ACCOUNTING FOR INTERACTION AND INDIVIDUAL SPECIFIC EFFECTS IN AN ANALYSIS OF INTERNATIONAL AIR TRAVELER PREFERENCES

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ABSTRACT

In this paper, we analyze product attributes and consumer characteristics in an air travel selection decision based on contingency theory. Previous work has focused on main effects without exploring the significance of interaction or individual heterogeneity effects. Contingency theory suggests contextual and individual factors are important in enhancing model predictions. Using conjoint and ordered probit analyses, we find that including interaction and individual specific intercepts alters the impacts of main effect variables. Furthermore, accounting for interaction and individual heterogeneity increases the predictive ability of the preference model for airline travelers.

Keywords: Air Travel Preference, Consumer Characteristics, Country-of-Origin, Conjoint Analysis, International Marketing

I. INTRODUCTION

A sophisticated communication infrastructure and an ever-growing online presence of businesses around the world have intensified competition in the global markets (Gerber 2010). Consequently, it has become essential for marketers and travel researchers to develop an understanding of travelers' brand preferences and choices in the context of international product and service offerings.

Demographics and product attributes are the variables most frequently used to segment consumer airline markets with demographic categories used to match air service attributes (Bruning and Saqib, 2013; Bruning 1997). Although subsequent research has identified new bases for segmentation, including lifestyles, benefits, etc., profiling of air passengers by attribute importance has changed very little. Safety, timeliness and price are among the top-of-mind attributes travellers think of when evaluating air travel experiences. In the airline industry, various service aspects continue to be based on the demographic characteristics of the target traveller groups, and thus demographics continue to play an influential role.

In order to segment the market for brand positioning, targeting, and promotion strategies, it is critical for marketers to gain an understanding of how consumers form preferences for international offerings. Moreover, increased dependence upon international trade makes it even more worthwhile for marketers to understand more than relevant demographic factors. They also need to be cognizant of the country-of-origin effect that influence travelers' preferences for a host of products, including air travel services. Previous research (Bruning and Saqib 2013; Sharma 2011; Maheswaran, 1994; Heslop and Papadopoulos, 1992) has shown that one's impression of a country shapes attitudes and impacts purchase behaviors with regard to that country's offerings. Furthermore, contingency theory suggests that interaction effects are of critical importance to understanding the contextual factors that affect consumer attitudes and choices.

Our primary research objective is to isolate the important attributes that influence air traveller service evaluations and, more specifically, isolate key interactions across these attributes. We borrow insights from contingency theory to study the impact of interaction effects between product attributes and consumer characteristics on consumers' preferences in the context of international air travel. Decisions about marketing variables are more likely to be effective if the impact of such variables and the interaction effects between key product attributes and consumer characteristics are well understood. The interaction effects could further provide insights into more appropriate segmentation schemes in international markets. Previous research in international marketing has reported significant main effects that explain international airline preferences (Bruning, Hu, and Hao 2009), and interaction effects of product attributes and consumer characteristics upon choice based on empirical studies (Cordell 1991; Johansson, Douglas, and Nonaka 1985). In this research, however, we explore theoretical reasons behind some of these interaction effects and test our hypotheses to assess their significance.

In the analysis we employ experimental conjoint and ordered probit analyses to estimate a model of traveler preferences for international air carriers. In addition to testing the interactions effect in our model, we also control for individual traveler heterogeneity using individual specific intercepts. Greene (2001)

suggests that by adding individual specific effect variables, significant efficiencies are gained in estimating cross-sectional demand and customer preference models. Moreover, including individual specific effects also works as a proxy for any consumer related omitted variables that may cause bias and remain unobservable in the consumer panel data. Controlling for individual heterogeneity in estimating preference models could remove bias and clarify the unique impacts of main and interaction variables. Due to the ordinal nature of the dependent variable, we employ ordered probit analysis (rather than multinomial probit, or logit) to test main, interaction and individual specific effects, and to estimate our international air carrier preference model. We present this in the empirical portion of our paper.

The remaining sections of the paper are organized as follows. In section two we review the literature that deals with the product and consumer related factors involved in choice decisions. Section three presents the theoretical work behind our proposed interaction effects among the explanatory variables. Section four presents the model and the study methodology. We describe the data collection and sampling, conjoint experiment, and our procedure for estimating the ordered probit model. The fifth section presents the results followed by conclusion, managerial implications and directions for future research.

Contingency Theory

Contingency theory is a theoretical approach that is well suited to analyzing complex interactions among various dimensions of a phenomenon. Originally formulated by Herbert Simon (1976), contingency theory deals with the effect of interactions among various environmental and individual factors on performance outcomes. According to Zeithaml, Varadarajhan, and Zeithaml (1988), contingency theory emphasizes the importance of situational influence that moderate the influence of main effect factors on outcome variables in an analysis. In the case of consumer preference and choice analyses, it accounts for the moderating influences of attitudinal and demographic factors that alter the impact of price, quality, and other main effect factors. Contingency theory contributes to theory measurement and practical management by identifying important contingency variables that distinguish between situational contexts (e.g., sub-group attitudes, behavior, and different time periods). The theory allows managers and researchers the opportunity to modify general conclusions to more meaningful conclusions that are specific to sub-group and situation-specific contexts.

Contingency theory recognizes that general theories, while useful for understanding relationships and predicting states of outcome variables, are not necessarily as informative or as accurate as special case derivatives of general theories. Drazin and Van de Ven (1985) argue that the more one expects there is a single, best model to explain phenomena, the more important it becomes that specific independent variables explain outcome variables. They describe the interaction approach to contingency theory as focusing on the impact that interactions between independent variables have on performance variables. The contingency approach is particularly helpful in analyzing air traveler preferences and trip evaluations. Based on contingency theory, we question the viability of a single set of criteria for determining preferences in all circumstances. Instead, we examine the interactions between the contextual variables and emphasize consumer-specific and situation-specific

factors in the analysis to explain air traveler preferences.

