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Transport and Regional Dispersal of Tourists: Is Travel Modal Substitution a Source of Conflict between Low-Fare Air Services and Regional Dispersal?

Tay T. R. Koo,[1] Cheng-Lung (Richard) Wu,[1] and Larry Dwyer[1]

Abstract

This article explores the relationship between low-cost carrier (LCC) service proliferation and regional dispersal of tourists by examining the mode choice decision of leisure tourists. This research applies a stated choice method controlling for travel mode attributes as well as trip context (whether a trip is single- or multidestination). The results suggest that leisure traveler mode choice is influenced by the trip context; however, low airfares more than offset this effect on travel mode choice. On the basis of data collected in the Northern New South Wales travel corridor in Australia, this article shows that a study of travel mode choice can reveal potential conflicts and synergies in the marketing and management of destinations. The results have implications for destinations worldwide.

Keywords

low-cost carriers; transport mode choice; tourist dispersal; regional tourism

Low-cost carriers (LCCs) are often cited as one of the more obvious outcomes of deregulation of the aviation industry in United States (Meyer and Oster 1987) and in Europe (Lawton 2002; Williams 2002). Australia too has been subject to the adoption of the LCC model by both incumbent and new entrant airlines since the early 1990s. Today, it is estimated that it has one of the largest LCC penetration rates in a given single aviation market, with 50% of the market share (CAPA, 2006). One key impact of LCCs in Australia has been its direct services to nonprimary airports (see, e.g., Lawton 2002). Today, more regional destinations are directly serviced from the metropolises of Australia than ever before.

Meanwhile, in recognition of the importance of tourism in contributing to regional economic prosperity (as well as alleviating urban congestion from increased tourist flows), the Australian federal government prioritized greater regional dispersion of domestic and international tourists as a key policy goal in the medium term (DITR 2003). The changes in regional tourist flows brought about by LCCs are readily observed in Australia. Between 2000-2001 and 2005-2006, non–capital city airports gained 81.7% growth in passenger traffic—an increase of more than 3 million arrivals (compiled from BTRE 2007). A more comprehensive regional dispersal however will require greater dispersal, where tourists venture into the surroundings and regions peripheral to the gateways. This research was conceived in the context of these two parallel developments in Australia, that is, the proliferation of the post-2000 LCCs and the greater regional dispersal policy.

The emergence of LCCs has improved air travel access to regions outside the capital cities in Australia by offering discounted tickets and nonstop services from key domestic origin markets. By the same token, it has also increased the competitiveness of air travel against other modes of travel in regions traditionally reliant on ground modes. Recent research by Whyte and Prideaux (2007) in North Queensland (Australia) has shown the relative decline of car and long-distance coach travel between 2001 and 2005, while air travel increased in the same period, largely marked by the proliferation of two Australian LCCs (Virgin Blue and Jetstar). As a result, tourism businesses located between tourism-generating regions and regional destinations experienced declines in visitation (Whyte and Prideaux 2007).

In Australia, car is the dominant travel mode used for visiting rural regions (TTF 2002). The car allows travelers the flexibility to establish their own travel itinerary (Taplin and McGinley 2000), while air travel often does not offer the same flexibility and spontaneity in the choice of travel routes (Stewart and Vogt 1997). Consequently, travel mode is an important means by which the different levels of spatial

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degrees of freedom for tourists are achieved (Lew and McKercher 2006). In fact, recent research has shown that the spatial patterns of travel and travel mode used are related to the travel experience sought. Moscardo and Pearce (2004) studied the moderating role of life cycle factors in the choice of long-distance mode of travel and found that self-drive tourists are considerably different from non–self-drive tourists in the travel experience sought in the North Queensland Region. In particular, the study found that self-drive tourists tend to place more importance on visiting rural communities than other travelers.

There is a potential conflict between the increasing use of air travel and dispersal. This is because dispersal typically requires a high degree of mobility, which can be most easily met by using the car but is most difficult to meet by air transport. Conversely, according to the law of demand in microeconomic theory, the improved affordability of airfares is a potent force in increasing the demand for air travel. The trade-offs in mode choice decisions, made between prices and the intrinsic aspects of travel modes, are underexamined issues in tourism literature. Lumsdon and Page (2004, p. 21) stressed the need for more cross-fertilization between tourism research and the established field of transport economics, stating,

> Modal competition has attracted highly quantitative and theoretical research by modelling travel behaviour. Yet the explicit tourism and leisure dimension remains a virgin area for research to understand the relationship between the potential for modal switching for pleasure travel rather than the prevailing focus of many transport studies on commuting.

While this article will not fully address the gap in knowledge identified by Lumsdon and Page, it aims to contribute by cross-applying methods established in the transport economics literature to the problems confronted in tourism. Specifically, the objective of this article is to examine the proposition that LCC proliferation adversely affects regional dispersal. This shall be approached via the analysis of the trade-offs involved in leisure travelers' travel mode choice decisions.

Research into the influence of travel mode choice on regional dispersal of tourists can generate knowledge critical for regional tourism management, particularly with respect to transport policy and marketing. Since the use of one travel mode over another will be associated with particular spatial patterns of travel—different patterns of dispersal—mode choice studies can help identify linkage patterns of different destinations. Consequently, such information contributes to recognizing natural partners in regional or locational cooperation (Oppermann 1995; Lue, Crompton, and Fesenmaier 1993). This is particularly relevant for the state tourism organizations whose roles are to facilitate liaison and provide cooperative marketing for the diverse range of tourism regions within their jurisdiction.

Moreover, research into the relationship between proliferation of air travel and regional dispersal will help provide a more accurate and robust assessment of the impact of regional transport policy and investments. For smaller regional airports, significant investment is necessary to facilitate the entry of LCC services; for example, on runway and terminal space upgrades and purchase of security equipment. Information on the modal substitution and the associated changes in tourists' travel patterns will help assess the impact of such investments through more informed forecasting of tourism demand.

Tourists' Dispersal

Australia's national tourism organization, Tourism Australia, uses the definition of regional dispersal as trips originating in state and territory capital cities into destinations other than these cities and the Gold Coast. In this article the regions are dichotomized into gateways or periphery. Lew and McKercher (2002) defined gateways as the first destination of overnight stay in the trip, which can be either a point of entry or the main destination itself. In Australia, the gateways are almost always the largest townships of the tourism regions. For the purpose of this research, a single-destination trip is defined as a trip that involves a stay only in one gateway, whereas a multidestination trip involves at least one overnight stay in the gateway and one in the periphery. The cases in which a trip involves stopovers on more than one gateway are not considered in this research.

Dispersal is achieved when many destinations are visited within the same trip, or when a unique trip is undertaken in many parts of the destination (Wu and Carson 2008). From the viewpoint of individual preferences, it is possible for there to be as many variations in spatial behavior of tourists at the destination and in the region surrounding the destination as there are individuals traveling. Lue, Crompton, and Fesenmaier (1993) conceptualized the variation in the patterns of trip itinerary into five basic patterns of multidestination trips. Oppermann (1995) developed this further into two single-destination and five multidestination trips. The multidestination trip patterns identified have been applied to differing contexts by researchers; on a domestic-regional level (Stewart and Vogt 1997), to travel by international tourists (Tideswell and Faulkner 1999), as well as intercontinental travel (Lew and McKercher 2002). Some of the common trips featured in these studies that are relevant to this research are the patterns of regional tour and en route travels (Figure 1). In this research, a single-destination trip refers to a trip that only involves an overnight stay in the gateway (denoted D), while multidestination trips involve overnight stops in at least two different destinations, one of which is the gateway.

