen "strategy".

A nested multinomial logit model is used to analyze the determinants of individual choice among alternative "purposes of visit" and destinations. Those (initially separate) choice sets of destinations and "purposes of visit", for which the IIA proposition cannot be rejected and within which alternatives should not be further aggregated, are assumed to form subsets of the tourists' full choice set. The estimates of the corresponding dissimilarity parameters eventually permit to judge the adequacy of the assumed nesting structure. Again, the focus of the analysis is upon the interference of the two likelihood ratio tests and the estimates of the dissimilarity parameters.

The estimation results shown in tables 4 to 8 have been selected from a much larger set of tables, which will be sent to interested readers upon request. The criteria by which tables 4 to 8 have been chosen are given in the respective subsections. In order to save space, we have decided to shortly describe rather than tabulate the estimation results for alternative model specifications when comparing these to the estimation results presented in tables 4 to 8.

### 3.1 The data

The data used for this study have been drawn from a sample of (West) Germans older than 14 years and living in independent households in West Germany or Berlin, who were interviewed for their vacation behavior in 1985. Persons whose destination choice had been determined by business relations have been excluded from the sample.

The dataset includes persons that declared themselves not to be in the position of household head, leaving a puzzle as to whether all household members joined the journey and as to who was responsible for the decision. In lack of other information, it is henceforth assumed that each individual has decided separately whether or not to go on vacation, yet that the individuals' choice of activities and travel destinations may have been influenced by the socioeconomic characteristics of travel companions.

The definition of vacation used in the original dataset covers leisure-related sojourns of more than four days at places other than the individuals' home. Persons who spent more than one spell of leisure-related vacation in 1985 (i.e. roughly 15% of the respondents) have been asked to refer to the "main vacation of the year" when answering the various questions as to their vacation behavior.

The dataset provides detailed information with respect to the tourists' vacation activities as well as their judgments as to several "quality" aspects. Moreover, individuals have been asked to indicate the primary "purpose of their vacation" among a list of nine vaguely defined categories ("adventure", "amusement", "sightseeing", "study", "amusement", "relaxing", "beach", "relatives/ friends", "sports", and "health"). Hardly any information is available that could shed light on the vacation activities of those persons who did not spend vacation in 1985.

The socioeconomic status of the respondents and their household members is comparatively well documented. The respondents' home location is indicated at the level of German *Bundesländer*. No information is given that would allow to measure the precise distance between their home and their travel destination.

The respondents' vacation resort is unknown. Instead, respondents have been asked to indicate one out of roughly 150 regions in which they spent the major part of their vacation. The size of the respective regions seems to have been determined by their distance to Germany and by the total number of tourists visiting the area:

Within Germany, vacation resorts have been aggregated to roughly 50 regions, the definition of which seems to have been based on the regional structure of tourist authorities. European countries that are frequently visited by German tourists are split into two to four regions, the geographical borders of which are typically unknown. Alaska is distinguished from the other states of the U.S. Destinations in the Far East, Central and South America, and Central Africa have been aggregated to groups of (neighboring) countries. All other destinations are indicated at country-level.

### **3.2 The set of individual-specific exogenous variables**

The individual-specific variables (which are surveyed in table 1) are to reflect the socio-economic status of the respondents and their travel companions. In order to clarify the interaction between the effects of age and income, dummy variables have been defined for separate age/income groups.

In lack of detailed geographic information with respect to the chosen destination, two variables representing the individual's judgment of the vacation area prior to the visit are to reflect the individuals' perception of area-specific characteristics such as climate (SUNNY) and the effects of overcrowding (NATURE).

The (virtually endogenous) variable NEWDEST is to reflect whether the individual has visited the vacation area before (and has thus obtained location-specific information).

The four dummy variables BERLIN, WG-N, WG-C, WG-SW indicate the respondents' home region. Bavaria is the reference category. For reasons of parsimony, *Bundesländer* have been aggregated to larger regions that share topographical characteristics, neighbo-



ring states, or coastline.

For the multinomial logit models, to which Cramer and Ridder's likelihood ratio test is applied, and for the extended multinomial logit models, we use a set of socioeconomic explanatory variables only. For the empirical analysis of the determinants of individual destination choice, a destination-specific price index, the construction of which is described in the following subsection, is added to the set of explanatory variables.

**Table 1: Individual-specific variables<sup>13</sup>**

<i>Variable</i>	<i>Description</i>	<i>Mean</i>	<i>Min</i>	<i>Max</i>
<i>Alternative-Specific Variable</i>				
PCDCOST	total vacation expenditure per person and day	82.02	2.38	555.56
<i>Variables Describing the Individuals' Socioeconomic Status:</i>				
A39IPCS	age < 40, income per capita below or equal to sample average (1,270 DM)	.25	0	1
A39IPCL	age < 40, income p.c. above sample average	.13	0	1
A62IPCS	39 < age < 63, income p.c. below or equal to sample average	.14	0	1
A94IPCS	age > 62, income p.c. below or equal to 1,400 DM	.18	0	1
A94IPCL	age > 62, income p.c. above 1400 DM	.08	0	1
SINGLE	one-person household	.27	0	1
CHILD18	minor(s) joined the travel group	.31	0	1
CHILD18HH	non-employed minor in household	.28	0	1
SCHOOL	respondent left school at the end of the compulsory school time	.64	0	1
CITY1	city size of domicile < 5,000 inhabitants	.11	0	1
CITY2	5,000 inh. ≤ city size of domicile < 100,000 inh.	.24	0	1
BERLIN	respondent lives in West Berlin	.04	0	1
WG-N	respondent lives in Schleswig-Holstein, Bremen, or Lower Saxony	.20	0	1
WG-C	respondent lives in Northrhine-Westfalia or Hesse	.38	0	1
WG-SW	respondent lives in Saarland, Rhineland-Palatine, or Baden-Wuerttemberg	.21	0	1
<i>Indicators of Personal Motives and Judgments:</i>				
SUNNY	respondent chose vacation area because of sunny climate	.20	0	1
NATURE	respondent chose vacation area because of "untouched nature"	.11	0	1
<i>(Endogenous) Choice Variable:</i>				
NEWDEST	respondent visited vacation area for the first time	.21	0	1

<sup>13</sup>Variable means refer to the corresponding choice (sub)set.

### 3.3 Constructing alternative-specific “prices”

As an empirical proxy to the unobservable, individual-specific price of the individuals’ vacation, a cost index is imputed for each of the regional alternatives considered in the nested multinomial logit model.

The sample is split into subsamples of persons who indicated either of the categories “adventure”, “sightseeing”, “studying”, “amusement”, “relaxing”, or “beach” as their motive to visit a specific destination within the regional choice set. In order to determine the weight of each of the cost factors described in table 2, the latter are regressed upon the individuals’ total expenditure per day and person ( $P_{ij}$ ):

$$P_{ij} = \alpha_i + X_{ij}\beta_i + Y_j\gamma_i + \epsilon_j \quad , \quad (3-4)$$

where  $X_{ij}$  denotes commodities/ activities consumed by individual  $j$  at destination  $i$  and  $Y_j$  represents characteristics of individual  $j$ ’s travel group.