II. PRODUCT ATTRIBUTES AND BRAND PREFERENCES

Price, Quality, and Brand Name

There exists an extensive research literature regarding the effects of product attributes on brand choice (Muthukrishnan and Kardes 2001), including price (Murthi, *et al.,* 2007), quality (Erdem, *et al.,* 2008), and brand name (Moorthy, 2012; Dodds, *et al.,* 1991). Dodds *et al.* (1991) report that price and brand name significantly affect consumers' willingness to buy. A significant effect of product quality on choice has been well established in the literature (Erdem *et al.* 2008).

Consumer researchers studying the airline industry have identified several important flight attributes (factors) that significantly impact consumers' in selecting airlines. Tsaur, Chang and Yen (2002), found staff courtesy, on-board comfort and cleanliness, safety, responsiveness of the attendant, on-board entertainment and extended travel service were important service attributes, while Liou and Tzeng (2007) discovered that safety and reliability were the critical factors of airline service quality. Based on an extensive review, Wen and Yeh (2010) identify 18 factors as important to air travel consumers: price, convenience and frequency of flights, convenience of booking and ticketing, in-flight factors, staff factors, safety, complaint handling and airline image. Thus, a set of specific flight attributes have been identified that related to price and non-price aspects of air travel assessment.

Country-of-Origin and Country Brand

In addition to price and quality, two additional product attributes are the country-of-origin (COO) and brand name. Dodds *et al.* (1991) report that brand name significantly affects buyers' perception of quality and value. COO has been researched extensively in the international marketing literature, and is known to influence consumers' preferences as well as creating halo effects with other product attributes (Sharma, 2011; Johansson *et al.* 1985; Maheswaran 1994). Maheswaran (1994) reports that consumers rely on COO to evaluate products, particularly when information about other product attributes is ambiguous. Heslop and Papadopoulos (1992) find that consumers hold specific notions of a nation's image in the choice situation that impacts their purchase decisions. Thus, the COO of a product or service is considered an important factor in numerous purchase decisions. For example, previous research shows that, among other factors, air travelers consider a carrier's COO in evaluating options and arranging travel plans (Bruning *et al.* 2009; Green and Wind 1975; Bruning, 1997).

Consumers' Characteristics and Brand Preference

Consumer characteristics have been shown to influence consumers' choice in a number of studies (Ferraro, Bettman, Chartrand 2009; Johansson *et al.,* 1985). In the current study, we also account for certain demographics in addition to consumer ethnocentrism.

Demographics. Several marketing scholars document the effects of consumer demographics on brand choice (Nevo 2000; Hoch *et al.* 1995). In a comparison of alternative segmentation schemes, Novak and MacEvoy (1990)

establish that a regression model including demographics and a summated value scale was superior (with a higher R2), in terms of predicting consumer behavior, to a model including only the summated value scale. Although research in anthropology and economics report a strong relationship between social class and consumption patterns (Douglas and Isherwood 1979), the evidence has been mixed regarding the direction of this relationship in the marketing literature. Hoch *et al.* (1995) report a significant relationship between demographic factors and consumer choice, whereas Elrod and Winer (1982) identify a weak association. In the context of household consumer panel data, Gupta and Chintagunta (1994) report a significant improvement in their model fit by including demographic characteristics in the model estimation; however, little or no improvement occurred in the model's predictive ability.

Consumer Ethnocentrism. Shimp and Sharma (1987) find consumer ethnocentrism to be an important factor in consumption behavior. The term ethnocentrism refers to the tendency to view one's own group more positively or more distinguished than others, and to view other groups as inferior (Levine and Campbell 1972). Consumer ethnocentrism "gives the individual a sense of identity, feeling of belongingness, and an understanding of what purchase behavior is acceptable or unacceptable to the in-group" (Shimp and Sharma 1987, p. 280). It is a consumer characteristic that manifests itself as an attitudinal variable, which is known to affect consumers' purchase intentions (Balabanis and Diamantopoulos, 2004). Previous research (Mort and Duncan, 2003; Bruning, 1997) has linked consumer ethnocentrism to the COO effects of a product or service and to impacts on consumers' preferences as both a main and an interaction effect.

Interaction Effects. COO Interaction Effects. Investigating the main effects of product attributes and consumers' characteristics on brand choice has gained considerable attention in the marketing literature. Johansson *et al.* (1985) reported the interaction effects of COO and demographic factors (age, income, gender) on consumers' preference ratings for automobiles from Germany, Japan, and the U.S. Similarly, Cordell (1991) investigated the interaction effects of COO with competitive contexts and found the COO to be more important for upscale products within a class, suggesting that COO may be more important to the big spender than to the economy shopper.

Product-Consumer Demographic Interaction Effects. The interaction effects of product related attributes with consumer characteristics could help us further understand consumer segments beyond just the main effects of product attributes and consumer characteristics. For example, a high priced product/ service may send a quality signal to consumers, however; relatively high-income consumers (compared to low-income consumers) may read the signal differently. This relationship finding would suggest the need to investigate the effect of price and income interaction on brand preferences. Similarly, COO of a product may significantly affect brand choice in some situations for certain products; however, this effect may be different for older consumers as compared to younger ones. In fact, traditional economic theory supports the notion that based on their characteristics (e.g., income level), buyers may have different thresholds and willingness to buy products (Hotelling 1929). Previous findings strongly suggest that studying the interaction effects of product and consumer related attributes could further explain choice preferences and lead to more effective segmentation schemes. For

example, previous research suggests that consumers with different characteristics have different thresholds (Mittal and Kamakura 2001) and, consequently, their preference ratings of a product or service are likely different. Thus, in this study, we incorporate both consumer characteristics and product attributes in a model of air travel preference and propose that interaction effects, along with main effects, are significant explanatory variables that account for air travelers' choice preferences.

Moreover, we also propose that including the interaction effects will significantly improve the preference model's goodness-of-fit, and its predictive ability. Thus, we propose the following hypothesis:

H1: The model with main and interaction effects will reflect a better fit to the data compared to the main effects-only model.

To investigate specific interactions, we review some evidence from extant literature, and propose the likelihood of a number of significant relationships in consumers' attitudes and preferences for different products and services based on their unique demographic profiles. Some of those demographic variables are discussed next.