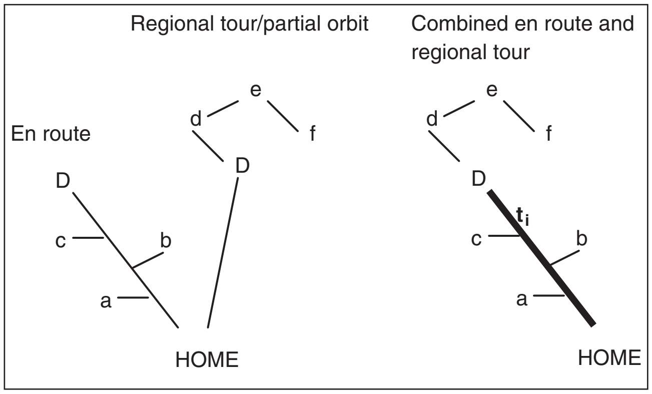

Figure 1. Patterns of Multidestination Travel
Note: Modified from Lue, Crompton, and Fesenmaier (1993) and Oppermann (1995).

The consequences of modal substitution toward air travel can be detrimental to the peripheral destinations. Substitution away from ground modes implies bypassing smaller destinations located between major origin markets and popular domestic leisure destinations. A destination such as Port Macquarie, a seaside town located between Sydney and Byron–Ballina in New South Wales, is an example[1] (as shown in Figure 2). Back to Figure 1, in the combined en route and regional tour diagram, t_i represents the transport linkage between home and destination, and the subscript *i* represents the available travel mode on this link, such as car or air. If substitution occurs toward air travel because of low fares, then the smaller destinations a, b, and c will be bypassed, with the only possibility of visitation conceivable when the traveler travels back from D.

Modal substitution is not the only channel of influence of affordable air travel on dispersal. If the cheap and direct flights stimulate a greater number of tourists to D then this increases the pool of tourists that may travel further to the peripheral destinations of d, e, and f. In some circumstances, even the destinations a, b, and c may experience an increase in visitations from the travelers flying into D. This may occur when the return route or mode is different from that used for access, such as when the tourist uses a car to travel back home, or when the air arrivals take day trips from D to the surrounding periphery using local transport. It is acknowledged that these sources of change in spatial patterns have important implications for the evaluation of the net effect of affordable air travel on dispersal. The two sources outlined above, however, were not considered in this study because it was assumed that the majority of travelers on the corridor use the same mode to travel both ways. Second, day trips from D represent a base-camp pattern, which does not constitute the dispersal defined in this study. The primary focus of this research is on the effect of modal substitution on regional destinations, for example, a, b, and c. As explained below, the decision by tourists to disperse to d, e, and f is viewed as an exogenous factor that this research controls using a stated choice experiment.

Tourists' travel mode choice on each leg of the journey does not occur in isolation; rather, it is influenced by the entire trip and the context in which travel decisions are made (Page 2005). Thus, in light of the combined en route and regional tour diagram in Figure 1, while leisure tourists' long-distance travel mode choice applies only to the t_i segment of the journey, the decision of whether the tourists' trips involve dispersal to d, e, and f will affect the mode choice on t_i. For instance, on distances where ground modes compete with air travel, a possible scenario is that if the tourist's itinerary includes a visit to d then driving the entire trip may become more attractive than when the tourist only requires a trip to D. Subsequently, a tourist may make this switch in travel mode. This implies a linkage between the destinations d, e, f and a, b, c, because driving the entire distance inadvertently provides opportunities for en route visitations along t_i. In contrast, flying will preclude this possibility, resulting in a complete bypass (corridor effect) unless some form of vehicle is used to travel back down to c from the gateway (D). In this article, we examine the effect of multidestination trips on mode choice, that is, the effect of trips with and without visits to d, e, or f, on mode choices along t_i.

Discrete Choice Framework

Discrete choice models (DCM) are widely applied to analyze spatial problems in intraurban commuting patterns, consumer shopping behavior, migration patterns, and residential location decisions (Timmermans and Golledge 1990) as well as long-distance travel mode choice. In recognition of the discrete nature of many decisions by tourists, for example, destination choice, DCMs have been applied in tourism research for some time (e.g., Morley 1994; Louviere and Hensher 1983). More recently, a variety of DCMs have been applied to model tourists' choice of destination and accommodation, as well as to examine expenditure allocation behavior; for instance, nested logit (Mules and Huybers 2002), multinomial logit (MNL; Pina and Delfa 2005), random parameter logit (Nicolau and Mas, 2006), and universal logit (Crouch et al. 2007). However, the vast majority of DCM applications use MNL because of its relative ease in estimation, and because it provides the basis on which further model development can take place (Hensher, Rose, and Greene 2005). In this study, we are especially interested in the signs and weights attached to the variables as opposed to the market share prediction. Thus, it was judged that the MNL model would be sufficient for the present purposes.

Econometric models often use data collected on choices already made in the market, commonly referred to as revealed preference data. Revealed preference data suffer from a lack of variation in the levels of explanatory variables and

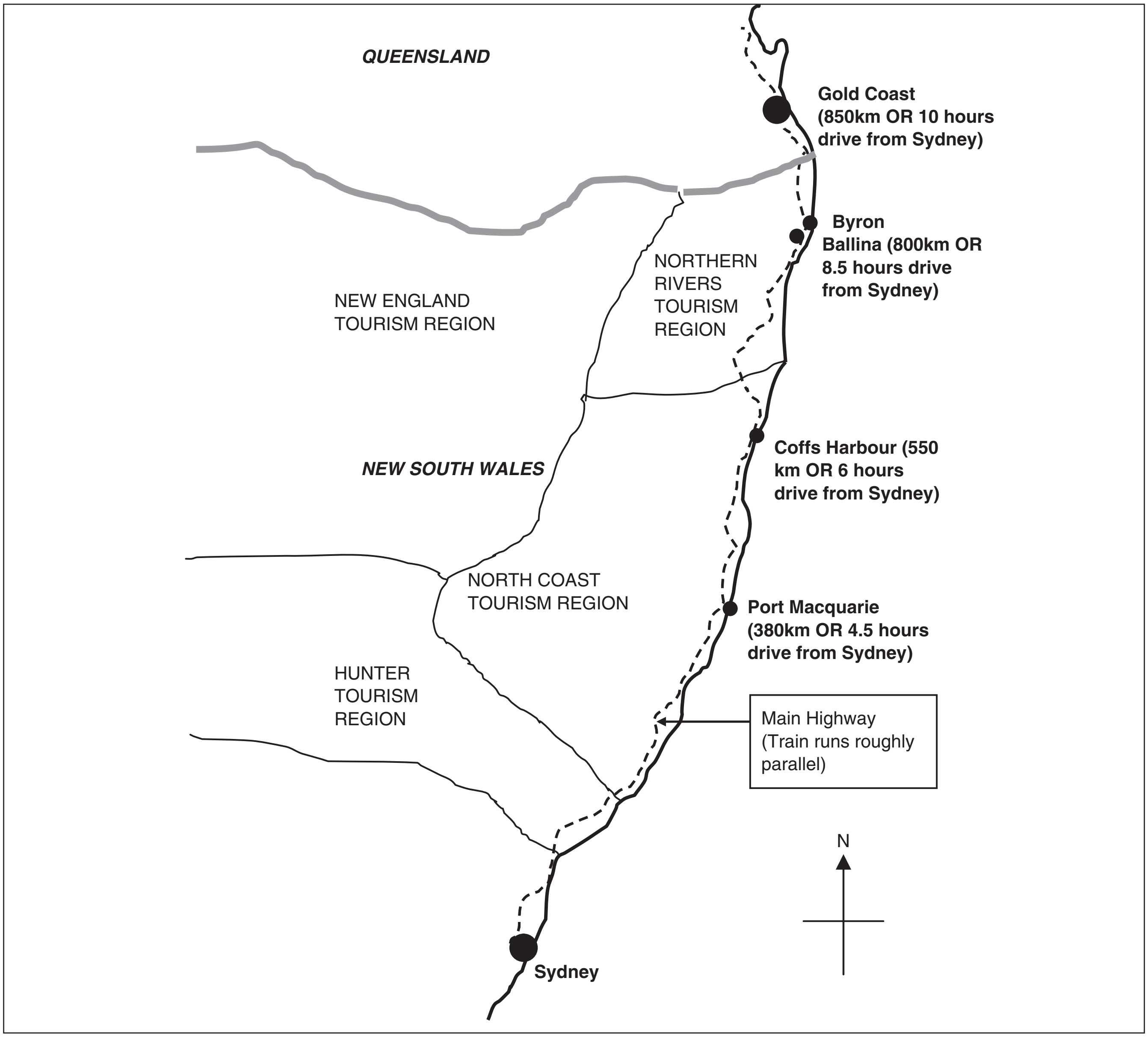

Figure 2. Northern New South Wales Coast
Note: Drawn by the authors based on tourism regions classification available from New South Wales State Tourism Organisation.