Alternative-specific cost indices,  $\hat{P}_{ij}$ , are then constructed for all observations and destinations on the basis of the obtained estimates, the observed group-specific average demand per destination  $\bar{X}_i$ , and the individual-specific characteristics:

$$\hat{P}_{ij} = \hat{\alpha}_i + \bar{X}_i\hat{\beta}_i + Y_j\hat{\gamma}_i \quad . \quad (3-5)$$

**Table 2: Cost factors and individual-specific characteristics**

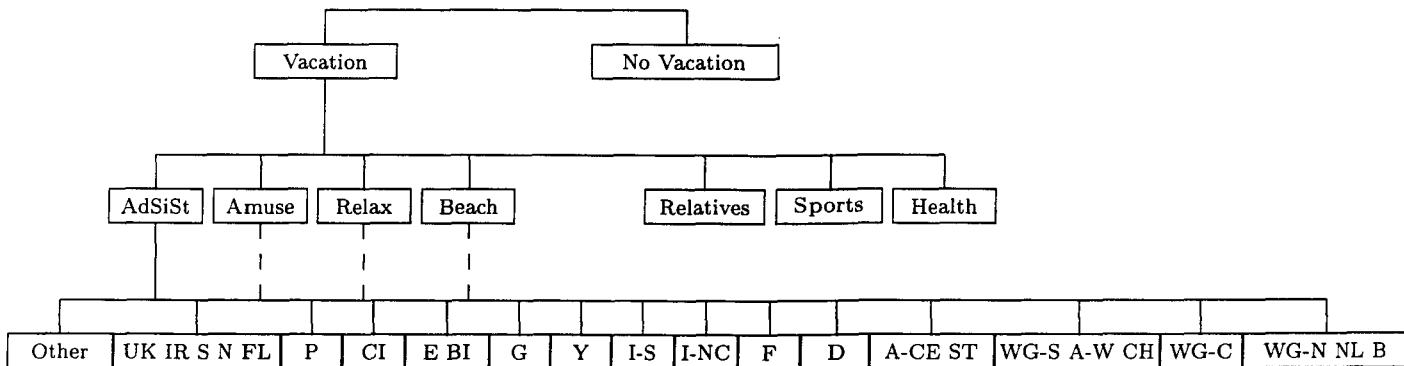
<i>Variable</i>	<i>Description</i>
LENGTH	number of vacation days
CPRIVAC	respondent chose camping or private accommodation
PPUBTR	respondent used public transport (including air transport)
PACKAGE	respondent joined package tour
HIKING	indicated vacation activity: hiking
SIGHTS	indicated vacation activity: sightseeing
SUN	indicated vacation activity: sunbathing
DISCO	indicated vacation activity: visits to discotheques
EXCUR	indicated vacation activity: excursions
TOUR	tourist visited several destinations
NTRAV	number of persons joining travel group
CHILD18	minors joined the travel group

### 3.4 Nested multinomial logit model: assumptions

As depicted in figure 1, we propose a three-level nesting structure within the choice set of tourists. We first distinguish the option not to spend vacation from the subset of alternative vacation purposes chosen by those who did spend vacation. The four vacation purposes “adventure, sightseeing, or studying”, “amusement”, “relaxing”, or “beachlife”, eventually, split into identical subsets of fifteen regions.

The apparent asymmetry of the distribution for both regions and vacation purposes and consequently the small number of persons visiting friends or relatives, pursuing sports, or spending health-related vacation in foreign destinations necessitated our proposition of an asymmetric nesting structure within the choice set (cf. figure 1 and table 3).

**Figure 1: The choice of vacation activities and destinations**



Acronyms as well as a detailed description of the alternatives are given in the appendix. The number and percentage of respondents who chose either of the alternatives in the choice set is shown in table 3.

**Table 3: Frequency of visits by vacation purpose and destination<sup>14</sup>**

	AdSiSt	Amuse	Relax	Beach	Relatives	Sports	Health	Total
No Vac.								2557 <i>48.4</i> <i>100</i>
Other	77 <i>33.8</i> <i>32.6</i>	47 <i>4.5</i> <i>19.9</i>	31 <i>3.5</i> <i>13.1</i>	23 <i>4.5</i> <i>9.8</i>	50 <i>20.8</i> <i>21.2</i>	5 <i>4.3</i> <i>2.1</i>	3 <i>2.0</i> <i>1.3</i>	236 <i>4.5</i> <i>100</i>
UK IR S N FL	19 <i>8.3</i> <i>31.2</i>	9 <i>1.5</i> <i>14.8</i>	18 <i>2.1</i> <i>29.5</i>	4 <i>0.8</i> <i>6.6</i>	5 <i>2.1</i> <i>8.2</i>	6 <i>5.1</i> <i>9.8</i>	0 <i>0.0</i> <i>0.0</i>	61 <i>1.2</i> <i>100</i>
P	5 <i>2.2</i> <i>17.9</i>	6 <i>1.0</i> <i>21.4</i>	5 <i>0.6</i> <i>17.9</i>	8 <i>1.6</i> <i>28.6</i>	4 <i>1.7</i> <i>14.3</i>	0 <i>0.0</i> <i>0.0</i>	0 <i>0.0</i> <i>0.0</i>	28 <i>0.5</i> <i>100</i>
CI	0 <i>0.0</i> <i>0.0</i>	10 <i>1.6</i> <i>18.5</i>	14 <i>1.6</i> <i>25.9</i>	27 <i>5.3</i> <i>50.0</i>	1 <i>0.4</i> <i>1.9</i>	1 <i>0.9</i> <i>1.9</i>	1 <i>0.7</i> <i>1.9</i>	54 <i>1.0</i> <i>100</i>
E BI	8 <i>3.5</i> <i>2.9</i>	83 <i>13.6</i> <i>29.9</i>	66 <i>7.5</i> <i>23.7</i>	110 <i>21.7</i> <i>39.6</i>	3 <i>1.2</i> <i>1.1</i>	7 <i>6.0</i> <i>2.5</i>	1 <i>0.7</i> <i>0.4</i>	278 <i>5.3</i> <i>100</i>
G	15 <i>6.6</i> <i>14.2</i>	26 <i>4.3</i> <i>24.5</i>	24 <i>2.7</i> <i>22.6</i>	37 <i>7.3</i> <i>34.9</i>	1 <i>0.4</i> <i>0.9</i>	2 <i>1.7</i> <i>1.9</i>	1 <i>0.7</i> <i>0.9</i>	106 <i>2.0</i> <i>100</i>
Y	3 <i>1.3</i> <i>2.0</i>	32 <i>5.2</i> <i>20.8</i>	38 <i>4.3</i> <i>24.7</i>	71 <i>14.0</i> <i>46.1</i>	6 <i>2.5</i> <i>3.9</i>	3 <i>2.6</i> <i>2.0</i>	1 <i>0.7</i> <i>0.7</i>	154 <i>2.9</i> <i>100</i>
I-S	1 <i>0.4</i> <i>2.1</i>	11 <i>1.8</i> <i>22.9</i>	15 <i>1.7</i> <i>31.3</i>	13 <i>2.6</i> <i>27.1</i>	4 <i>1.7</i> <i>8.3</i>	0 <i>0.0</i> <i>0.0</i>	4 <i>2.7</i> <i>8.3</i>	48 <i>0.9</i> <i>100</i>
I-NC	21 <i>9.2</i> <i>11.8</i>	45 <i>7.4</i> <i>25.3</i>	40 <i>4.6</i> <i>22.5</i>	56 <i>11.1</i> <i>31.5</i>	3 <i>1.2</i> <i>1.7</i>	7 <i>6.0</i> <i>3.9</i>	6 <i>4.1</i> <i>3.4</i>	178 <i>3.4</i> <i>100</i>
F	28 <i>12.3</i> <i>18.4</i>	52 <i>8.5</i> <i>34.2</i>	20 <i>2.3</i> <i>13.2</i>	37 <i>7.3</i> <i>24.3</i>	7 <i>2.9</i> <i>4.6</i>	6 <i>5.1</i> <i>4.0</i>	2 <i>1.4</i> <i>1.3</i>	152 <i>2.9</i> <i>100</i>
D	3 <i>1.3</i> <i>4.5</i>	14 <i>2.3</i> <i>20.9</i>	13 <i>1.5</i> <i>19.4</i>	31 <i>6.1</i> <i>46.3</i>	3 <i>1.2</i> <i>4.5</i>	2 <i>1.7</i> <i>3.0</i>	1 <i>0.7</i> <i>1.5</i>	67 <i>1.3</i> <i>100</i>
A-CE ST	7 <i>3.1</i> <i>3.5</i>	59 <i>9.7</i> <i>29.5</i>	86 <i>9.8</i> <i>43.0</i>	6 <i>1.2</i> <i>3.0</i>	9 <i>3.7</i> <i>4.5</i>	21 <i>18.0</i> <i>10.5</i>	12 <i>8.2</i> <i>6.0</i>	200 <i>3.8</i> <i>100</i>
WG-S A-W CH	25 <i>11.0</i> <i>3.6</i>	141 <i>23.1</i> <i>20.3</i>	343 <i>39.2</i> <i>49.4</i>	11 <i>2.2</i> <i>1.6</i>	60 <i>24.9</i> <i>8.7</i>	48 <i>41.0</i> <i>6.9</i>	66 <i>44.9</i> <i>9.5</i>	694 <i>13.1</i> <i>100</i>
WG-C	1 <i>0.4</i> <i>0.1</i>	14 <i>2.3</i> <i>12.4</i>	56 <i>6.4</i> <i>49.6</i>	0 <i>0.0</i> <i>0.0</i>	25 <i>10.4</i> <i>22.1</i>	4 <i>3.4</i> <i>3.5</i>	13 <i>8.8</i> <i>11.5</i>	113 <i>2.1</i> <i>100</i>
WG-N NL B	15 <i>6.6</i> <i>4.2</i>	62 <i>10.2</i> <i>17.4</i>	106 <i>12.1</i> <i>29.7</i>	73 <i>14.4</i> <i>20.5</i>	60 <i>24.9</i> <i>16.8</i>	5 <i>4.3</i> <i>1.4</i>	36 <i>24.5</i> <i>10.1</i>	357 <i>6.8</i> <i>100</i>
Total	228 <i>100</i> <i>4.3</i>	611 <i>100</i> <i>11.6</i>	875 <i>100</i> <i>16.6</i>	507 <i>100</i> <i>9.6</i>	241 <i>100</i> <i>4.6</i>	117 <i>100</i> <i>2.2</i>	147 <i>100</i> <i>2.8</i>	5283 <i>100</i> <i>100</i>