Gender Effect. An exploration of the gender difference in information processing has been deemed useful for gender segmentation purposes (Jung and Lee, 2006). Based on earlier studies of gender differences, Carlson (1971; 1972) finds that men may be guided by pursuit of aspirations and achievement whereas women are guided by communal and interpersonal goals. Furthermore, Moschis and Churchill (1978) argue that gender may affect the acquisition of certain consumer skills — males display stronger materialistic attitudes and social motivations to consume

than do females. These earlier studies led to further research on differences in the way men and women process information. Subsequent studies on gender effects found a difference in male and female information processing (Meyers-Levy and Maheshwaran 1991). For example, Nowaczyk (1982) found that females responded to nonverbal stimuli by providing more elaborate visual descriptions than did the males. Meyers-Levy and Maheswaran (1991) also concluded that generally females paid more attention and processed more information than their male counterparts. Okoroafo (2010) reports that women are more responsive to coupon stimuli, and Beldona and Namasivayan (2006) discovered that women are more sensitive to price increases in hotel and leisure purchases than males. In airline consumer studies, Bruning (1997) discovered females were more price sensitive than males but also tended to be more loyal when all flight attributes were taken into account. In sum, due to the differences in the way males and females have been found to process information and respond to stimuli, we expect that females will be more sensitive to price than males. Therefore, we propose:

H2: The interaction term for gender and price will be negatively related to airline preference.

Age Effect. In marketing research, age has been considered a significant basis for market segmentation. Researchers in sociology propose that consumers in different age groups are likely to have different attitudes about a certain issue such as environmentalism. For example, studies have shown that younger people are more environmentally concerned than relatively older people (Van Liere and Dunlap 1980). The argument is based on the reasoning that people in similar age cohort experience similar historical and economic conditions that shape

their attitude patterns (i.e., the cohort effect). Phillips and Sternthal (1977) have reported differences in information processing across age groups. A concern of older adults may be protecting social standing and wealth; whereas, younger people may be less attached to the current social status and may therefore be more open to a social change that could possibly benefit them in the future. In the mobile phone market, Kumar (2008) presented evidence corroborating younger users were more sensitive to service performance than were their older cohorts. In another study Petzer and De Meyer (2011) also found younger adults to be more sensitive to service levels than older adults. With respect to airline carrier evaluations, Bruning (1997) reported greater service level sensitivity for younger and middle-age compared to older international airline travelers. Thus, prior research leads us to propose that older adults would reflect more conservative behavior and younger travelers will be more responsive to service changes. Therefore, we propose:

H3: The interaction term for age and service importance will be negatively related to preference.

Income Effect. Perhaps one could argue that based on economic theory, income should be the most intuitive variable to affect consumers' choices. Standard economic theory suggests that people with lower income have greater budgetary constraints and, as a result, less preference for high priced goods and services compared to individuals with high income. Several research studies report an effect of consumers' income on their product and brand preferences. For example, Urbany, Dickson and Kalapurakal (1996) find that household income level was inversely related with price search. Less price sensitivity of higher income households has also been reported in other studies (e.g.,

Kalyanam and Putler, 1997). While studying the role of income on brand preference, Kalyanam and Putler (1997) find that households with lower income are more likely to purchase private labels and generic brands (generally low priced), and are less likely to purchase national brands (generally high priced), compared with higher incomes households (Sethuraman and Cole 1999). Thus, one could reasonably infer that individuals from higher income households generally prefer products/services of high quality and are less price sensitive. Bruning (1997) reported that income and service quality were both positively related to airline choice, which would imply that an interaction between the two factors would also display a positive relationship to airline preference. Therefore, we propose:

H4: The interaction term for income and high quality (high airline service in our study) will be positively related to preference.

Individual Specific Effects. Contingency theorists and the marketing research literature suggest that consumer preferences can be driven by group-level variables (Besanko, Dube, and Gupta 2003; Hoch *et al.* 1995) as well as individual characteristics (Liechty, *et al.,* 2005). However, the majority of research employs the group-level variables while ignoring the individual information. This could lead to biased results because the regression estimates only control for the variation in the group level while ignoring the possibility that the results could also be driven by individual differences. Consequently, ignoring consumer heterogeneity may lead to biased results and incorrect inferences concerning marketing strategies (Leszczyc and Bass 1998). In consumer panel data, unobserved heterogeneity would most likely pose a problem to the robustness of the preference model

because of a number of individual-related omitted variables (e.g., attitude towards flying, or random variations related to traveler situations, etc.). The effects of consumer heterogeneity, however, could be accounted for by using the intercepts as a proxy for the omitted variables.

As noted earlier, in this study we integrate the contingency theory perspective and include four group-level demographic factors to account for consumer heterogeneity: gender, age, income and ethnocentrism. In addition to the group level factors, we also account for the individual specific attitudinal effects across consumers by creating individual intercepts for each respondent. Our design follows Greene's (2004) suggestion, which is to include a complete set of intercepts in order to effectively control for individual cross-sectional variation in linear and non-linear models. By creating an intercept for each survey respondent, we obtain clean estimates of our research coefficients of interests by controlling for individual related omitted variables and group-specific variations. We also expect that accounting for individual heterogeneity will improve the fit and predictive ability of the model. Thus, we propose the following hypothesis:

H5: The model with main, interaction

and individual effects will reflect a better fit to the data compared to either the main-effects only or the main and interaction effects models.

III. METHODS

The Conjoint Experiment

Procedure. Our study involved a conjoint preference modeling activity. The focus point of the conjoint exercise was a hypothetical trip between two unspecified international points. Respondents were shown twenty scenarios with various trip attribute combinations and a rating form for subjects to indicate trip bundle preferences based on a nine-point (1-9) preference scale. Attributes selected for inclusion in the experiment are suggested by previous research in marketing and transportation (Bruning 1997; Green and Wind 1975). The six attributes included the following: price, in flight service, number of stops, on time performance, country of carrier, and whether a flyer mileage program is offered. The country of carrier attribute is used as a proxy for the relative importance of the country of origin (COO) factor in the air carrier selection process. The demographic variables included in the questionnaire

Table 1: Conjoint Experimental Attributes and Attribute Levels

Attribute	Attribute Level		
	Low	**Moderate**	**High**
Price	$560	$685	$779
In-flight Service	Low	Medium	High
Number of Stops	2 Stops	1 Stop	Non-Stop
On-time Performance	70%	85%	95%
Flyer Program	No		Yes
Carrier Country	Mexico	US	Canada

Table 2: Sample Conjoint Scenarios Including Attributes and Attribute Levels

Scenario 1: 1=$2000 price; 2=Low in-flight service; 3=60% on-time performance; 4= 3 stops before destination; 5=Non-Canadian airline; 6=No frequent flyer program.