difficulties in observing the alternatives actually considered by the decision maker (Hensher, Rose, and Greene 2005). Stated choice data on the other hand involve presenting to a decision maker a combination of alternatives (e.g., flying or driving) and attributes (e.g., price) as hypothetical scenarios. An example of stated choice application on long-distance travel mode choice is the study by Hensher (1997), which used this method to estimate the demand for a then-planned high-speed rail between Sydney and Canberra. More recently in tourism, Crouch et al. (2007) applied the stated choice method to examine preferences in the allocation of discretionary expenditure on domestic tourism against alternatives such as reducing household debts and overseas holiday, while Mules and Huybers (2002) applied this method to the short-break destination choice of Sydney and Melbourne residents.

The stated choice method was used in this research for several reasons. First, stated choice method is an experiment that manipulates the control variables. For example, airfares are systematically varied across the choice alternatives so that their influence on respondents' choice of travel mode can be estimated in a controlled environment. This approach overcomes the common pitfalls of revealed preference data, such as the lack of variation in the levels of variables (Louviere, Hensher, and Swait 2000). In addition, alternatives considered and the prices paid by tourists are information often not readily available in secondary data sources or in the form of revealed preference data. Finally, this method allows the analyst to vary other aspects of the trip so as to answer a question central to this study: "How would you change your current choice had your trip involved a stay at least two hours' drive away from the main town center?" This allowed the researchers to estimate the effect of change in trip context on travel mode choice in a controlled environment.

By applying the stated choice framework, we are able to estimate the extent to which each factor influences travel mode choice. The controlled factors are travel mode attributes (e.g., airfare) and trip characteristics (or trip context; multidestination vs. single-destination trip). The stated choice method is particularly appropriate when the study is interested in the willingness to pay and trade-offs among choice alternatives, rather than market share predictions (Hensher, Rose, and Greene 2005). Since the objective of this study is to extract the trade-offs between modal-specific attributes (e.g., price) and trip context (single-destination vs. multidestination), stated choice data were chosen. The following sections on research methodology outline the discrete choice model, the data collection region, choice alternatives, attributes considered, and experimental design for the stated choice survey.

The Model

Discrete choice models are grounded in random utility theory (Ben-Akiva and Lerman 1985). The most basic model of multialternatives is the MNL model, or sometimes referred to as the Mcfadden style conditional logit model. The MNL is of the form:

$$P_{ni} = \frac{e^{V_{ni}}}{\sum_j e^{V_{nj}}}, \quad (1)$$

where P_{ni} denotes the probability of individual n choosing alternative i, V_{ni} represents the systematic (observed) components of the utility described by the attributes, socioeconomic and trip characteristics of alternative i for individual n. Likewise, V_{nj} represents the observed variables for all alternatives in the choice set. In the MNL model, it is the relative utility of one alternative to another that matters. The difference in the random (unobserved) component of each utility function is logistically distributed. The linearly additive utility functions, V_{ni}, are first estimated from the data and then transformed into probability estimates.

This article examines the factors affecting mode choice in differing trip contexts, for example, single-destination versus multidestination. The stated choice experimental design used in this study enables the estimation of the mode choice model for each trip context separately as well as in a single equation that includes both contexts. For the former, the following utility function is estimated for each mode of transport in each trip context.

$$V_{ni} = \alpha_i + \beta_i X_{ni} + \phi_i Z_{ni}. \quad (2)$$

V_{ni} is the level of utility for individual n choosing alternative i. V_{ni} is a function of the levels of the attributes X_{ni}, where βi is a vector of coefficients to be estimated for each attribute of each alternative i. Z_{ni} is the individual's characteristics with coefficients vector ϕ_i. In discrete choice models, socioeconomic characteristics of the individual decision makers are included in the model to account for the potential heterogeneity in preferences (Ben Akiva and Lerman 1985). If there are m alternatives, there can only be $m - 1$ ϕ_i that can be estimated, as one alternative has to be used as a base to which the relative utility of all other alternatives is identified (e.g., Borooah 2002). Similarly, the alternative specific constants, α, can only be estimated for $m - 1$ of the alternatives.

As for the single equation approach, Oppewal and Timmermans (1991) have shown that the following utility function can be estimated given an appropriate experimental design:

$$V_{ni} = \alpha_i + \delta_d \alpha_i + \beta_i X_{ni} + \delta_d \beta_i X_{ni} + \phi_i Z_{ni}. \quad (3)$$

The additional term in equation 3 is δ_d, which is a dummy term that takes the value of 0 when the choice is made under a single-destination trip context and 1 when the trip is multidestination. δ_d interacts with the alternative specific constants (α_i) and the alternative specific attributes of travel modes ($\beta_i X_{ni}$). The latter enables, in a single model, the estimation of separate coefficients for each trip context of the same attribute. Both models were applied in this study.

Study Region

Case Study Region

The data collection regions were Ballina and Byron in the Northern Rivers tourism region of New South Wales, Australia (see Figure 2). Byron is a popular seaside leisure destination, where 22% of total trips originate from Sydney and 26% from Brisbane (TRA 2007).[2] The Ballina–Byron airport is located in Ballina, which is a 25-minute drive from Byron. The leisure travelers (holiday and visiting-friends-and-relatives travel purpose) on the corridor from Sydney to Byron were chosen as study subjects for two main reasons. First, two LCCs, Virgin Blue and Jetstar, commenced services to the Ballina–Byron airport, introducing low fares and greater ticket discounting practices. Thus, it was expected that travelers on this route are familiar with the air travel alternatives and the low fares frequently advertised. Second, the corridor is approximately 800 km, a distance sufficient for competition to prevail between private car, coach, rail, and air travel.

Choice Alternatives

The feasible set of alternatives for this study included car, rental car, bus or coach, train, Virgin Blue (DJ), Jetstar (JQ), Regional Express (REX), and flights to Gold Coast airport. Technically, transport to Gold Coast airport is not an independent mode; rather, it represents an alternative route. The decision to include flights to the Gold Coast was made in consultation with local industry practitioners and researchers. Gold Coast airport is only 1 hour's driving distance from Byron and there are high levels of air service frequencies to the Gold Coast compared to only daily services on the route between Ballina–Byron and Sydney. Thus, withdrawing this alternative would exclude a prominent form of competing air transport to Ballina–Byron. While trains no longer operate directly to Byron, the inclusion in this study does not pose a problem. In fact, the ability to account for an unavailable mode is an important advantage of stated choice experiments, applied previously in studies examining the viability of currently unavailable alternatives (e.g., Hensher 1997).

The Attributes of Modal Alternatives

This research aimed to provide a comprehensive specification of modal attributes in recognition of the fact that underspecified models will increase the likelihood of violating the identical and independent distribution (IID) assumption of the error terms in MNL models (Hensher, Rose, and Greene 2005). Consequently, attribute specification was based on a literature review of modal attributes on interregional mode choice, and a wider survey of the literature including those studies that examined the importance of qualitative variables such as road conditions, safety, schedules, and delay risks for public transport alternatives.