In order to ensure a sufficient number of degrees of freedom for each alternative, we, moreover, constrain the destination-specific coefficients assigned to the lowest decision level to be equal across the four vacation purposes “adventure, sightseeing, or studying”, “amusement”, “relaxing”, and “beach”. In order to account for node-specific differences in the impact of the socioeconomic variables, we assign the same set of socioeconomic variables (with the exception of those variables measuring the perception of location-specific characteristics such as sunshine) to the intermediate and to the lowest nesting level of the decision tree. The impact of the age-income variables upon the propensity to spend relaxing vacation in Central Germany “adds up” over the three nodes “vacation”, “relaxing”, and “Central Germany”, for instance (cf. table 8).

<sup>14</sup>Row and column percentages are indicated in italics.

## 4 Estimation results

### 4.1 Cramer and Ridder's specification test

Cramer and Ridder's specification test is applied both to the choice set of regions and to the choice set of vacation purposes. Tables 4a-c and 5 present the values of test statistics obtained by sequential comparison of corresponding pairs of multinomial logit models.

In order to investigate whether or not the composition of the choice set affects the results of Cramer and Ridder's specification test, we start from various choice subsets of regional alternatives. Tables 4a-b serve as examples for this approach.<sup>15</sup> The small number of visitors to some of the destinations which are given by the data source has forced us to use arbitrary aggregation schemes for vacation areas within Germany and for the British Isles.

Table 4c starts from a higher regional aggregation level and shows alternative sequences of choice sets comprising all vacation areas visited by the respondents. Alternative pairs of regions are pooled at the same aggregation level in order to "optimize" the merging process.

Similarly to the "common sense" aggregation scheme used in the data source, tables 4a-c suggest that the size of the aggregated vacation areas should vary in accordance with their distance from Germany. The aggregation criterion used in this study leads to the choice set of fifteen regions which is described in figure 1 and table 3.

If determined on the basis of a set of exclusively socioeconomic explanatory variables, the boundaries of vacation areas sometimes cross political, yet recognize language borders: The examples of Belgium, The Netherlands, and Northern Germany as well as

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<sup>15</sup>We have conducted similar analyses for a choice subset covering Yugoslavia, Northern France, Southern France, South Tyrol, Northern, Central, and Southern Italy/ Sicily/ Sardinia as well as for a choice subset comprising the Balearic Islands, the Canary Islands, Northern Spain, Southern Spain, Portugal, and Southern France.

Western Austria, Switzerland and Southern Germany throw into strong relief that tourists distinguish vacation areas by geographical characteristics rather than by country borders as has been previously assumed by the large majority of empirical analyses of tourism demand.<sup>16</sup> Visual inspection of the results, moreover, suggests that topographical characteristics (such as mountains or coasts), climate, yet also the development state of the regional tourist industry seem to matter.

**Table 4a: Cramer-Ridder likelihood ratio test for regions within Germany and its Northwestern neighbors<sup>17</sup>**

Hyp.	Alternatives							LR	Cf.	CR(16)
1	<u>WG-Nec</u>	<u>WG-NBS</u>	<u>NL B</u>	D	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>45.3</u></b>	1,2	24.6
	<u>WG-Nec</u>		<u>NL B</u>						1,3	27.8
	<u>WG-Nec</u>	<u>WG-NBS</u>							1,4	29.5
		WG-NBS		D					1,5	53.7
2	<u>WG-Nec</u>	<u>WG-NBS</u>	<u>NL B</u>	D	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>28.1</u></b>	2,7	30.2
3	<u>WG-Nec</u>	<u>NL B</u>	<u>WG-NBS</u>	D	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>29.7</u></b>	3,7	27.0
4	<u>WG-Nec</u>	<u>WG-NBS</u>	<u>NL B</u>	D	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>36.8</u></b>	4,7	25.3
			<u>NL B</u>	D					4,6	53.9
	WG-Nec	WG-NBS		D					4,8	59.4
5	<u>WG-Nec</u>	<u>WG-NBS</u>	D	<u>NLB</u>	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>38.1</u></b>	5,8	53.7
6	<u>WG-Nec</u>	<u>WG-NBS</u>	<u>NL B</u>	D	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>27.0</u></b>	—	—
7	<u>WG-Nec</u>	<u>WG-NBS</u>	<u>NL B</u>	D	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>22.5</u></b>	—	—
8	<u>WG-Nec</u>	<u>WG-NBS</u>	D	<u>NL B</u>	WG-C	WG-S A-W CH	Oth. Dest.	<b><u>30.8</u></b>	—	—

<sup>16</sup>Cf. e.g. Bakkal (1991) or O'Hagan and Harrison (1984).

<sup>17</sup>Acronyms that are underlined and typed in boldface letters indicate that the estimates of the respective destination-specific parameters are not significantly different from each other at a significance level of 1%. Values of the LR test statistic which are underlined and type in boldface letters indicate that the IIA axiom is rejected at a significance level of 1%. The first column of each table ("Hyp.") assigns acronyms to each choice set. The central block of columns lists all the alternatives comprised in the respective choice set. The second-to-last column indicates the pair of model specifications for the which Cramer and Ridder's test statistic—CR(degrees of freedom)—has been computed. The last column gives the test statistic. In tables 4a and b, the third-to-last column shows the test statistic of a likelihood ratio test (LR) discriminating between extended multinomial logit models and multinomial logit models for the respective model specification. All programs have been written in SAS-IML.

**Table 4b: Cramer-Ridder likelihood ratio test for regions within Germany and its Southern neighbors**

Hyp.	Alternatives									LR	Cf.	CR(16)
A	A-W <u>A-W</u> A-W A-W	A-CE <u>A-CE</u> A-CE	ST <u>ST</u> ST	CH <u>CH</u>	<u>WG-ALP</u> <u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	57.9	A,F A,B A,E A,D A,C	6.9 8.3 14.0 34.7 35.0
B	<u>A-W</u> A-W	A-CE ST A-CE ST		CH <u>CH</u>	<u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	<u>49.3</u>	B,J B,L B,P	14.0 23.1 45.6
C	<u>A-W ST</u>	<u>A-CE</u>		CH	WG-ALP	WG-SeA	WG-C	WG-N NL B	Oth. Dest.	43.6	C,P	18.9
D	<u>A-W A-CE</u>	<u>ST</u>		CH	WG-ALP	WG-SeA	WG-C	WG-N NL B	Oth. Dest.	39.7	D,P	19.2
E	A-W WG-ALP <u>A-W WG-ALP</u>		<u>ST</u>	CH	<u>A-CE</u>	<u>WG-SeA</u> <u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	<u>48.9</u>	E,J E,G	8.4 21.8
F	<u>A-W</u>	A-CE	ST	CH	<u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	<u>54.0</u>	F,G	28.9
G	<u>CH</u>	A-CE	ST	<u>A-W</u>	<u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	38.1	G,H	24.8
H	<u>A-CE</u>	<u>ST</u>	A-W CH WG-ALP WG-SeA				WG-C	WG-N NL B	Oth. Dest.	22.6	H,O	8.4
I	<u>A-W CH</u>	A-CE ST		<u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	31.4	I,M	11.9	
J	A-CE ST		<u>CH</u>	<u>A-W</u>	<u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	<u>41.9</u>	J,M	25.9
K	A-W <u>A-W</u>	A-CE ST		<u>CH</u>	<u>WG-ALP</u> <u>CH</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	<u>44.3</u>	K,N K,M	20.7 22.4
L	A-W	A-CE ST		<u>WG-ALP</u>	<u>CH</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	<u>38.9</u>	L,N	7.2
M	A-CE ST		<u>A-W</u>	<u>CH</u>	<u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	27.1	M,O	20.7
N	<u>A-W</u>	A-CE ST		<u>CH</u>	<u>WG-ALP</u>	<u>WG-SeA</u>	WG-C	WG-N NL B	Oth. Dest.	<u>36.0</u>	N,O	30.4
O	A-CE ST		A-W CH WG-ALP WG-SeA				WG-C	WG-N NL B	Oth. Dest.	18.8	O,Q	73.2
P	A-W A-CE ST		CH	WG-ALP	WG-SeA	WG-C	WG-N NL B	Oth. Dest.	33.2	P,Q	88.3	
Q	A-W A-CE ST CH WG-ALP WG-SeA						WG-C	WG-N NL B	Oth. Dest.	7.6	—	—