Scenario 2: 1=$2000 price; 2=Medium in-flight service; 3=60% on-time performance; 4=3 stops before destination; 5=Non-Canadian airline; 6=No frequent flyer program.

Scenario 20: 1=$1650 price; 2=High in-flight service; 3=95% on-time performance; 4=Non-stop flight; 5=Canadian carrier; 6=Frequent flyer program.

were age, income and gender. Data were also collected to measure each consumer's ethnocentrism by using the CETSCALE developed by Shimp and Sharma (1987). The scale is well established in the marketing research literature and its validity and reliability have been well supported (Netemeyer, *et al.,* 1991). Levels of each of the attributes are identified in Table 1.

All conjoint model attributes are dummy coded (0,1). Only moderate and high levels of each of the factors are included as explanatory variables. The low levels for all attributes are excluded to avoid creating a singular matrix, and are treated as a base against which the coefficients of moderate and high level explanatory variables are estimated. The frequent flyer mileage attribute is the only exception with the two levels, yes and no, and is also dummy coded as 1, if the program is offered by the airline, and 0 otherwise. In-flight services are defined as low, moderate, and high based on the travel scenario. Low in-flight service is defined as the scenario of poor selection of magazines, no newspapers, no meals, and too few attendants for quick service, poor music quality, noisy aircraft, and inhospitable staff. Moderate service is defined as the scenario of at least one interesting magazine, no newspaper, cold sandwich and dessert,

satisfactory speed of service, reasonable music quality, aircraft not too noisy, and congenial staff. The high in-flight service is characterized as having a good selection of newspapers and magazines, a hot meal, quick service, clear music and a movie, quiet aircraft, and excellent staff. The remaining attributes included in the analysis are self-explanatory. All levels of the price and quality (in-flight services, on-time performance, and number of stops) attributes were subjected to several waves of pre-testing prior to actually conducting the conjoint experiment in the several airports. The key flight attributes and levels, and several examples of the 20 conjoint scenarios are presented in Table 2.

Data. Data were collected from over 450 Canadian respondents at different Canadian airports. After data cleansing, 389 interviews were used. A purposive sample design was employed to identify and collect information from the sample units. Based on aggregate air traveler statistics, efforts were made to balance the sample according to gender, age, and departure times and days. Table 3 provides the demographic information of respondents. Interviewers were instructed to randomly select passengers from the gate areas of the participating airports based on seat location within departure areas.

Table 3: Respondent Characteristics

	N	Percentage
Gender		
Male	236	60.67
Female	153	39.33
Age		
<20	30	7.71
21-30	84	21.59
31-40	93	23.91
41-50	98	25.19
51-60	58	14.91
61-70	17	4.37
>70	9	2.31
Income		
<$9,999	12	3.08
$10,000-$29,999	44	11.31
$30,000-$59,999	114	29.31
$60,000-$89,999	98	25.19
>$90,000	121	31.11
Total	389	

The Ordered Probit Model

We used an ordered probit model to test our hypotheses. The ordered probit model is used in cases where multinomial logit or probit models would ignore the ordinal nature of the dependent variables, such as a rating or ranking data (Greene 2004). Another reason for using the order probit model as supposed to the logit model relates to the assumption of the distributional form of the error term. The error term in the order probit models follow a normal distribution, whereas logit model assumes a logistic distribution. The ordered probit model is built around a latent regression in the same manner as the binomial probit model. Latent variable models postulate a causal link between explanatory variables and a qualitative response variable with the objective of predicting the likelihood of responses under given changes on explanatory variables. Thus, underlying the ordinal data in ordered probit models is a latent but continuous descriptor of response. The random error associated with this continuous descriptor is assumed to follow a normal distribution. Embedded in these models is a threshold concept where choice outcomes are generated by explanatory variables that cross thresholds in the decision process. An individual responds to exogenous stimuli with a certain choice when his/her utility function exceeds some threshold levels. This threshold represents the latent variable, which is unobservable, and only the outcome of the decision process is observed. Given the N possible ratings of an alternative (product or service brand), respondents choose the rating that most closely represents their own feelings about the product attributes. The ordered probit model is estimated using maximum likelihood estimation.

IV. RESULTS AND DISCUSSION

Parameter estimates of the three ordered probit models are shown in Table 4. The first of the three models includes only the main effects, while the second model includes all the main and interaction effects. The third model extends the analysis one step further and depicts main, interaction and unobservable individual-specific effects; the latter effect through measuring intercept terms for each respondent who participated in the conjoint exercise.

In comparing the three models for each set of respondents, we report parameter estimates, significance levels of the estimates, and four indices of model performance (i.e., the Likelihood Ratio index (LRI), Log-likelihood value, Akaike Information Criterion (AIC), and C-statistics). In addition, we use the Likelihood Ratio to test our hypothesis,