Service qualities are generally more difficult to account for in models because of their subjective nature (Hensher, Rose, and Greene 2005). Service convenience is often associated with service schedule and frequency in the travel mode choice literature. Frequency of the transport service, as with price and time, frequently appears in the attribute specification (and it is also easily quantified). For example, Koppelman and Sethi (2005) used a schedule convenience attribute that included arrival and departure time of the day as dummy variables as well as a measure of the reliability of the transport service by incorporating an unreasonable delay dummy variable.

The nature of the qualitative variables is likely to differ for each mode. On nonurban driving it was found that in Australia, the top three issues for the regional motorists were behavior of other drivers, condition of roads, and safety and accidents (ANOP Research Services 2005). Hence, model specification for a car alternative should include road quality and safety variables. Previous studies such as Greene and Hensher (2003), in specifying the stated choice experiment attributes for road types in long-distance travel, used attributes such as number of lanes, the existence of median strips, percentage of free-flow time, etc. On road safety and risk, Rizzi and Ortuzar (2003) investigated the impact of perceived road risk on route choice for interurban trips using the yearly fatal accident rate on the given route. Most of the attribute-level labels were based on real market information so that the designed choice scenarios were as realistic as possible. The attributes and attribute-level labels are explained in detail below and summarized in Table 1.

Price

The prices for air transport mode were obtained from the Jetstar, Virgin Blue, and Regional Express Web sites on November 17, 2006, for the period between November 18, 2006, and January 25, 2007, and again on December 27, 2006, for the period between December 28, 2006, and January 29, 2007. Based on the published fares in the period above, this experiment controlled for three levels of air ticket price: \$80, \$150, and \$220. The \$80 fare was one of the lowest available in that period, and \$220 was the highest. Similarly, the train and coach prices were based on the published fares on company Web sites (Countrylink, Greyhound, and McCafferty). The price attribute-level labels for train and coach were \$60, \$120, and \$180. Finally, rental rate per day was specified in the model for the rental car alternative. As per the other alternatives, the labels were based on real market price of several rental car companies in Ballina–Byron. These were \$30, \$60, and \$90 per day.

In Australia, more than three-quarters of the motorists have a good idea of the petrol price at a given point in time (ANOP Research Services 2005). Therefore, it was viewed that the fuel price per liter was an appropriate measure of the motorists' perception of the price of travel on car. Fuel price ranges were obtained from the Australian Automobile Association monthly average fuel prices for Sydney Metropolitan Area between December 1998 and December 2006. The prices fluctuated around \$1.10/liter. The three fuel price level labels based on 1998 to 2006 fuel price time series were \$0.70, \$1.10, and \$1.50.

Time

The time attribute is in two parts: in-vehicle time (IVT) and out-of-vehicle time (OVT). The attribute-level labels used for all modes are based on published information from airport transfer operators, flight schedules, and travel guides. For Jetstar, Virgin Blue, Regional Express, and the flight to Gold Coast, the IVT was controlled at the levels of 1, 1.5, and 2 hours. For OVT, this varied between 2, 3, and 4 hours. For other scheduled transport services such as Coach and Train alternatives, the IVT varied from 11, 13, and 15 hours,

Table 1. Attributes

	Ticket Price	Fuel Price	In-Vehicle Time	Out-Vehicle Time	Door-to-Door Time	Frequency
Jetstar	$80	–	1 hour	2 hours	–	4/week
	$150 (price$_1$)		1.5 hour (it$_1$)	3 hours (ot$_1$)		Daily (freq$_1$)
	$220 (price)		2 hours (it)	4 hours (ot)		4/day (freq)
Virgin Blue	$80	–	1 hour	2 hours	–	4/week
	$150 (price$_1$)		1.5 hour (it$_1$)	3 hours (ot$_1$)		Daily (freq$_1$)
	$220 (price)		2 hours (it)	4 hours (ot)		4/day (freq)
Regional Express	$80	–	1 hour	2 hours	–	Daily
	$150 (price$_1$)		1.5 hour (it$_1$)	3 hours (ot$_1$)		4/day (freq$_1$)
	$220 (price)		2 hour (it)	4 hours (ot)		10/day (freq)
Fly to Gold Coast	$80	–	1 hour	2 hours	–	Daily
	$150 (price$_1$)		1.5 hour (it$_1$)	3 hours (ot$_1$)		4/day (freq$_1$)
	$220 (price)		2 hours (it)	4 hours (ot)		10/day (freq)
Rental car	–	$0.70/liter	–	–	7 hours	–
		$1.10/liter (price$_1$)			9 hours (it$_1$)	
		$1.50/liter (price)			11 hours (it)	
Private car	–	$0.70/liter	–	–	7 hours	–
		$1.10/liter (price$_1$)			9 hours (it$_1$)	
		$1.50/liter (price)			11 hours (it)	
Train	$60	–	11 hours	1 hour	–	4/week
	$120 (price$_1$)		13 hours (it$_1$)	3 hours (ot$_1$)		Daily (freq$_1$)
	$180 (price)		15 hours (it)	5 hours (ot)		4/day (freq)
Coach	$60	–	11 hours	1 hour	–	Daily
	$120 (price$_1$)		13 hours (it$_1$)	3 hours (ot$_1$)		4/day (freq$_1$)
	$180 (price)		15 hours (it)	5 hours (ot)		10/day (freq)

	Schedules	Reliability	Road Risk	Road Condition	Rental Rate
Jetstar	↑	75%	–	–	–
	Morning arrival and departure	85% (relia$_1$)			
		95% (relia)			
Virgin Blue	Afternoon arrival and departure (sch$_1$)	75%	–	–	–
		85% (relia$_1$)			
		95% (relia)			
Regional Express	Evening arrival and departure (sch)	75%	–	–	–
		85% (relia$_1$)			
		95% (relia)			
Fly to Gold Coast	↓	75%	–	–	–
		85% (relia$_1$)			
		95% (relia)			
Rental car	–	–	50% reduction	30% upgrade	$30 per day
			No change (risk$_1$)	60% upgrade (con$_1$)	$60 per day (rate$_1$)
			50% increase (risk)	90% upgrade (con)	$90 per day (rate)
Private car	–	–	50% reduction	30% upgrade	–
			No change (risk$_1$)	60% upgrade (con$_1$)	
			50% increase (risk)	90% upgrade (con)	
Train	Morning departure and night arrival	–	–	–	–
	Night departure and morning arrival (sch$_1$)	–	–	–	–
Coach	Arrival between 12 p.m. and 6 a.m. (sch)			30% upgrade	
				60% upgrade (con$_1$)	
				90% upgrade (con)	

Note: All variables are for one-way travel. Abbreviations used for model estimation are in parentheses, e.g., (price$_1$).

whereas the OVT ranged from 1, 3, and 5 hours. For private and rental car alternatives, combined IVT and OVT were specified. The door-to-door time variable had three levels, for example, 7, 9, and 11 hours.

Road Risk

The Pacific Highway is the major artery that runs for most of the Sydney to Ballina–Byron route and it rates as one of the worst roads in regards to safety and risk (Australian Automobile Association Road Assessment Program; AAA 2005). Road safety and risk was measured by the level of fatal accident rate with the following labels: 50% reduction in fatal accidents, no change, and 50% increase in fatal accidents. Such approach to road safety and risk in stated choice experiments has been demonstrated in previous studies such as Rizzi and Ortuzar (2003).

Road Condition

At the time of the survey, 243 km of the 618 km (40%) of Pacific Highway was in the form of dual divided lanes with a median (RTA 2006). The reminder of the highway was in the form of undivided two or four lanes. However, it was expected that additional sections of the undivided lanes were to be upgraded in the following years. The road condition attribute labels were 30% upgrade, 60% upgrade, and 90% upgrade of the highway.

Reliability

Airline on-time performance data are available from the BTRE (2007) aviation statistics. The figure shows the percentage of airline arriving and/or departing within 15 minutes of scheduled time. REX and Jetstar had a 90% on-time performance, while Virgin Blue's performance was 83% in 2006. In the experiment, the labels were 75%, 85%, and 95% on-time performance. The reliability attribute was omitted for the coach and train alternatives because of limited data on the actual levels.