**Table 4c: Cramer-Ridder likelihood ratio test for all vacation areas**

Hyp.	Alternatives																	Cf.	CR(16)				
a	WG-N	WG-C	WG-S	A-W	A-CE	ST	CH	D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	a,b	34.46
b	WG-N	WG-CS		A-W	A-CE	ST	CH	D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	b,c	105.6
c	WG			A-W	A-CE	ST	CH	D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	c,d	39.1
d	WG			A-W	A-CE	ST	CH	D	NL B	F	I	Y	G	E	BI	CI	<u>UK IR</u>	<u>S N FL</u>	EG SU H	B R P SM	Oth.	d,e	21.9
e	WG			A-W	A-CE	ST	CH	D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	e,f	34.0
f	WG			<u>A</u>	<u>ST</u>	CH	D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	f,g	19.9	
g	WG			A ST		CH	D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	g,h	34.3	
h	WG			A ST CH			D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	h,i	54.5	
i	WG			A ST CH			D	NL B	F	I	Y	G	E	BI	CI	UK IR	S N FL	EG SU H	B R P SM	Oth.	ij	26.9	



Table 4c, cont.

Hyp.	Alternatives											Cf.	CR(16)																		
j	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	BR	P	SM	Oth.	j,k	60.0			
k	WG	A	ST	CH	D	N	L	B	F	I	Y	G	<u>E</u>	<u>B</u>	<u>I</u>	<u>C</u>	<u>I</u>	UK	IR	EG	SU	H	BR	P	SM	Oth.	k,l	22.3			
l	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	BR	P	SM	Oth.	l,m	63.3			
m	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	BR	P	SM	Oth.	m,n	124.2			
n	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	BR	P	SM	Oth.	n,o	32.8			
o	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	<u>BR</u>	<u>P</u>	<u>SM</u>	<u>Other</u>	o,p	10.2			
m1	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	H	B	R	P	<u>SM</u>	<u>EG</u>	<u>SU</u>	<u>Oth.</u>	m1, n1	29.6		
n1	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	H	B	R	P		EG	SU	SM	Other	n1, p1	42.2	
p1	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	<u>H</u>	<u>B</u>	<u>R</u>			<u>EG</u>	<u>SU</u>	<u>P</u>	<u>SM</u>	<u>Other</u>	p1, q	30.3
n2	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	B	R	<u>P</u>	<u>SM</u>	<u>Oth.</u>	n2, p2	30.4		
p2	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	<u>EG</u>	<u>SU</u>	<u>H</u>	<u>B</u>	<u>R</u>		<u>P</u>	<u>SM</u>	<u>Other</u>	p2, q	27.5	
q	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	B	R	<u>P</u>	<u>SM</u>	<u>Other</u>	q,r	60.4		
r	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	B	R	P	SM	Other	r,s	116.1		
s	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	B	R	P	SM	Other	s,t	178.6		
t	WG	A	ST	CH	D	N	L	B	F	I	Y	G	E	B	I	C	I	UK	IR	EG	SU	H	B	R	P	SM	Other	t,u	439.5		
u	WG	A ST CH D NL B F I Y G E B I C I											UK	IR	EG	SU	H	B	R	P	Other										

We apply the same aggregation procedure to the set of nine “elemental” vacation purposes distinguished in the data base. In spite of the vagueness of the definition of vacation purposes, the results of the sequential testing procedure are surprisingly clear. The results shown in table 5 indicate that vacation purposes should be aggregated on the basis of the cost-intensity of the corresponding vacation activities. We employ the results of the analysis for the definition of alternatives assigned to the second nesting level of the three-level nested multinomial logit model described in section 3.4. We, however, separate sports from the “human capital” oriented alternatives in order to account for the much smaller number of destinations visited by persons whose motive was to pursue sports as compared to those whose evident vacation motive was to learn.

**Table 5: Cramer-Ridder likelihood ratio test for vacation purposes**

Hyp.	Alternatives									Cf.	CR(15)
I	<b>Si</b>	<b>St</b>	Ad	Sports	Beach	Amuse	Relax	Relat.	Health	—	
II	<b>Si &amp; St</b>	<b>Ad</b>	Sports	Beach	Amuse	Relax	Relat.	Health		I,II	16.6
III	<b>Si &amp; St &amp; Ad</b>	<b>Sports</b>	Beach	Amuse	Relax	Relat.	Health			II,III	18.6
IV	<b>Si &amp; St &amp; Ad &amp; Sports</b>	Beach	Amuse	Relax	Relat.	Health				III,IV	19.9
V	<b>Si &amp; St &amp; Ad &amp; Sports &amp; Amuse</b>	Beach	Relax	Relat.	Health					IV,V	76.7
VI	<b>Si &amp; St &amp; Ad &amp; Sports &amp; Beach</b>	Amuse	Relax	Relat.	Health					IV,VI	83.3
VII	<b>Si &amp; St &amp; Ad &amp; Sports</b>	<b>Beach &amp; Amuse</b>	Relax	Relat.	Health					IV,VII	98.9
VIII	<b>Si &amp; St &amp; Ad &amp; Sports</b>	Beach	<b>Amuse &amp; Relax</b>	Relat.	Health					IV,VIII	165.0
IX	<b>Si &amp; St &amp; Ad</b>	<b>Sports &amp; Beach</b>	Amuse	Relax	Relat.	Health				III,IX	29.8
X	<b>Si &amp; St &amp; Ad &amp; Amuse</b>	Sports	Beach	Relax	Relat.	Health				III,X	50.4
XI	<b>Si &amp; St &amp; Ad</b>	Sports	Beach	Amuse	<b>Relax &amp; Relat.</b>	Health				III,XI	74.0
XII	<b>Si &amp; St &amp; Ad</b>	Sports	<b>Beach &amp; Amuse</b>	Relax	Relat.	Health				III,XII	98.8
XIII	<b>Si &amp; St &amp; Ad</b>	Sports	Beach	<b>Amuse &amp; Relax</b>	Relat.	Health				III,XIII	165.0
XIV	<b>Si &amp; St &amp; Ad</b>	Sports	<b>Beach &amp; Relax</b>	Amuse	Relat.	Health				III,XIV	243.6
XV	<b>Si &amp; St &amp; Ad</b>	Sports	<b>Beach &amp; Relax &amp; Health</b>	Relat.	Amuse.					XIV,XV	170.5
XVI	<b>Si &amp; St &amp; Ad</b>	Sports	<b>Beach &amp; Amuse &amp; Relax</b>	Relat.	Health					XIV,XVI	105.8
										XIII,XVI	184.5

## 4.2 The independence from irrelevant alternatives assumption

The estimation results presented in tables 6 and 7 have been obtained by the two-step estimation procedure suggested by Chesher and Santos Silva (1992). First the choice probabilities  $P^{MNL}$  have been determined on the basis of a multinomial logit model. The respective estimates  $\hat{P}^{MNL}$  have subsequently been used as explanatory variables of the extended multinomial logit model. Estimates of the alternative-specific coefficients are presented in the first part of tables 6 and 7, respectively. The estimated covariance parameters, i.e. the parameters assigned to the additional explanatory variables  $\hat{P}^{MNL}$ , are presented in the second part of the two tables.