Table 4: Ordered Probit Results

Independent Variables	Main Effects Only Model	Main Effects with Interactions	Full Model with Intercepts
Medium Price	-0.529	-0.531	-0.600
	(-17.93)**	(-18.01)**	(-20.15)**
High Price	-0.876	-1.010	-1.151
	(-29.74)**	(-8.73)**	(-9.87)**
Medium Service	0.504	0.507	0.592
	(17.03)**	(17.12)**	(19.76)**
High Service	0.796	0.841	0.949
	(27.11)**	(8.78)**	(9.84)**
One-Stop	0.391	0.393	0.464
	(13.34)**	(13.40)**	(15.64)**
Non-Stop	0.828	0.428	0.492
	(28.18)**	(4.94)**	(5.64)**
Medium Performance	0.182	0.183	0.220
	(6.23)**	(6.25)**	(7.48)**
High Performance	0.546	0.548	0.630
	(18.84)**	(18.92)**	(21.51)**
Flyer Yes	0.271	0.273	0.317
	(10.84)**	(10.88)**	(12.55)**
US Carrier	0.092	-0.160	-0.169
	(3.17)**	(-1.79)	(-1.89)
Canadian Carrier	0.410	0.074	0.069
	(14.21)**	(0.71)	(0.65)
Gender	-0.068	-0.030	0.055
	(-2.85)**	(-1.00)	(0.05)
Age	-0.042	-0.042	-0.192
	(-4.87)**	(-3.56)**	(-0.56)
Income	-0.044	-0.145	-0.468
	(-4.08)**	(-7.65)**	(-0.96)
Ethnocentrism	0.009	0.007	-0.081
	(5.56)**	(3.65)**	(-0.54)
High Price×Gender		-0.111	-0.127
		(-2.20)*	(-2.52)*
High Price×Income		0.077	0.086
		(3.48)**	(3.86)**
High Service×Age		-0.061	-0.068
		(-3.36)**	(-3.71)**
High Service×Income		0.045	0.053
		(1.96)	(2.31)*
Non-Stop×Income		0.109	0.127
		(4.94)**	(5.69)**
Canadian Carrier×Age		0.062	0.073
		(3.51)**	(4.10)**
CanadianCarrier×Ethno		0.005	0.006
		(1.54)	(1.82)
US Carrier×Income		0.068	0.078
		(2.99)**	(3.39)**
LR Index	0.1287	0.1309	0.1925
Log-Likelihood	-14365.026	-14328.983	-13312.310
AIC	28776.052	28719.966	27456.620
C	0.750	0.754	0.806

Value of z-statistics in parentheses, * significant at the 5% level; ** significant at the 1% level

which posits that incorporating interaction effects and intercepts, in addition to main effects, renders our model statistically different and superior to the main effects only model.

The literature indicates that using maximum likelihood estimates in the presence of fixed effects is problematic because a substantial bias away from zero exists in discreet choice models when T

(the number of questions asked from a respondent in our study) is very small (Greene 2004). To address this issue, we conducted a Monte Carlo simulation to estimate the bias in our estimates of the ordered probit coefficients. Our simulation results indicated that the bias was minimal, which lends credence to the robustness of our approach to measuring air traveler preferences via the ordered probit model.

Main Effects Model

All of the estimated coefficients for individual product attributes are statistically significant and in the predicted direction. The negative signs for the Medium (-.529, $p < .01$) and High Price (-.876, $p < .01$) dummy variables indicate that as price increases, the scenario preference ratings decrease because the perceived sacrifice increases relative to the level of utility gained. The positive coefficients of Medium (.504, $p < .01$) and High Service (.796, $p < .01$) variables reflect that consumers' ratings increase with increases in service levels. As expected, we also note that the coefficient for the High Service variable is greater than the coefficient for Medium Service, which shows that the marginal effect on consumers' ratings is higher as a result of including High Service in the scenario as compared to Medium Service. Similar differences are observed with the same implications for One-Stop (.391, $p < .01$), Non-Stop (.828, $p < .01$) and Performance levels Medium (.182, $p < .01$) and High (.546, $p < .01$). The positive coefficient of Flyer Yes (.271, $p < .01$) indicates that consumers' ratings also increase when a frequent flyer mileage program is offered by an airline for a trip. In brief, the coefficients of the Main Effect model variables are as expected and in the predicted direction.

In the Main Effects model, the coefficients for all the demographic variables are significant, thus suggesting that consumers' individual characteristics should also be taken into consideration for segmentation purposes, after accounting for product attributes. The negative coefficients for Age (-.042, $p < .01$) and Income (-.047, $p < .01$) variables indicate that as age/ income increases, the respondent is likely to rate scenarios lower, which could be due to their increased experience and exposure to many products/services compared to young or low income respondents. The negative coefficient associated with Gender (-.068, $p < .01$) indicates that females are more likely to rate scenarios more negatively compared to male respondents.

The low but positively significant coefficient value associated with ethnocentrism (0.009, $p < .01$) indicates that ethnocentrism does account for variance in consumers' rating responses (i.e., the individual specific effects of ethnocentrism), but is not a highly weighted factor. As a result, one could safely generalize the coefficients of country high, or Canadian Carrier (0 .410, $p < .01$), and country medium, or US Carrier (0 .092, $p < .01$), as a net positive effect of country-of-origin on consumers' preferences for a particular trip scenario.

Main and Interaction Effects Model

The second model estimates main and interaction effects of the product and consumer factors upon consumers' preference ratings associated with each trip scenario. With the addition of the interaction terms, main effects for the product and consumer factors are altered in a number of instances. In the Main Effects Model, all main effects were statistically significant. After including interaction effects into the analysis using the Full Model, however, three main

effects Gender (p = .148), Canadian Carrier (p = .558) and US Carriers (p = 0.07) are shown to be insignificant, and one main effect, US Carrier (p = 0.07), becomes marginally significant. Furthermore, of the seventeen main effects variables, only four reflect substantial changes in parameter estimates after including the interaction terms (i.e., Non-Stop (.828/.428), Canadian Carrier (.410/.074), US Carrier (.092/-.160), and Income (-.044/-.145)).

Six of the estimated interaction effects in the full model are significant. The significantly negative coefficient for the High Price with Gender interaction (-.111, p < .05) shows that females are more likely to rate a trip scenario more negatively than males when the price is high. Thus, **H2** is supported. Similarly, as predicted by **H3**, the negative High Service with Age interaction coefficient (-.061, p < .01) indicates that younger Canadian respondents are likely to rate travel scenarios higher than older respondents when the service factor is high. On the other hand, the significantly positive High Price with Income interaction (.077, p < .01) suggests that higher income respondents are more likely to rate a trip scenario more positively compared to low income respondents when the price is high. With respect to service levels, the High Service with Income interaction (.045, p < .01) indicates higher income respondents are more likely to rate conjoint scenarios more positively compared to lower income respondents when the service level is high. A similar result is observed for the Non-Stop with Income interaction (.109, p < .01); higher income respondents are likely to rate conjoint scenarios higher than lower income respondents with scenarios that include a non-stop flight option. These results support **H4**.