Schedules

Schedule attributes were labeled according to arrival and departure times. For air alternatives, these were departures and arrivals in the morning, afternoon, and in the evening. For train and coach alternatives, the equivalent labels were morning departure and night arrival, night departure and morning arrival, and arrival between 12 a.m. and 6 a.m.

Frequency

Virgin Blue and Jetstar operate daily services, whereas Regional Express (a regional carrier) alternative and Sydney–Gold Coast alternative operate more frequently. Thus, the attribute-level label has been adjusted accordingly. Virgin Blue and Jetstar attribute labels were 4 per week, daily, and 4 per day, while for Regional Express and Sydney–Gold Coast, the labels were daily, 4 per day, and 10 per day. At the time of the survey, there were between three and four daily coach services on the travel corridor. To reflect this, the experiment controlled coach schedule frequency for daily, 4 per day, and 10 per day. For the train alternative, the labels were 4 per week, daily, and 4 per day to reflect the fact that train services are less frequent than coach services in the current market.

Experimental Design and Survey

A fractional factorial of the 3^{44} full-factorial design was selected for this experiment. This fractional factorial only allowed for the independent estimation of the main effect of each attribute on mode choice. This orthogonal array provided up to 44 control variables in three levels so that nonlinear effects could be estimated. After removing two treatment combinations without designed trade-offs, 106 choice sets were generated with a total of 44 attributes across eight alternatives, and three attribute levels for each attribute (please see Table 1 for each alternative's attributes). Thus, each attribute of an alternative is orthogonal to all other attributes of that alternative as well as the attributes of all other alternatives. This constituted an orthogonal main effect–only design, where the main effects are not protected from potential confoundment with two-way and higher order interaction effects (Louviere, Hensher, and Swait 2000). All alternatives were available in all choice scenarios.

In addition, to test for the effect of trip context on mode choices (single-destination trip vs. multidestination trip), the design was duplicated so the context of a single-destination trip and a multidestination trip could be presented with the exact same design. That is, respondents were asked to make mode choice decisions under scenarios when the trip involves only a single-destination and scenarios of multidestinations. This duplication procedure is in line with that suggested by Oppewal and Timmermans (1991) for a single-equation model with context effects. Thus, a complete design had 212 choice sets (106 multiplied by two) blocked by 53 so that four choice sets (212 divided by 53) were shown to each respondent during the survey.

The survey was undertaken in the main beach area of Byron Bay and at the departure lounge of Ballina–Byron airport, which is the main gateway airport of the region. Simple random sampling strategy was used. Departing travelers were approached in the departure lounge, or while they were in the long queue to the security screening points. For tourists surveyed at the main beach area, each survey distributor approached newly arriving visitors in their allocated area of the beach. The respondents were screened to ensure their trips involved a stay of at least one night in Byron, on a trip purpose other than business or work. In addition, the visitors had to be residents of Greater Metropolitan Sydney to ensure that all travelers meet the basic choice context, thus excluding those who used Sydney as a transit point. On consultation with local tourism research office, the survey was undertaken through the course of 8 days between January 20 and 27, 2007, with five survey distributors. This period is traditionally the final week of the summer peak in Ballina–Byron. The survey was face-to-face where possible (except in the departure lounge) to ensure response quality.

In total, 340 respondents attempted the survey, of which 302 were usable for empirical analysis. The survey distributors were asked to keep records of the number of people they approached, and from this we were able to impute that the response rate was approximately 20% for the beach visitors and 10% for the departing visitors at the departure lounge. Of the 302 valid samples, 80 came from the surveys conducted at the airport. This gave a total sample of 1,202 observations (excluding six missing observations) across 302 individuals. Just under half of the sampled tourists were between ages 18 and 35, which is consistent with the fact that Byron is favored by young travelers as a beach and surfing destination. Age groups 36 to 45 and 46 to 55 represented 19% and 20%, respectively, while only 3.5% were older than 65. Gender distribution was slightly skewed toward female (62%). More than 94% of the sample was traveling in a party size of four or less and 29% of the total was traveling alone.

Results

The results discussed herein pertain to the utility functions only. That is, we present the outputs for the utility functions (the V_{ni} in equations 2 and 3), and do not produce probability estimates. Thus, the emphasis in this article is on the effects of the attributes and trip context (trip characteristics) on the utility levels relative to the base alternative, train. The results between the two approaches, that is, single equation and separate equation, are very similar to one another. To preserve flow, the single-equation model outputs are shown in the main text, while the separate-equation model outputs are shown in the appendix. All control variables were effects-coded. Tests revealed some evidence of a nested structure between air modes and ground modes. However, the nested logit model did not statistically improve the model fit and it did not produce inconsistent results to the MNL. We persevered with the MNL model results because it illustrates our points in a simpler manner. Table 2 shows the summary statistics of the MNL models (both single-equation and separate-equation models).

The final result of the single-equation model is presented in Table 3. Each of the coefficients is interpreted as a ceteris paribus effect on the total utility of a given travel mode (relative to the train alternative). Attributes found to be insignificant for all the alternatives in the model were dropped during the model estimation process. The key purpose of Table 3 is to show the results we wish to highlight the most in the context of the research question. Consequently, some context-interaction variables were omitted from the model. The train mode was the base alternative for all alternative specific constants and variables.

Table 2. Summary Statistics

	Single-Equation Model	Single-Destination Model	Multi-destination Model
Log likelihood (no coefficient)	−1831.582	−1249.7444	−1249.7444
Adjusted pseudo-R^2	.262	.282	.246
No. of observations	1,208	604	604

Price

Price variables (price [\$220] and price_1 [\$150]) were highly significant for all air alternatives. For instance, when the price was high (\$220 one-way) Virgin Blue yields a loss of 0.58 in utility, but gained 0.58 when the price was very low (\$80)[3] (given that the coefficient on price \$150 is effectively zero). Thus, there is a 1.16 utility difference (0.58 – (–0.58)) between a Virgin Blue flight when the price is \$80 compared with a Virgin Blue flight when the price is \$220. The same applies to all other alternatives.

Time Variables

All time variables were not significant at the 5% level. They were subsequently removed from the model and the table. This is surprising because time is often an important explanatory variable in urban mode choice studies, although it is usually the case that leisure tourists are less responsive to time than business travelers. Potential reasons for this result are discussed in the next section.

Surrogates for Convenience (Schedules and Frequency)

Virgin Blue's morning arrival was preferred to an afternoon arrival. For a given frequency, it appears that tourists will derive some additional utility if the arrival time is earlier than the current 12 p.m. arrival service. Frequency is statistically significant for Jetstar and REX. For instance, thrice-daily frequency is a positive source of utility for tourists choosing Jetstar.