Table 6 serves as an example of our attempt to investigate the validity of the IIA proposition by application of the likelihood ratio test statistic to (extended) multinomial logit models for various choice subsets of eight out of fifteen destinations.

**Table 6: Estimation results for a choice subset of eight destinations**

(extended multinomial logit model, two-step-estimation procedure,

base category: Northern Germany, The Netherlands, and Belgium)<sup>18</sup>

Variables	Alternatives						
	Other	F	CI	P	E BI	WG-S A-W CH	WG-C
CONST	-0.171 (-0.16)	-5.902** (-2.22)	-7.186 (-1.56)	-33.258 (-0.00)	-0.951 (-0.59)	-0.723 (-0.61)	1.643 (0.39)
AGE39IPCS	-0.177 (-0.57)	1.433*** (2.67)	-0.822 (-1.11)	27.533 (0.00)	0.500 (1.35)	-0.408 (-1.24)	-0.180 (-0.32)
AGE39IPCL	0.445 (1.01)	1.628*** (2.69)	0.146 (0.20)	27.504 (0.00)	0.830* (1.72)	-0.902* (-1.74)	-1.786 (-1.36)
AGE62IPCL	0.296 (0.99)	-0.077 (-0.16)	0.201 (0.37)	26.577 (0.00)	0.255 (0.69)	0.138 (0.46)	0.100 (0.19)
AGE94IPCS	-0.465 (-1.30)	-0.202 (-0.33)	-0.877 (-1.10)	-1.209 (0.00)	-0.367 (-0.77)	0.286 (0.80)	0.096 (0.16)
AGE94IPCL	-0.222 (-0.47)	-1.190 (-1.41)	1.114 (1.09)	25.751 (0.00)	-0.344 (-0.60)	0.552 (1.08)	0.340 (0.40)
SCHOOL	-0.318 (-1.05)	-1.373*** (-2.74)	-0.433 (-0.75)	-0.646 (-0.87)	-0.504 (-1.54)	0.502* (1.67)	0.282 (0.47)
SINGLE	-0.111 (-0.41)	0.156 (0.43)	-1.611** (-2.02)	0.652 (0.98)	0.190 (0.60)	-0.274 (-0.93)	-0.295 (-0.54)
CHILD18	0.016 (0.06)	-1.005** (-2.43)	-0.910 (-1.46)	-1.836** (-1.98)	-0.389 (-1.27)	0.212 (0.88)	0.056 (0.12)
SUNNY	2.625*** (3.07)	2.456** (2.54)	5.673*** (3.21)	3.183** (2.13)	2.789*** (2.89)	-0.105 (-0.13)	-0.257 (-0.17)
NATURE	0.206 (0.54)	-1.360** (-2.53)	0.317 (0.39)	-0.467 (-0.56)	-0.776 (-1.56)	0.405 (0.96)	0.491 (0.78)
NEWDEST	0.630** (2.01)	-0.020 (-0.05)	1.335** (2.52)	2.216** (2.44)	0.412 (1.29)	-0.195 (-0.70)	-0.038 (-0.08)
BERLIN	-1.493** (-2.17)	-0.723 (-0.74)	-2.828** (-2.11)	2.009 (1.43)	-0.256 (-0.34)	-0.312 (-0.47)	0.739 (0.52)
WG-N	-1.317** (-1.97)	-0.029 (-0.04)	-1.563 (-1.51)	1.713 (1.42)	-0.262 (-0.38)	-0.455 (-0.69)	0.648 (0.48)
WG-C	-1.688*** (-2.68)	0.110 (0.15)	-2.372** (-2.38)	0.477 (0.40)	-0.481 (-0.73)	-0.189 (-0.32)	0.898 (0.66)
WG-SW	-1.492*** (-2.95)	0.689 (1.03)	-2.216** (-2.37)	0.367 (0.31)	-0.081 (-0.14)	-0.137 (-0.29)	0.419 (0.32)

<sup>18</sup>In all the tables presented in this study, one (two, three) stars indicate significance of the respective parameter estimate at the 10% (5%, 1%) level. *t*-ratios are given in parentheses. All coefficients and covariance parameters assigned to the base category are set equal to zero.

Table 6, cont.

Estimates of covariance parameters<sup>19</sup>

	Other	F	CI	P	E BI	WG-S A-W CH	WG-C
Other	-1.911 (-0.62)						
F	-7.809** (-2.27)	-1.453 (-0.22)					
CI	1.768 (0.28)	-4.590 (-0.57)	8.427 (0.61)				
P	-12.886* (-1.96)	-13.848* (-1.83)	-1.861 (-0.15)	-19.853 (-1.50)			
E BI	-3.034 (-1.11)	-1.766 (-0.53)	-3.774 (-0.63)	-6.995 (-1.05)	-6.467* (-1.80)		
WG-S A-W CH	-4.758* (-1.79)	-8.168** (-2.46)	-2.968 (-0.48)	-14.792** (-2.23)	-4.099 (-1.58)	-5.761* (-1.85)	
WG-C	-2.928 (-0.69)	-2.474 (-0.36)	-2.651 (-0.23)	-16.575 (-1.52)	-5.631 (-1.24)	-2.952 (-0.73)	-14.249 (-1.57)
PCP	0.48						
$\sigma$	0.06						
$\rho^2_{adj.}$	0.17						
LR(28)	36.2						
No. obs.	2221						

For all but one choice subset of destinations,<sup>20</sup> the likelihood ratio test statistic has indicated that the IIA proposition cannot be rejected.

In order to investigate whether or not IIA is valid across the two choice subsets assigned to the intermediate and upper nesting level of the model depicted in figure 1, we estimate an extended multinomial logit model for seven vacation purposes *and* the option not to spend vacation. The likelihood ratio test statistic shown in table 7 indicates that the

<sup>19</sup>PCP denotes the percentage of correct predictions.  $\sigma$  is a prediction index (cf. Hensher and Johnson, 1981).  $\rho^2_{adj.}$  denotes the adjusted likelihood ratio index suggested by Horowitz (1983). LR(degrees of freedom) is the likelihood ratio test statistic obtained by comparison of the extended multinomial logit model with the corresponding multinomial logit model.

<sup>20</sup>The IIA proposition has been rejected at a significance level of 5% for the choice subset covering Northern/ Central Italy, Southern Italy, South Tyrol/ Central/ Eastern Austria, the Alpine area, Central Germany, Northern Germany/ The Netherlands/ Belgium, Denmark, and a conglomerate of all other destinations. The result could not be replicated after substituting one arbitrary alternative in the choice subset by any other destination in the entire regional choice set.

IIA proposition cannot be rejected for these eight alternatives and thus questions our assumption of three nesting levels of the individual decision process.

**Table 7: Estimation results for a choice subset of seven vacation purposes and alternative no/short vacation**

(extended multinomial logit model, two-step-estimation procedure,  
base category: health-related vacation)