With respect to the country factors, the Canadian Carrier by Age interaction (.062, p < .01) reflects the tendency for older respondents to rate scenarios more highly than younger respondents when a Canadian carrier is included in the scenario. Similarly, more affluent Canadians tend to rate scenarios more highly than less affluent Canadians when a U.S. carrier is included in the conjoint scenarios as depicted in the US Carrier by Income interaction (.068, p < .05). Finally, the Canadian Carrier by Ethnocentrism interaction (.005, p < .083), while not significant is directionally supported, thus hinting that highly ethnocentric respondents may tend to increase scenario assessments relative to respondents scoring lower on the ethnocentrism scale when a Canadian carrier is included in the conjoint scenarios.

Assessing the results of the two models given in Table 2, it could be observed that all indices improve with the addition of the interaction terms in the equation. The LR Index improves from .128 to .131, the log-likelihood ratio increases (signifying an improvement in the model fit), and the AIC index shows slight improvement. Thus, the model with its unconstrained interaction effects parameters is significantly stronger than just the main effects model. The likelihood ratio test yields a highly significant difference (p < 0.001) in comparing the two models. Thus, **H1** is supported. Moreover, the C-statistics value of 0.750 shows that the model has better predictive ability than chance, where a value of 0.5 is no better than chance (SAS Institute, 2008). These results support all four hypotheses of our study.

Full Model with Intercepts

The Main Effects Model and the Main and Interaction Effects Model do not account for individual specific effects. Hsiao (2003, p.193) suggests that pooling

the data could "… ignore individual differences and treat the aggregate of the individual effect and the omitted-variable effect as a pure chance event". In the third model we address this issue by including an intercept for each survey respondent to account for unobservable individual specific effects. As Greene (2004) points out, the advantage of including the intercepts is that the full information estimators provide results for all model parameters including the parameter of the heterogeneity.

As we predict, the results of the Full Model indicate that including intercepts to account for individual heterogeneity further improves the fit and predictive ability of the model. With the addition of intercepts, both the interaction and main effects for the product and consumer factors are altered in a number of ways. First, the coefficients of four demographic variables (i.e., gender, age, income, and ethnocentrism) cease to be statistically significant, which is not unexpected because now an intercept included in the model for each respondent accounts for these demographic variables. Secondly, the beta coefficients of most of the significant main and interaction effects increase in their magnitudes, thus improving the aggregate contribution of all the explanatory variables in predicting the dependent variable.

When comparing the results of the Main and Interactions Effect model with the Full Model including intercepts, we observed that all indices improve with the addition of intercepts in the equation. The LR Index improves from .132 to .192, an improvement of almost 47%, and the log-likelihood ratio increases (signifying an improvement in the model's goodness-of-fit), and the AIC index also shows improvement. Thus, the Full Model with intercepts that account for individual heterogeneity is significantly stronger than just the main effects only model, or the interactions

effects model. The likelihood ratio test yields a highly significant difference (p < 0.001) in comparing the Main and Interaction Effects model with Full Model including the intercepts. In addition, predictive ability is demonstrably improved as reflected in the C-statistics value of 0.806. Finally, we test whether there is a statistical difference across three models. We use likelihood ratio test by nesting Main Effects model into Main and Interaction Effects model, and Main and Interaction Effects model into the Full model with intercepts, respectively. Our Chi-square statistics indicate that the nested models improved significantly (at less than 1% significance level) compared to the prior models (results are tabulated for brevity but are available upon request). In sum, these results support **H5**.

The use of fixed effects in an ordered probit model is sometimes criticized because the coefficients may be biased if the within group sample size is small. As Greene (2004) suggests, in principal the fixed effect approach is viable, but two shortcomings (one practical and one methodological) could result in problems. First, creating and estimating the coefficients of a large number of intercepts could be computationally challenging. Second, with fixed group sizes T (which is 20 in our study – the number of responses obtained from each respondent) estimators could be substantially biased away from zero. Bias will diminish as the group size (T) increases, but would not disappear even if T=20 as in our case. Green (2004) also compares the performance of pooled estimators versus the estimators with intercepts, and finds that estimators in the pooled sample (without the intercepts) could be biased downward, while estimators with intercepts could be biased upward. This observation raises an important question: given that the fixed effects estimator approach is

problematic for relatively small T values, is it best to ignore the heterogeneity and use the pooled estimator, or to use the fixed effect estimator despite its weaknesses?

Following Greene's argument, we use Monte Carlo simulation to assess whether our Full Model estimates are significantly biased. Based on our simulation results, overall, we find that the bias in our estimator is quite minor. We find that the mean and median coefficients generated from our simulations are fairly close to the coefficients obtained from the original data. The results of our simulation are available upon request from the first author.

V.   CONCLUSIONS

Our primary effort in this research was to focus on the role of interaction and individual heterogeneity effects of product and consumer attributes in a consumer preference model dealing with airline travelers. We employed a conjoint experiment in conjunction with the ordered probit analysis to analyze product and consumer attributes as well as interaction effects for a hypothetical international air trip. The analyses were conducted with a sample of Canadian travelers. Our results dramatize that the Full Model with main, interaction and individual heterogeneity effects outperforms both the Main Effects and Main and Interaction Effects models. The results show that all of the product attributes included in the conjoint experiment affect travelers' preferences — price, service, number of stops, on-time performance, frequent flyer mileage program, and the country of the airline. This finding confirms the results of prior research: product-related factors and own-country bias affects air carrier preferences. With respect to consumer characteristics, income level and degree of ethnocentrism were significant main effects, while age and gender were not.