Table 3. Multinomial Logit Estimation Results

Variables	Coefficients	Variables	Coefficients	Variables	Coefficients
Constants		MD constants		Inertia	
				(drove before)	
Car	0.28	Car	−0.27	Car	0.42**
Coach	−1.70*	Coach	−1.03		
DJ	0.43	DJ	−1.03**	Inertia	
				(flew before)	
GC	−0.85	GC	−0.71	DJ	1.08***
JQ	0.37	JQ	−0.85*	GC	0.68**
REX	−0.07	REX	−0.91**	JQ	1.22***
RC	−1.89**	RC	0.17	REX	0.90***
Price (high price)		MD-on-price		Travel	
		(high price)		party size	
Car	−0.02	–	–	Car	0.40***
Coach	−1.24*	–	–	Coach	0.14
DJ	−0.58***	DJ	0.16	DJ	0.29
GC	−0.29	GC	−0.55	GC	0.38**
JQ	−0.72***	JQ	0.23	JQ	0.34**
REX	−0.71***	REX	0.09	REX	0.32*
RC	0.11	–	–	RC	0.40**
Price (medium price)		MD-on-price		Age	
		(medium price)			
Car	−0.02	–	–	Car	0.84***
Coach	0.41	–	–	Coach	0.54
DJ	−0.06	DJ	0.08	DJ	0.92***
GC	−0.57**	GC	0.37	GC	0.79***
JQ	0.03	JQ	−0.26	JQ	0.82***
REX	−0.22	REX	0.15	REX	0.85***
RC	−0.11	–	–	RC	0.73**
Freq (high frequency)		MD-on-freq			
		(high frequency)			
Coach	0.96**	–	–		
DJ	−0.15	DJ	0.37*		
GC	−0.19	GC	0.06		
JQ	0.47***	JQ	−0.37*		
REX	0.29**	REX	−0.08		
Freq (medium frequency)		MD-on-freq			
		(medium frequency)			
Coach	−1.24*	–	–		
DJ	0.11	DJ	−0.18		
GC	0.11	GC	−0.04		
JQ	−0.30**	JQ	0.11		
REX	−0.15	REX	0.31		
Schedule (arrival in the afternoon)					
Coach	0.00				
DJ	−0.23**				
GC	0.00				
JQ	−0.11				
REX	0.00				

Note: DJ = Virgin Blue; JQ = Jetstar; REX = Regional Express; GC = Gold Coast; RC = rental car; MD = multidestination; freq = frequency.
*p = .1. **p = .05. ***p = .01.

Other Variables

The significant age coefficients for each mode show that as age increases, the attractiveness of alternatives other than train increases relative to the train alternative. Risk, road condition, fuel price, and reliability variables were either insignificant or statistically significant but too small relative to other statistically significant variables such as price and trip context.

Inertia Effect

A person's choice in the experiment is explained, to an extent, by the mode actually chosen in the current trip. If the person drove to Byron, then the utility from choosing the car mode increases by 0.42 units of utility relative to choosing the train mode in the choice scenario. Similarly, if the person actually flew to the destination for the trip on which the survey was undertaken, choosing to fly again generally yields much greater utility than choosing the car mode or any other alternatives.

Trip Context Effect

The context (multidestination [MD] constants, multidestination effect on price [MD-on-price], and multidestination effect on frequency [MD-on-freq]) effect has a similar level of influence on Jetstar, Virgin Blue, and Regional Express. If a visitor, in addition to a stay in Byron, is to stay at least one night in regions at least 2 hours' drive away from Byron, then the utility derived from air transport diminishes. For example, the utility earned from flying with Virgin, Jetstar, and Regional Express decrease by a constant of 1.03, 0.85, and 0.91, respectively. The context can also moderate the influence that modal attributes have on choice. The variables under MD-on-price and MD-on-freq show the effect of context on price and frequency. With the exception of frequency and price, the context-and-attribute interaction effects were mostly insignificant. These variables were subsequently omitted from the model and the table.

Discussion and Implications

The results show that multidestination context has an effect of shifting the utility functions of air transport alternatives by a negative constant relative to single-destination trips. This is shown by the significant MD-constant variables and the insignificant MD-on-price and MD-on-freq variables. While the overall utility functions shift, the slopes of the utility functions remain equal across contexts. This has an interesting interpretation in random utility theory. The alternative specific constants can be viewed as the average impact of the unobserved utility on the alternatives (Hensher, Rose, and Greene 2005). This suggests that the important determinants of travel mode choice from the single- versus multidestination point of view were not captured by our model's attributes; rather their effects were captured by the MD constants. Variables that should be included in the future are affective factors such as a sense of freedom or other functional factors such as a degree of flexibility (Anable and Gatersleben 2005). The differences in trip context are more likely to manifest through these attributes of travel modes.

Modal substitution is a source of conflict between LCCs and regional dispersal. There is evidence that a modal switch would occur from car to air even in situations when car may be the most suitable mode for the trip. The findings show that tourists experience disutility from flying when the trip involves travel beyond the gateway regions, that is, dispersal. This is shown by the negative MD-constant variables on air travel alternatives. In fact, the increase in utility sourced from a decrease in airfare from \$220 to \$150 is insufficient to offset the loss in utility of air travel due to the need to disperse (or simply put, the influence of context). However, in situations when the price decreases from \$220 to \$80, the gain in utility is sufficient to offset the disutility of context, ceteris paribus. For instance, Virgin Blue's utility increases by 1.16 when the price drops from \$220 to \$80 (see Results section), which is larger than the disutility of 1.03 caused by the shift in the choice scenarios from single-destination to multidestination travel. This suggests that in the presence of low airfares, multidestination trip arrivals by air will increase, because even if air travel may inconvenience tourists' travel on arrival, tourists are willing to trade off the inconvenience for the low price, regardless of the trip context. Thus, from this we can learn how LCC can introduce a greater mixture of tourists arriving by air. This consequently has the effect of reducing the bias that air modes have in bringing greater numbers of single-destination than multidestination travelers.

The results have a number of implications regarding the nature of the relationship between regional destinations and airlines as well as for the subsequent challenges for destination managers. First, the level of airfare is an important factor that determines whether mode choices cause conflicts between affordable air services and regional dispersal. When airfare levels are medium to high, the trip context effect dominates the utility gained from a decrease in fares. However, when airfares become low, tourists are much more likely to switch to air even in situations when car may be the most suitable form of transport for the trip. This implies a bypass of destinations (e.g., Port Macquarie in Figure 2) en route by those travelers making the switch from ground modes toward air. It is noted, however, that more research is needed to determine whether the accessing tourists who paid low airfares may use rental cars to visit the peripheral destinations or limit their travels to the gateway only. The extent to which this occurs will determine the net effects of affordable airfares on tourist dispersal, as well as on the region's tourism economy.

Second, in the presence of low airfares, multidestination trip arrivals by air will increase and that these travelers should be identified and targeted to encourage dispersal from the gateway. The consequences of direct and cheap air travel on rapid urbanization and congestions in tourism destinations have been documented in the tourism research literature (e.g., Papatheodorou 2002). In Australia, the spatial pattern of air travel demand is such that individual LCC services to peripheral regions within close proximity is not economically viable for the LCCs. Therefore, for those regions in the vicinity of the gateways, it is important to provide sufficient means of ground transport by which the demand for dispersal to the periphery is facilitated and enticed. Otherwise, increased congestion may appear in the gateway cities, causing the very problem that the Australian government aims to relieve (as outlined earlier in introduction).

Third, the results have implications for cooperative marketing and the developments of niche markets. Through travel mode choice, marketing promotion for multidestination trips in one area may induce an unintended yet favorable impact for the destinations en route. In our example, greater dispersal to the regions peripheral to Byron increases the attractiveness of driving the entire trip, which results in greater car travels along the Sydney–Byron corridor. This increases the likelihood of planned or spontaneous stopovers en route in regional centers such as Port Macquarie or Coffs Harbour, which belong to a different administrative boundary (for tourism) to Ballina and Byron (see Figure 2). Knowledge of the natural partners among regional destinations can help regional tourism organizations to mobilize marketing resources more effectively. This research has shown that the greater understanding of mode choice can help to identify the linkage patterns between two regions belonging to different geopolitical boundaries.

Fourth, the linkage patterns among regional destinations may change as a result of changes in airline services. It was shown previously that car travel benefits both the destinations en route and those peripheral to the gateway. However, when airfares are low, flying becomes a more attractive option, inducing tourists to bypass en route destinations while maintaining their visits to the periphery of the gateway. As a consequence of changes in airfares, what may have previously been a natural partnership between two regions may no longer be so, tilting toward that of competition than complementarity through modal substitution.