Variables	Alternatives						
	AdSiSt	Amuse	Relax	Beach	Relatives	Sports	No Vac.
CONST	-9.760** (-2.40)	-1.252 (-0.41)	-1.530 (-0.63)	-2.356 (-0.90)	-10.902 (-1.57)	-24.356** (-2.32)	-0.867 (-0.37)
AGE39IPCS	2.347*** (3.61)	2.089*** (3.60)	1.144** (2.18)	2.113*** (3.80)	1.493** (2.33)	2.211*** (2.95)	1.519*** (2.97)
AGE39IPCL	4.374*** (3.74)	2.768** (2.55)	2.193** (2.14)	3.757*** (3.53)	1.394 (1.09)	5.123*** (3.70)	1.918* (1.88)
AGE62IPCL	1.845** (2.40)	-0.594 (-0.90)	0.175 (0.30)	0.294 (0.51)	0.319 (0.33)	3.111*** (3.05)	-0.542 (-0.92)
AGE94IPCS	-0.215 (-0.40)	-0.565 (-1.29)	-0.346 (-0.87)	-2.071*** (-4.09)	0.501 (0.93)	-2.614*** (-2.61)	-0.290 (-0.77)
AGE94IPCL	0.305 (0.36)	-1.830** (-2.29)	-0.414 (-0.64)	-2.219*** (-2.88)	0.652 (0.63)	0.140 (0.13)	-0.970 (-1.50)
SCHOOL	-0.673 (-1.51)	-0.204 (-0.52)	-0.477 (-1.32)	-0.884** (-2.24)	0.214 (0.42)	-1.142** (-1.98)	-0.108 (-0.31)
SINGLE	-0.811 (-1.45)	0.581 (1.18)	-0.119 (-0.26)	-0.059 (-0.13)	1.067 (1.59)	-1.433** (-2.06)	0.536 (1.13)
CHILD18HH	-0.503 (-0.88)	-0.288 (-0.57)	0.267 (0.62)	0.390 (0.89)	0.948 (1.24)	0.856 (1.22)	-0.046 (-0.11)
CITY1	-2.336** (-2.57)	1.209 (1.51)	0.706 (0.99)	0.261 (0.37)	1.066 (0.98)	-3.944*** (-3.12)	1.545* (1.95)
CITY2	-0.953 (-1.57)	-0.179 (-0.34)	-0.301 (-0.62)	-0.805 (-1.57)	-0.553 (-0.75)	-0.773 (-1.04)	-0.058 (-0.13)
BERLIN	1.335 (0.74)	-0.053 (-0.03)	2.997* (1.89)	0.855 (0.56)	0.067 (0.04)	-0.753 (-0.32)	1.747 (1.21)
WG-N	-0.316 (-0.75)	-0.003 (-0.01)	0.427 (1.20)	0.192 (0.54)	-0.096 (-0.23)	-0.234 (-0.47)	0.136 (0.42)
WG-C	0.050 (0.10)	-0.508 (-1.16)	0.389 (0.93)	-0.385 (-0.92)	-0.801 (-1.38)	0.609 (0.95)	-0.217 (-0.55)
WG-SW	0.282 (0.66)	0.064 (0.17)	0.385 (1.03)	-0.321 (-0.82)	0.174 (0.41)	-0.519 (-0.95)	0.263 (0.76)

**Table 7, cont.**

*Estimates of covariance parameters*

	AdSiSt	Amuse	Relax	Beach	Relatives	Sports	No Vac.
AdSiSt	4.251 (0.37)						
Amuse	-9.394 (-1.16)	-4.059 (-0.44)					
Relax	-6.287 (-0.82)	-7.410 (-1.08)	-6.662 (-0.94)				
Beach	-6.958 (-0.91)	0.031 (0.00)	-3.802 (-0.58)	0.307 (0.04)			
Relatives	-13.305 (-1.27)	-8.417 (-0.88)	-10.142 (-1.25)	-8.323 (-1.03)	5.602 (0.32)		
Sports	-8.170 (-0.75)	-14.507 (-1.47)	-11.054 (-1.21)	-9.507 (-1.03)	-18.407 (-1.47)	22.586 (1.05)	
No Vac.	-11.364 (-1.59)	-2.562 (-0.39)	-5.116 (-0.84)	-3.744 (-0.60)	-6.645 (-0.86)	-19.219** (-2.23)	-5.935 (-0.92)
PCP	0.50						
$\sigma$	-1.40						
$\rho^2_{adj.}$	0.08						
LR(28)	34.37						
No. obs.	5283						

### 4.3 Comparison of specification tests

It seems noteworthy that the results of Cramer and Ridder's likelihood ratio test prove to be hardly affected by changes in the composition of the choice set, even if the IIA specification test indicates misspecification of both null and alternative hypothesis.

Tables 4a and 4b show that the IIA proposition is mostly rejected for the less aggregated of two model specifications when Cramer and Ridder's test statistic suggests that the subset of alternatives in question should be merged. Table 4b, however, demonstrates that the IIA proposition is not necessarily rejected if the aggregation level is too low. As reflected by the LR and CR test statistics for model specifications A and B, the IIA proposition may in fact become invalid after merging elementary alternatives for which IIA proved to be fulfilled.

## 4.4 Nested multinomial logit model

The estimated coefficients for the three-level nested multinomial logit model presented in table 8 by and large parallel those obtained for the extended multinomial logit models for choice subsets. The reflected dissimilarity structure for alternative purposes of vacation and the option not to spend vacation, however, contradicts the estimation results presented in table 7.

In the following, the estimation results for various alternative nesting structures are summarized in order to shed light on the interference of the specification tests discussed previously and the estimates of dissimilarity parameters. The empirical results as to the determinants of tourists' destination choice are presented in the second part of this section.

### 4.4.1 Nesting structure

In contrast to the results shown in table 7, the estimate for the dissimilarity parameter assigned to the highest nesting level is significantly larger than one. The estimate thus indicates misspecification of either intermediate or highest nesting level of the three-level nested multinomial logit model depicted in figure 1.<sup>21</sup> The estimate of the dissimilarity parameter assigned to the intermediate nesting level is significantly lower than one (and larger than zero) when obtained by sequential estimation of the lowest and intermediate nesting level only. The respective estimate shown in table 8, which *seems* to be significantly larger than one, has been computed recursively from the sequential estimates for all three levels.<sup>22</sup> In contrast to the conclusions to be drawn from table 8, the assumed nesting structure for the choice subsets of regions and vacation purposes *cannot* be rejected if the option not to spend vacation is neglected.

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<sup>21</sup>It should be noted that the assumption of stochastic utility maximization may be fulfilled for dissimilarity parameters larger than one. Cf. Börsch-Supan (1990) or Koning and Ridder (1994).

<sup>22</sup>For the sequential estimation technique and the ensuing recursive determination of the parameter estimates for nested multinomial logit models cf. McFadden (1981).

We have estimated several alternative three- and two-level nested multinomial logit models of the individuals' decision whether or not and where to spend vacation, and which vacation activities to pursue for various other sets of explanatory variables. We have also estimated three- and two-level nested multinomial logit models on the basis of various other aggregation schemes for destinations and vacation purposes. The reflected impact of the price index as well as the socioeconomic variables upon the individual decision process proved to be stable for all chosen model specifications. Among the large number of alternative model specifications, we found a single model specification (a two-nested multinomial logit model for the same set of explanatory variables yet for a choice subset of seventeen destinations<sup>23</sup>) for which the estimate of the dissimilarity parameter of the upper nesting level (comprising vacation purposes and the option not to spend vacation) was not significantly larger than one.

However, Cramer and Ridder's likelihood ratio test has indicated that the aggregation scheme underlying the definition of alternatives in the respective two-level nested multinomial logit model<sup>24</sup> is clearly inferior to the one underlying the model specification presented in this study. Moreover, likelihood ratio tests discriminating between extended multinomial logit models and multinomial logit models for various choice subsets of eight out of the corresponding seventeen destinations have indicated that the IIA proposition is not fulfilled at the lowest nesting level of the seemingly superior two-level nested multinomial logit model. Both the goodness-of-fit index and prediction success index are substantially higher for the model presented in this study than for other comparable model specifications. We therefore favor the model specification presented in table 8 in spite of the worrisome estimate for the dissimilarity parameter at the highest nesting level.

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<sup>23</sup>The respective choice subset comprised the following destinations: Portugal, the Canary Islands, Spain/ Balearic Islands, Greece, Yugoslavia, Italy, France, Switzerland, Eastern/ Central Austria, Denmark, the Sweden/ Finland/ Norway/ United Kingdom/ Ireland, German Alps/ Western Austria/ South Tyrol, Southern Germany excluding German Alps, Central Germany, Northern Germany excluding Baltic and North Sea shores, Baltic and North Sea shores of West Germany, other destinations. The respective estimation results are not included in this paper.

<sup>24</sup>The aggregation scheme used for regions within Spain, Italy, Austria, and Germany is inadequate as shown by tables 4a-c.



#### 4.4.2 Determinants of individual behavior

The simultaneous analysis of the individuals' decision whether or not to spend vacation, which activities to pursue, and which destination to visit reveals a linear impact of age and a non-linear impact of income upon the individuals' choice (cf. table 8):

The young seem to have been less inclined to spend vacation in 1985, yet to have chosen more cost-intensive vacation activities at more distant destinations with typically hot and sunny climates. Larger income evidently increased the shadow price of time and thus reduced the willingness of young persons to spend vacation. Young persons who did spend vacation at a place different from home chose more expensive vacation activities and were willing to accept higher travel costs. Contrary to the behavior of the young and rich, retired persons with high income were both more inclined to travel and to spend more expensive vacation.