The four consumer characteristics, however, indicate significant interaction effects with a number of product attributes. Gender interacted with price; income interacted with price, service, number of stops, and country; age interacted with service and country; and ethnocentrism interacted with country of carrier. Although intuitive, the high price and income interaction in our study would suggest marketing high priced trips to higher income people. Similarly, high service and income interaction further suggests marketing superior services to people with higher income, and significant non-stop service and income interaction suggests that people with higher income value non-stop flights more than do people with lower income. Canadian carrier and age interaction suggests that older Canadians prefer Canadian carriers more than do the younger adults; whereas, US carrier and income interaction suggests that Canadians with higher incomes value US carriers more than do Canadians with lower incomes. Thus, we conclude that interaction effects are important in identifying traveler preferences for factors that impact preferences for air carriers.

Simply evaluating main effects models alone, which is the typical approach taken in earlier research, is not sufficient. The results support our propositions, which state that interaction effects and individual-specific effects are significant; thus, they cannot be ignored in modeling traveler preferences. Including interaction effects improves the model's fit and predictive ability significantly. Furthermore, individual-specific intercepts account for individual differences, and thus renders the interpretation of main effect and interaction coefficients less biased and more efficient.

Managerial Implications

The results of our study suggest that international marketers need to look beyond product and consumer attributes, when segmenting markets for product positioning and promotion strategies. Segmentation strategies that treat consumers as if no differences existed between members of the same sub-set create significant errors in designing and implementing marketing programs. The effect of basing segmentation schemes solely upon just the main effects of a preference model may suggest segmenting a market into older and younger adults, high and low income, or males and females. However, the significance of interaction effects, as we found in our study, suggests further micro-segmentation of the markets to effectively promote products and services. Thus, one of the practical implications of this study is that it suggests that airlines may want to consider further micro-segmenting the market before expanding into a different geographic market.

In our model, some of the interaction effects we found were intuitive such as Income and High Service interaction, suggesting that high-income travelers would prefer high service. However, by exploring these effects, one may discover interaction effects that are less intuitive, such as a negative High Price and Gender interaction, which suggests that females might be more price sensitive to a particular product category. Exploring and finding these less intuitive interaction effects would lead to market segments that are less obvious. Effectively targeting those less obvious and hidden market segment could likely increase market share for a firm before it expands into a different market. Thus, another practical implication of this study for managers is that, using the interaction effects, they should explore those hidden micro-segments in the population that are less obvious to effectively realize the potential of their existing markets.

The importance of investigating the interaction effects of consumers' characteristics with product attributes on consumers' preferences increases when the objective is to segment potential consumers of a product/service both for national and international brand promotion. Since it is increasingly recognized that groups of consumers in different countries often have more in common with one another than with other consumers in the same country (Steenkamp and Hofstede 2002), segmenting consumers based upon product attributes, consumer characteristics, and the interactions between the two is likely to lead to better predictions of brand choice of certain consumer groups across national boundaries.

VI. REFERENCES

Balabanis, G. and Diamantopoulos, A. (2004). Domestic country bias, country-of-origin effects, and consumer ethnocentrism: a multidimensional unfolding approach. *Journal of the Academy of Marketing Science,* 32(1), pp. 80-95.

Beldona, S. and Namasivayan, K. (2006). Gender and demand-based pricing: differences in perceived (Un) fairness and repatronage intentions. *Journal of Hospitality and Leisure Marketing,*14(4), pp. 89-107.

Besanko, D., Dube, J.P. and Gupta, S. (2003). Competitive price discrimination strategies in a vertical channel using aggregate retail data. *Management Science,* 49, September, pp. 1121-1238.

Bruning E. R., Michael Y. Hu, Wei (Andrew) H. (2009). Cross-national segmentation: an application to the NAFTA airline passenger market. *European Journal of Marketing,* 43: 11/12, 1498 – 1522.

Bruning, E.R. (1997). National loyalty and product choice: the case of international air travel. *International Marketing Review,* 14(1), pp. 59-74.

Bruning, E. and Saqib N. (2013). Cultural similarity and national bias: an assessment in an international service context. *Journal of Global Marketing,* 26(1), pp. 41-56

Cordell, V. V. (1991). Competitive context and price as moderators of country of origin preferences. *Journal of Academy of Marketing Science,* 19, Spring, pp. 123-128.

Dodds, W., Monroe, K. B. and Grewal, D. (1991). Effects of price, brand, and store information on buyers' product evaluations. *Journal of Marketing Research,* 27, August, pp. 307-19.

Douglas, M. and Isherwood, B. (1979). The world of goods. eds. basic books inc: New York.

Drazin, R. and Van de Ven A. (1985). Alternative forms of fit in contingency theory. *Administrative Science Quarterly,* 30, pp. 514-539.

Elrod, T. and Winer, R. (1982). An empirical evaluation of aggregation approaches for developing market segments. *Journal of Marketing,* 46, Fall, pp. 67-74.

Erdem, Tülin, Kean, M.P., and Baohong, S. (2008). A dynamic model of brand choice when price and advertising signal product quality. *Marketing Science,* 27, 1111-1125.

Ferraro, R., Bettman, J.R and Chartrand T.L. (2009). The power of strangers: the effect of incidental consumer-brand encounters on brand choice. *Journal of Consumer Research,* 35 (5): 729-741.

Gerber, D. (2010). *Global competition: law, markets and globalization.* Oxford University Press.

Green P. and Wind, Y. (1975). New way to measure consumers' judgments. *Harvard Business Review,* July-August, pp. 107-17.

Greene, W.H. (2001). Estimating econometric models with fixed effects. New York University, Leonard N. Stern School of Business, Department of Economics, Working Paper.

Greene, W.H. (2004). The behaviour of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects. *Econometrics Journal,* 7, pp. 98-119.

Gupta, S. and Chintagunta, P.K. (1994). On using demographic variables to determine segment membership in logit mixture models. *Journal of Marketing Research,* 31, February, pp. 128-136.

Heslop, L. A. & Papadopoulos, N. (1992). But who knows where or when? Reflections on the images. In Product Country Images, edited by N. Papadopoulos and L. Heslop. USA: Hawthorn Press.