Fifth, the significance of the inertia effect indicates that there is a degree of rigidity in the willingness of tourists to switch modes. That is, tourists have the tendency to drive if they have driven to the destination before. Given that this study was undertaken in a static setting, the inertia effect can be interpreted as a short-run rigidity that draws parallel to the inelastic nature of demand for many goods and services in the short run but which is elastic in the long run. LCC proliferation is seen as a crucial step toward the development of air travel in tourism much in the same way as the development of the charter sector and aviation deregulation (Bieger and Wittmer 2006). Quiggin (1997) argued that one effect of aviation deregulation in Australia was the demonstration effect to travelers that air travel was no longer a luxury reserved only for the affluent travelers. Hence, in the long run, greater flexibility in substitutions between those two modes (car and air) can perhaps be expected.

Limitations and Further Research

One surprising result from this study was the lack of significance of the time attributes. The authors propose the following explanation. The utility function specified for each mode in the MNL model was made of each mode's attributes, that is, cross effects were not estimated with an MNL model (see equation 2). Thus, in specifying the time attribute in the experiment, the attribute levels varied in the time specific to that mode, for example, car's time varied from 7 to 11 hours (a variation of up to 4 hours) whereas air modes varied from 1.5 to 3.5 hours (2 hours' variation). It is plausible that the study participants were not responsive to differences in time because air is still the fastest mode by more than 3 hours when the upper and lower bounds for air and private car times are compared. This absolute time advantage of air travel holds even when out-of-vehicle time is added. As a matter of fact, interregional mode choice studies, such as Hensher (1997), have shown that leisure tourists compared with business travelers are less responsive to time but much more in price. Thus, our result is not so surprising in this respect. Furthermore, this result may be a reflection of the differences in tourists' behavior compared to other choice contexts, as noted by Debbage (1991) in the study of tourists' spatial behavior in the Bahamas, "research in other fields (intra-urban commuting patterns, consumer shopping behaviour, and residential location decisions) may not be directly transferable to tourist behaviour" (p. 266). Thus, more empirical investigation into the sources that generate these differences is an important research issue for the future.

As for other attributes, the schedule-frequency nested attribute specification may be appropriate for future tests. This specifies a relationship between the two attributes that will yield an output that is more amenable to interpretation relative to the case when they are independently specified. For instance, rather than an independent specification of morning arrival and three flights a day, a nested schedule-frequency attribute has the interpretation "a morning arrival flight of the three flights available."

The lack of observed choices for alternatives such as coach, train, and rental car are likely to have contributed to some inaccuracies in the respective alternatives' parameter estimates. While a choice-based sampling strategy was considered, this necessarily is a strategy for revealed preference data collection. Moreover, some modes on Sydney–Byron segment were favored by a particular group of tourists, for example, the popularity of coach services by international backpackers, who were not the subjects of this study. Although tourist data at the level of Sydney–Byron is not readily available, recent statistics released by the Australian federal government agency, Tourism Research Australia, shows that only 7% of domestic overnight visitors to Byron arrive on modes other than car (74%) or air (19%)[4]. Thus, small sample sizes for the other modes are consistent with the true market share of the population.

For future work, this research can be extended in a number of ways. For instance, the number of alternatives can be reduced to air and car, and specify a tree (nested) structure that examines the choice of transport mode *at* the destination, given the mode used to access the destination. Such specification will allow a comparison of a choice between drive only and fly and then drive. Capitalizing on fly–drive market is an important challenge for the destinations located peripheral to the gateway and may also offer opportunities for the destinations en route as travelers may travel back home in the hired vehicle.

Our results show, in regards to dispersal, low airfares can increase the mix of tourists arriving by air. If the LCCs remain low cost primarily to offer low fares (e.g., abstain from providing business class), and if Ballina–Byron is served by at least two competing airlines, presumably then ticket-discounting practices will continue on this corridor. Since the availability of ground travel modes at the destination is critical for tourists' spatial behavior at the destination, the provision of transport at the destination or gateway will become an important challenge for destination managers. Regional tourism organizations and government agencies responsible for the management and distribution of benefits from tourism for their respective tourism regions would require more information on the level of influence a better local transport system might have on the dispersal of tourists and the associated economic benefits. For these problems, the nested structure mentioned above can include other alternative travel modes such as public bus services, shuttle buses, and rental cars. When the stated choice experiment is applied in such a context, we can generate information on the effect of ground travel mode availability on the propensity of tourists arriving by LCCs to venture beyond the gateways, so as to evaluate the impact of regional transport infrastructure on tourist dispersal. The authors are currently pursuing this line of research in Australia.

Conclusions

This article has analyzed the relative importance of travel mode attributes and trip characteristics on mode choices of leisure tourists on the Sydney to Byron–Ballina travel corridor in Australia. The results empirically demonstrated that travel mode choice can be an avenue of conflict between LCC service proliferation and tourists' regional dispersal. The study found that when airfares become low, tourists are much more likely to switch to air even in situations where car may be the most suitable mode of dispersal for the trip. Thus, when airfares are low, the complementary relationship between two regional destinations that stem from the use of cars along the travel itinerary may reverse to that of conflict, as a result of modal substitution from car toward air travel. The results have shown that trip context triggers a shift in the utility function but does not induce a change in the slope of the utility functions. It was argued that this supports the case for the inclusion of qualitative and affective factors of travel mode choice in future studies.

Although Australian data were used in this study, the results should be of interest to regional destinations worldwide. This is particularly the case for those destinations that are geographically large and where choice between a domestic flight and alternative ground transportation is a real option for potential travelers. The issues surrounding the implications of the growth of LCC for towns, which have traditionally relied on ground transportation for accessing tourists, have been underresearched despite their substantial importance to regional destination managers. The issues addressed in this article go at least some way to filling this research gap.

Appendix

Single-Destination Model		Multidestination Model		
Variables	Coefficient	Variables	Coefficient	*t* Statistic
Constant				
Car	0.739	Car	1.141**	–0.437
Coach	0.125	Coach	–1.536	1.093
DJ	1.133*	DJ	0.421	0.760
GC	0.333	GC	–0.961	1.196
JQ	1.288**	JQ	0.252	1.104
REX	0.721	REX	–0.057	0.793
RC	0.181	RC	–0.312	0.586
Price: high price				
Car	0.062	Car	–0.068	0.612
Coach	–0.804	Coach	–0.620	–0.378
DJ	–0.580***	DJ	–0.421***	–0.746
GC	–0.223	GC	–0.781**	1.260
JQ	–0.723***	JQ	–0.502***	–0.979
REX	–0.729***	REX	–0.617***	–0.373
RC	–0.007	RC	–0.201	0.446
Price: medium price				
Car	0.136	Car	–0.118	1.236
Coach	–0.497	Coach	0.474	–1.090
DJ	–0.052	DJ	0.034	–0.431
GC	–0.586**	GC	–0.206	–0.903
JQ	0.020	JQ	–0.220	1.164
REX	–0.199	REX	–0.068	–0.501
RC	0.056	RC	0.069	–0.032

Note: DJ = Virgin Blue; GC = Gold Coast; JQ = Jetstar; REX = Regional Express; RC = rental car.
**p* = .1. ***p* = .05. ****p* = .01.

Notes

1. Virgin Blue commenced Sydney–Port Macquarie services in early 2008.
2. Based on a 3-year average up to June 2007.
3. The control variables are effects coded, for example, *price* represents high price ($220) and $price_1$ represents medium-level price ($150). The coefficient for the low-level price ($80) is obtained by [–(coefficient of price + coefficient of $price_1$)].
4. Based on a 3-year average up to June 2007.

References

Anable, Jillian, and Birgitta Gatersleben (2005). "All Work and No Play? The Role of Instrumental and Affective Factors in Work and Leisure Journeys by Different Travel Modes." *Transportation Research Part A: Policy and Practice*, 39 (2/3): 163-81.

ANOP Research Services (2005). "Motorists' Attitudes 2005 ANOP National Survey Prepared for the Australian Automobile Association." Retrieved August 31, 2006, from http://www.aaa.asn.au/publications/polls.php

Australian Automobile Association (2005). "Australian Road Assessment Program Risk Maps." Retrieved November 30, 2006, from http://www.ausrap.org/ausrap/riskmaps.htm

Ben-Akiva, Moshe, and Steven Lerman (1985). *Discrete Choice Analysis: Theory and Application to Travel Demand*. Cambridge, MA: MIT Press.