Low schooling—and thus typically little income—prove to have reduced the respondents' willingness to travel, increased their willingness to spend relaxing or relatively inactive vacation, and reduced their willingness to visit destinations where German is neither spoken nor easily understood.

Parents prove to be less inclined to travel. Persons accompanied by children in the travel group, seem to prefer to spend vacation either with relatives (who might share the responsibility for the children) or to spend inactive vacation at traditional resorts within small distance from home (favorably at beaches).

The less urbanized the residential area of the respondents, the more they seem to be willing to travel and incur high vacation expenditure. Respondents from Berlin and the densely populated and highly industrialized regions in central West Germany favored relaxing vacation at small distance from home—preferably at vacation resorts where German is either spoken or German tourists are a common sight.

The estimated coefficients assigned to the respondents' home region reveal that re-

spondents generally favor destinations at small distance from their domicile. The other socioeconomic variables considered in this study seem to either increase or decrease the shadow price of distance and thus the maximal radius of accessible destinations. In contrast to the evident impact of travel costs, the impact of the price index of one day of vacation is not significantly different from zero. It can be speculated that tourists adjust the level of consumption to the regional price level rather than choosing “inexpensive” vacation resorts.

The sunnier the climate at a destination, the larger is the frequency of visitors who chose the destination because of its sunny climate. Similarly, the frequency of visitors, who chose their vacation resort because of the “untouched nature” at the site, is higher at sites that are less plagued by ecological problems. Eventually, the frequency of first-time visitors is higher at newly developed vacation areas (such as Portugal) yet also at destinations favored by the very young.

**Table 8: Estimation results for a three-level NMNL-model considering vacation purposes and destinations<sup>25</sup>**

(sequential estimation method)

*A. Nesting level: vacation vs. no vacation (base category: no vacation)*

Variables	Alternative: Vacation	
CONST	-23.142***	(-4.05)
AGE39IPCS	-22.488***	(-3.54)
AGE39IPCL	-35.575***	(-3.19)
AGE62IPCL	-6.347*	(-1.78)
AGE94IPCS	4.457	(1.50)
AGE94IPCL	7.214**	(1.97)
SCHOOL	-6.896***	(-2.83)
SINGLE	-2.915	(-1.08)
CHILDDHH18	-0.963***	(-4.33)
CITY1	6.822*	(1.79)
CITY2	5.036**	(2.00)
BERLIN	-26.847*	(-1.93)
WG-N	-3.422	(-0.99)
WG-C	0.873	(0.29)
WG-SW	-3.337	(-0.91)
Incl. Val.	12.835***	(5.42)

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<sup>25</sup>The parameter estimates given in table 8 have been recursively determined from the ratio of parameters and dissimilarity values obtained by sequential estimation; the respective *t*-ratios have been corrected as suggested by McFadden (1981). The null hypothesis for dissimilarity parameters states that the respective parameter values are equal to one, whereas the null hypothesis for all other parameters states that the respective respective parameters are equal to zero. Coefficients assigned to the base category are set equal to zero.

Table 8, cont.

*B. Nesting level: purpose of vacation (base category: health-related vacation)*

Variables	Alternatives					
	AdSiSt	Amuse	Relax	Beach	Relatives	Sports
CONST	-29.404*** (-3.95)	-19.405*** (-3.14)	-19.915*** (-3.25)	-20.540*** (-3.25)	-6.281 (-1.22)	-7.362 (-1.18)
AGE39IPCS	29.989*** (3.70)	27.903*** (3.77)	18.330*** (2.90)	26.560*** (3.67)	24.371*** (3.42)	29.003*** (3.54)
AGE39IPCL	44.403*** (3.52)	39.548*** (3.34)	31.798*** (2.86)	43.482*** (3.55)	32.561*** (2.85)	44.519*** (3.49)
AGE62IPCL	11.235** (2.00)	1.872 (0.41)	5.395 (1.22)	5.464 (1.17)	9.898** (2.00)	14.731** (2.43)
AGE94IPCS	-0.598 (-0.11)	-6.200 (-1.44)	-4.826 (-1.19)	-21.968*** (-3.37)	-0.420 (-0.10)	-23.906** (-2.16)
AGE94IPCL	-6.369 (-1.00)	-17.673*** (-2.88)	-6.036 (-1.21)	-24.017*** (-3.23)	-2.380 (-0.46)	-12.648 (-1.54)
SCHOOL	-2.886 (-0.86)	10.573*** (3.20)	11.098*** (3.42)	8.366*** (2.62)	8.654*** (2.62)	-5.380 (-1.41)
SINGLE	3.189 (0.82)	5.272 (1.48)	0.845 (0.25)	3.885 (1.05)	8.782** (2.32)	0.723 (0.16)
CHILD18	4.104 (1.02)	3.445 (0.95)	10.519*** (3.13)	14.659*** (4.11)	11.928*** (3.24)	6.275 (1.51)
CITY1	-8.320 (-1.55)	-7.664* (-1.66)	-7.736* (-1.70)	-10.250** (-2.10)	-10.071* (-1.88)	-4.187 (-0.72)
CITY2	-4.127 (-1.20)	-5.409* (-1.78)	-7.610** (-2.45)	-8.485** (-2.53)	-3.299 (-1.00)	-5.143 (-1.26)
BERLIN	22.816 (1.49)	22.706 (1.55)	51.334*** (3.18)	23.893 (1.62)	16.847 (1.16)	0.971 (0.05)
WG-N	10.480* (1.88)	14.405*** (2.74)	19.126*** (3.43)	14.804*** (2.77)	0.824 (0.18)	-2.270 (-0.42)
WG-C	4.387 (0.89)	6.762 (1.47)	14.203*** (2.86)	2.436 (0.53)	-6.878* (-1.65)	-3.576 (-0.76)
WG-SW	9.074 (1.61)	8.457 (1.61)	11.053** (2.07)	2.548 (0.49)	1.846 (0.39)	-2.173 (-0.39)
Incl. Val.	8.079*** (5.22)					

Table 8, cont.

*C. Nesting level: destinations (base category: Northern Germany, The Netherlands, and Belgium)*

Alternative-specific variable							
PCDCOST	-0.001 (-0.07)						
Socioeconomic variables							
Variables	Alternatives						
	Other	UK IR S N FL	P	CI	E BI	G	Y
CONST	-1.242 (-0.32)	-12.092* (-1.93)	-151.071 (0.02)	-19.597*** (-2.76)	-9.955** (-2.36)	-12.317** (-2.46)	0.986 (0.26)
AGE39IPCS	-0.176 (-0.06)	5.549 (1.12)	119.907 (0.02)	-5.645 (-1.30)	0.772 (0.30)	-1.349 (-0.39)	-0.791 (-0.29)
AGE39IPCL	6.172** (1.96)	11.766** (2.16)	117.124 (0.02)	1.064 (0.25)	5.051* (1.74)	3.316 (0.90)	1.055 (0.34)
AGE62IPCL	7.189** (2.24)	9.017 (1.60)	116.544 (0.02)	2.684 (0.64)	4.042 (1.39)	2.045 (0.54)	2.733 (0.88)
AGE94IPCS	0.765 (0.21)	5.370 (0.85)	-25.255 (-0.00)	-4.013 (-0.68)	-2.512 (-0.71)	-4.932 (-0.98)	-5.864 (-1.37)
AGE94IPCL	5.475 (1.29)	-0.895 (-0.09)	110.120 (0.02)	8.711 (1.47)	1.056 (0.26)	-3.476 (-0.63)	-15.870* (-1.72)
SCHOOL	-6.180*** (-3.01)	-9.252*** (-2.82)	-8.928* (-1.90)	-2.102 (-0.75)	-1.294 (-0.76)	-5.333** (-2.27)	-2.352 (-1.21)
SINGLE	-3.696 (-1.57)	-2.677 (-0.75)	5.845 (1.40)	-10.342** (-2.26)	0.364 (0.17)	6.278** (2.26)	-0.564 (-0.22)
CHILD18	-7.537*** (-3.03)	-0.489 (-0.16)	-15.088** (-2.15)	-9.422** (-2.41)	-5.716** (-2.57)	-5.470* (-1.89)	-2.153 (-0.98)
SUNNY	18.324*** (5.15)	-1.041 (-0.22)	25.210*** (4.36)	39.993*** (5.06)	31.037*** (5.78)	28.756*** (5.48)	26.703*** (5.57)
NATURE	2.805 (1.34)	11.758*** (3.82)	8.387** (2.04)	-1.625 (-0.46)	-9.164*** (-2.79)	4.167* (1.72)	0.407 (0.18)
NEWDEST	14.538*** (6.41)	9.143*** (3.42)	22.781*** (3.77)	8.500*** (3.24)	4.782*** (3.35)	12.300*** (5.22)	3.442** (2.01)
BERLIN	-10.131** (-2.26)	-13.467* (-1.82)	5.241 (0.66)	-17.253** (-2.21)	-1.889 (-0.43)	-8.990* (-1.82)	-19.145*** (-3.17)
WG-N	-17.561*** (-3.99)	-10.626** (-2.32)	-2.959 (-0.42)	-13.471*** (-2.64)	-5.316 (-1.48)	-13.428*** (-3.12)	-17.964*** (-3.98)
WG-C	-13.795*** (-3.68)	-13.924*** (-2.93)	-8.277 (-1.13)	-13.587*** (-2.91)	-3.568 (-1.07)	-14.442*** (-3.45)	-15.945*** (-3.98)
WG-SW	-6.598* (-1.87)	-7.680 (-1.61)	-2.441 (-0.30)	-8.485 (-1.63)	1.789 (0.49)	-7.194* (-1.74)	-14.574*** (-3.25)