Hoch, S. J., Kim, B.D., Montgomery, A.L. and Rossi, P.E. (1995). Determinants of store level price elasticity. *Journal of Marketing Research,* 32, February, pp. 17-29.

Hotelling, H (1929). Stability in competition. *The Economic Journal,* 39(153), March, pp. 41-57.

Johansson, J. K., Douglas, S.P. and Nonaka, I. (1985). Assessing the impact of country of origin on product evaluations: a new methodological perspective. *Journal of Marketing Research,* 22, November, pp. 388-396.

Kalyanam, K. and Putler, D.S. (1997). Incorporating demographic variables in brand choice   models: an indivisible alternatives framework. *Marketing Science,* 16(2), pp. 166-81.

Kumar, A. (2008). Age differences in mobile service perceptions: comparison of generation Y and baby boomers. *Journal of Services Marketing,* 22(7), pp. 568-577.

Leszczyc, P.T.L.P and Bass, F. (1998).Determining   the effects of observed and unobserved heterogeneity on consumer brand choice. *Applied Stochastic Models and Data Analysis,* 14, pp. 95-115.

Levine, R. and Campbell, D. (1972). Ethnocentrism: theories of conflict, attitudes and group behavior. New York: John Wiley and Sons.

Liechty, J.C., Fong, D.K.H. and DeSarbo, W.S. (2005). Dynamic models incorporating individual heterogeneity: utility evolution in conjoint analysis. *Marketing Science,* 24(2), pp. 285-293.

Liou, J. and Tzeng, G. (2007). A non-additive model for evaluating airline service quality. *Journal of Air Transport Management,* 13(3), pp. 131–138.

Maheswaran, D. (1994). Country of origin as a stereotype: effects of consumer expertise and attribute strength on product evaluations. *Journal of Consumer Research,* 21(2),   September,pp.354-365.

Meyers-Levy, J. and Maheswaran, D. (1991). Exploring differences in males' and females' processing strategies. *Journal of Consumer Research,* 18, June, pp. 63-70.

Mittal, V. and Kamakura, W. (2001). Satisfaction, repurchase intent, and repurchase behavior: Investigating the moderating effects of customer characteristics. *Journal of Marketing Research,* 38 (February), 131–42.

Mort, G. S. and Duncan, M. (2003). Owned by…': country of origin's new cue," Journal of International Consumer Marketing, 15 (3), pp. 49-69.

Moschis, G. P. and Churchill, G.A. (1978). Consumer socialization: a theoretical and empirical analysis. *Journal of Marketing Research,* 15, pp. 599-609.

Moorthy, S. (2012). Can brand extension signal product quality? *Marketing Science,* 31:756-770

Murthi, B.P.S., Haruvy, E. and Zhang, H. (2007). The effect of variability in price on consumer brand choice. *Review of Marketing Science,* 5(1), pages 4.

Muthukrishnan, A.V. and Kardes, F.R. (2001). Persistent preferences for product attributes: the effects of the initial choice context and uninformative experience. *Journal of Consumer Research,* 28, June, pp. 89-104.

Netemeyer, R.G.,Durvasula, S. and Lichtenstein, D.R. (1991). A cross-national assessment of the reliability and validity of the CETSCALE. *Journal of Marketing Research,* 28, August, pp. 320-327.

Nevo, A. (2000). A practitioner's guide to estimation of random-coefficients legit models of demand. *Journal of Economics and Management Strategy,* 9:513–548

Novak, T.P. & B. MacEvoy, B. (1990). On comparing alternative segmentation schemes: the list   of values (LOV) and values and life styles (VALS). *Journal of Consumer Research,* 17, June, pp. 105-109.

Nowaczyk, R. (1982). Sex-Related differences in the color lexicon. *Language and Speech,* 25, July-September, pp. 257-65.

Okoroafo, S. (2010). Gender perceptions of family businesses' marketing stimuli. *International Journal of Marketing Studies,* 2(1), pp. 3-12.

Petzer, D. and De Meyer, C.F. (2011). The perceived service quality, satisfaction and behavioral intentions towards cell phone network service providers: a generational perspective. *African Journal of Business Management,* 5(17), pp. 7461-7473.

Phillips, L. W. and Sternthal, B. (1977). Age differences in information processing: a perspective on the aged consumers. *Journal of Marketing Research,* 14, November, pp. 444-57.

SAS Institute (2008). *SAS/STAT 9.2 User's Guide.* Cary, NC.

Sethuraman, R. and Cole, C. (1999). Factors influencing the price premiums that consumers pay fornational brands over store brands. *Journal of Product and Brand Management,* 8(4), pp.340-351.

Sharma, P. (2011). Country of origin effects in developed and emerging markets: Exploring the contrasting roles of materialism and value consciousness. *Journal of International Business Studies* (2011) 42, 285–306.

Shimp, T. and Sharma, S. (1987). Consumer ethnocentrism: construction and validation of the CETSCALE. *Journal of Marketing Research,* 24, August, pp. 280-89.

Simon, H. (1976). Administrative behavior: a study of decision-making processes in administrative organization. (New York: The Free Press).

Steenkamp, J.B. E. M. and Hofstede, F. (2002). International market segmentation: issues and perspectives. *International Journal of Research in Marketing,* 19(3), pp. 185-214.

Tsaur, S., Chang, T. and Yen, C. (2002). The evaluation of airline service quality by fuzzy MCDM. *Tourism Management,* 23(2), pp. 107–115.

Urbany, J., Dickson, P.R. and Kalapurakal, R. (1996). Price search in the retail grocery market. *Journal of Marketing,* 60, April, pp. 91-104.

Van Liere, K. D. and Dunlap, R.E. (1980). The social bases of environmental concern: a review of hypotheses, explanations and empirical evidence. *Public Opinion Quarterly,* 44, pp. 181-197.

Wen, C. and Yeh, W. (2010). Positioning of international air passenger carriers using multidimensional scaling and correspondence analysis. *Transportation Journal,* 49(1), pp.7–23.

Zeithaml. V., Varadarajan, V. and Zeithaml, C. (1988). The contingency approach: its foundations and relevance to theory building and research in marketing. European Journal of Marketing, 22(7), pp. 37-64.

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