Bieger, Thomas, and Andreas Wittmer (2006). "Air Transport and Tourism—Perspectives and Challenges for Destinations, Airlines and Governments." *Journal of Air transport management*, 12 (1): 40-46.

Borooah, Vani K. (2002). *Logit and Probit: Ordered and Multinomial Models* (Sage University Papers Series on Quantitative Applications in the Social Sciences). Thousand Oaks, CA: Sage.

Bureau of Transport and Regional Economics (BTRE) (2007). "Transport Statistics." Retrieved January 10, 2007, from http://www.btre.gov.au

Centre for Asia Pacific Aviation (CAPA) (2006, October 3). *Peanuts: The Low Cost Airline Weekly*, 138.

Crouch, Geoffrey I., Harmen Oppewal, Twan Huybers, Sara Dolnicar, Jordan J. Louviere, and Timothy Devinney (2007). "Discretionary Expenditure and Tourism Consumption: Insights from a Choice Experiment." *Journal of Travel Research*, 45 (3): 247-58.

Department of Industry, Tourism and Resources (DITR) (2003). "Tourism White Paper—A Medium to Long Term Strategy for Tourism." DITR, Canberra, Australia.

Debbage, Keith (1991). "Spatial Behavior in a Bahamian Resort." *Annals of Tourism Research*, 18: 251-68.

Greene, William, and David A. Hensher (2003). "A Latent Class Model for Discrete Choice Analysis: Contrasts with Mixed Logit." *Transportation Research Part B: Methodological*, 37: 681-98.

Hensher, David A. (1997). "A Practical Approach to Identifying the Market Potential for High Speed Rail: A Case Study in the Sydney-Canberra Corridor." *Transportation Research Part A: Policy and Practice*, 31 (6): 431-46.

Hensher, David A., John M. Rose, and William Greene (2005). *Applied Choice Analysis: A Primer*. Cambridge, UK: Cambridge University Press.

Koppelman, Frank S., and Vaneet Sethi (2005). "Incorporating Variance and Covariance Heterogeneity in the Generalised Nested Logit Model: An Application to Modelling Long Distance Travel Choice Behaviour." *Transportation Research Part B: Methodological*, 39 (9): 825-53.

Lawton, Thomas C. (2002). *Cleared for Take-Off: Structure and Strategy in the Low Fare Airline Business*. Aldershot, UK: Ashgate.

Lew, Alan, and Bob McKercher (2002). "Trip Destinations, Gateways and Itineraries: The Example of Hong Kong." *Tourism Management*, 23 (6): 609-21.

Lew, Alan, and Bob McKercher (2006). "Modeling Tourist Movements: A Local Destination Analysis." *Annals of Tourism Research*, 33 (2): 403-23.

Louviere, Jordan J., and David A. Hensher (1983). "Using Discrete Choice Models with Experimental Design Data to Forecast Consumer Demand for a Unique Cultural Event." *Journal of Consumer Research*, 10 (3): 348-61.

Louviere, Jordan J., David A. Hensher, and Joffre D. Swait (2000). *Stated Choice Methods: Analysis and Application*. Cambridge, UK: Cambridge University Press.

Lue, C. C., J. L. Crompton, and D. R. Fesenmaier (1993). "Conceptualization of Multi-Destination Pleasure Trips." *Annals of Tourism Research*, 20: 289-301.

Lumsdon, Les, and Stephen J. Page (2004). "Progress in Transport and Tourism Research: Reformulating the Transport-Tourism Interface and Future Research Agendas." In *Tourism and Transport: Issues and Agenda for the New Millennium*, edited by Les Lumsdon and Stephen J. Page. London: Elsevier, pp. 1-28.

Meyer, John R., and Clinton V. Oster (1987). *Deregulation and the Future of Intercity Passenger Travel*. Cambridge, MA: MIT Press.

Morley, C. (1994). "Discrete Choice Analysis of the Impact of Tourism Prices." *Journal of Travel Research*, 33 (2): 8-14.

Moscardo, Gianna, and Phillip Pearce (2004). "Life Cycle, Tourist Motivation and Transport: Some Consequences for the Tourist Experience." In *Tourism and Transport: Issues and Agenda for the New Millennium*, edited by Les Lumsdon and Stephen J. Page. London: Elsevier, pp. 1-28.

Mules, Trevor, and Twan Huybers (2002). *Substitution between Tourism Destinations: An Application of Discrete Choice Modelling*. Sustainable Tourism Cooperative Research Centre Project 43001.

Nicolau, Juan L., and Francisco J. Mas (2006). "The Influence of Distance and Prices on the Choice of Tourist Destinations: The Moderating Role of Motivations." *Tourism Management*, 27 (5): 982-96.

Oppermann, Martin (1995). "A Model of Travel Itineraries." *Journal of Travel Research*, 33 (4): 57-61

Oppewal, Harmen, and Harry Timmermans (1991). "Context Effects and Decompositional Choice Modelling." *Papers in Regional Science*, 70 (2): 113-31.

Page, Stephen (2005). *Transport and Tourism: Global Perspectives*. 2nd ed. Harlow, Essex, UK: Pearson Education

Papatheodorou, Andreas (2002). "Civil Aviation Regime and Leisure Tourism in Europe." *Journal of Air Transport Management*, 8 (6): 381-88.

Pina, Albaladejo I., and M. T. Diaz Delfa (2005). "Rural Tourism Demand by Type of Accommodation." *Tourism Management*, 26 (6): 951-59.

Quiggin, John (1997). "Evaluating Airline Deregulation in Australia." *The Australian Economic Review*, 39 (1): 45-56.

Rizzi, Luis I., and Juan de Dios Ortuzar (2003). "Stated Preference in the Valuation of Interurban Road Safety." *Accident Analysis and Prevention*, 35: 9-22.

Road Traffic Authority (RTA) (2006). "Pacific Highway Upgrade." New South Wales, Australia: RTA. Retrieved November 30, 2006, from http://www.rta.nsw.gov.au/constructionmaintenance/majorconstructionprojectsregional/pacifichighwayupgrade/index.html

Stewart, Susan, and Christine Vogt (1997). "Multi-destination Trip Patterns." *Journal of Travel Research*, 33: 57-61.

Taplin, John, and Carmel McGinley (2000). "A Linear Program to Model Daily Car Touring Choices." *Annals of Tourism Research*, 27 (2): 451-67.

Tideswell, Carmen, and Bill Faulkner (1999). "Multidestination Travel Patterns of International Visitors to Queensland." *Journal of Travel Research*, 37: 364-74.

Timmermans, H. J. P., and R. G. Golledge (1990). "Applications of Behavioural Research on Spatial Problems, II: Preference and Choice." *Progress in Human Geography*, 14 (3): 311-54.

Tourism Research Australia (TRA) (2007). "Local Government Area Profiles." Retrieved July 1, 2008, from http://tra.australia.com/regional.asp

Tourism Transport Forum (TTF) (2002). *Keeping the Bush in the Game—New Approaches to Making Regional Tourism More Competitive*. Prepared by Hocking Research and Consulting for Tourism Transport Forum.

Williams, George (2002). *Airline Competition: Deregulation's Mixed Legacy*. Aldershot, Hants, UK: Ashgate.

Whyte, Randell, and Bruce Prideaux (2007). "Impact of Low Cost Carriers on Regional Tourism." In *CAUTHE*, *Proceedings of the 17th Annual Conference*, edited by I. McDonnell, S. Grabowski, and R. March. Sydney: University of Technology [CD-ROM].

Wu, Cheng-Lung, and Dean Carson (2008). "Spatial and Temporal Tourist Dispersal Analysis in Multi Destination Travel." *Journal of Travel Research*, 46 (3): 311-17.

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