Table 8, cont.

## C. Nesting level: destinations

<i>Socioeconomic variables</i>							
Variables	Alternatives						
	I-S	I-NC	F	D	A-CE ST	WG-S A-W CH	WG-C
CONST	-21.552*** (-2.82)	4.760 (1.22)	0.283 (0.07)	-13.680** (-2.24)	3.777 (1.00)	9.978*** (2.68)	-25.350*** (-2.59)
AGE39IPCS	1.198 (0.23)	0.971 (0.36)	5.563* (1.72)	3.616 (1.00)	-7.228** (-2.48)	-3.608* (-1.80)	-1.353 (-0.39)
AGE39IPCL	11.599** (2.05)	1.412 (0.45)	7.157** (2.01)	4.618 (1.03)	-8.261** (-2.32)	-7.475*** (-2.66)	-19.679** (-2.13)
AGE62IPCL	9.340 (1.57)	4.172 (1.30)	2.234 (0.60)	3.120 (0.68)	-0.599 (-0.21)	2.825 (1.25)	0.303 (0.08)
AGE94IPCS	-1.935 (-0.20)	-2.242 (-0.56)	-0.425 (-0.09)	-10.456 (-1.15)	-1.166 (-0.39)	3.055 (1.31)	4.070 (1.16)
AGE94IPCL	13.471* (1.72)	-4.324 (-0.79)	-3.949 (-0.66)	3.997 (0.61)	1.999 (0.53)	7.041** (2.25)	-0.260 (-0.05)
SCHOOL	-7.994** (-2.37)	-5.781*** (-2.78)	-10.827*** (-3.99)	-4.152 (-1.59)	0.244 (0.13)	1.394 (0.99)	4.406 (1.59)
SINGLE	-7.147 (-1.47)	0.325 (0.13)	-0.696 (-0.29)	-3.072 (-0.75)	-1.253 (-0.52)	-3.382* (-1.77)	1.784 (0.60)
CHILD18	6.035* (1.69)	-1.780 (-0.83)	-6.480*** (-2.61)	7.458** (2.34)	-4.640** (-2.02)	-1.011 (-0.64)	-3.228 (-1.09)
SUNNY	29.925*** (5.01)	26.070*** (5.59)	20.028*** (5.24)	1.093 (0.28)	16.574*** (4.95)	4.139** (1.97)	1.776 (0.50)
NATURE	4.704 (1.43)	-6.049** (-1.97)	-0.127 (-0.05)	9.667*** (3.37)	8.386*** (4.16)	7.402*** (4.74)	6.168** (2.46)
NEWDEST	2.999 (1.02)	3.722** (2.27)	4.760*** (2.86)	-2.219 (-0.78)	2.860* (1.76)	1.245 (1.01)	4.022* (1.89)
BERLIN	-4.262 (-0.77)	-23.900*** (-3.57)	-16.138*** (-2.65)	-1.900 (-0.30)	-15.202*** (-2.83)	-8.231** (-2.13)	12.431 (1.32)
WG-N	-18.913*** (-2.93)	-24.231*** (-4.53)	-14.873*** (-3.47)	2.119 (0.45)	-15.221*** (-3.58)	-11.641*** (-3.37)	6.810 (0.77)
WG-C	-20.009*** (-3.41)	-19.048*** (-4.41)	-11.869*** (-3.20)	-9.380* (-1.83)	-11.154*** (-3.13)	-7.038** (-2.38)	12.717 (1.45)
WG-SW	-1.853 (-0.40)	-10.766*** (-2.83)	-2.970 (-0.84)	-20.839** (-2.10)	-6.525* (-1.77)	-1.463 (-0.48)	5.198 (0.55)
PCP	0.54						
$\sigma$	0.21						
$\rho^2_{adj.}$	0.22						
No. obs.	5283						

## 5 Conclusion

The sequential application of Cramer and Ridder's specification test for the equality of the alternative-specific parameters of multinomial logit models shows that individual destination choice can be analyzed at a surprisingly low regional aggregation level. If used as an aggregation criterion, this specification tests leads to a model specification for which the IIA axiom cannot be rejected. The boundaries of the preferred choice set seem to be determined by language borders, topographical characteristics, climate, and distance from home.

Cramer and Ridder's likelihood ratio test appears to be sensitive to deviations from the IIA axiom. If the IIA axiom is fulfilled for both model specifications to be compared, the specification test does not seem to be affected by the presence of inadequately defined third alternatives in the respective choice sets. Also, the aggregation criterion appears to be robust with respect to the sequence of increasingly aggregated choice sets.

Likelihood ratio tests discriminating between universal logit models and multinomial logit models indicate that the IIA proposition may be fulfilled for choice sets of spatial alternatives even if relevant geographical characteristics are omitted, the definition of spatial alternatives is vague, and the individuals' access to locations within the given spatial alternatives may be constrained by their socioeconomic characteristics. In spite of the stringent assumptions upon which they base, (nested) multinomial logit models prove to be adequate and flexible tools for a cross-section analysis of the determinants of spatial choice on the basis of microdata.

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# A Acronyms

## Definition of regional alternatives

WG	West Germany
WG-N	West Germany (Schleswig-Holstein, Lower Saxony, and Berlin),
WG-NBS	North and Baltic seashores of West Germany
WG-Nec	Northern West Germany excluding coastline
WG-C	West Germany (Northrhine-Westfalia and Hesse)
WG-S	West Germany (Saarland, Rhineland-Palatine, Baden-Wuerttemberg, and Bavaria),
WG-CS	West Germany (South and Center)
WG-ALP	German Alps
WG-SeA	Southern West Germany excluding German Alps
A	Austria
A-W	Austria (West)
A-CE	Austria (Center and East)
CH	Switzerland
D	Denmark
NL B	The Netherlands and Belgium
F	France (North and South)
ST	South Tyrol
I	Italy excluding South Tyrol
I-NC	Northern and Central Italy excluding South Tyrol
I-S	Southern Italy including Sicily and Sardinia
Y	Yugoslavia
G	Greece
E	Spain (North and South, excluding Balearic Islands and Canary Islands)
BI	Balearic Islands
CI	Canary Islands
P	Portugal
SM	Southern Mediterranean states, Cyprus, and Turkey
H	Hungary
SU	Soviet Union
EG	East Germany
UK	United Kingdom
IR	Ireland
S	Sweden
N	Norway
FL	Finland
Other Dest.	Other destinations

## Definition of alternative vacation purposes

AdSiSt	"adventure" (Ad) & "sightseeing" (Si) & "study" (St)
Amuse	"amusement"
Relax	"relaxing"
Beach	"beach"
Relatives	"visit to relatives or friends"
Sports	"sports vacation"
Health	"health-related vacation" (excluding prescribed cures)