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Habit persistence in tourist sub-industries

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ABSTRACT

Habit persistence across six U.S. tourism sub-industries is estimated using a dynamic forward looking model. Estimates show that habits largely determine current expenditure for air transportation, shopping, accommodation, and other transportation. Estimated uncompensated price elasticities find that air transport and accommodation are price elastic in the short-run and long-run. Shopping is price inelastic in the short-run but price elastic in the long-run. An important result is that air transportation and other transportation are elastic substitutes for price changes in air transportation but inelastic substitutes for price changes in other related transportation. Estimates show that expenditure across most of the tourist sub-industries is closely related because they are gross complements. Food and beverages are necessities, price inelastic, and relatively unresponsive to changes in expenditure across the sub-industries. The estimates show that policy makers and tourist marketing should account for habit persistence and differences between the short-run and long-run.

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Habit formation; short-run and long run estimates; tourist sub-industries

1. Introduction

Consumer habits and the business cycle have an impact on tourism marketing strategies, public tourism policy, and revenue for the tourism industry. To evaluate the short-term and long-term impacts that consumer choices have on the tourism industry, many studies provide estimates of own-price elasticities, cross-price elasticities of substitution, and budget elasticities of demand. Recent studies like Croes, Ridderstaat, and Rivera (2018) found that the business cycle has a substantial impact on tourism demand and Mohammed (2019) finds that tourism imports are generally income and price elastic. The meta-analysis of Nunkoo, Seetanah, Jaffur, Moraghen, and Sannassee (2020) analyzed the relationship between economic growth and tourism and found support for the tourism-led growth hypothesis. Peng, Song, Crouch, and Witt (2015) found that dynamic models that include a lagged dependent variable to model tourist loyalty and "word of mouth", for example, Garín-Munoz (2006), Naude and Saayman (2005), Seetaram (2010), and Liu (2019), produce more elastic price and income elasticities. These studies typically focus on a single measure of tourism and fail to capture tourist habit formation across tourist-sub industries. Modelling habit formation is important for the impact on tourist revenue

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by sector because habits are likely to differ over tourist sub-industries such as transportation, accommodation, food, recreation, and other tourist activities.

Tourism in the United States is a significant part of the service sector. International and domestic tourism generated over one trillion dollars from the more than one billion of person-trips, US Travel Association (2019). Tourist-related employment generates millions of labor-intensive jobs and is often one of the largest employer industry in many states. Leisure travel in the U.S. accounts for about 80% of all domestic travel and an important part of the tourist industry. Some major attractions for both domestic and international travelers are the national parks, amusement and theme parks, entertainment, shopping and culinary choices. Food services and lodging generate significant revenue.

Expenditure across different tourist sub-industries like accommodation, food, sightseeing, transport, shopping, entertainment, and miscellaneous expenditure have been analyzed by Divisekera and Deegan (2010) for Ireland, Divisekera (2010) for Australia, Wu, Li, and Song (2012) for Asian tourism, Ahn, Baek, Lee, and Lee (2018) for Korea, and Aratuo and Etienne (2019) for the United States. These studies do not focus on consumer habits but have varying degrees of substitution, complementarity, and budget elasticities across tourist commodities which have important consequences for tourist marketing, revenue, and policy.

Habits often impact expenditure decisions of consumers. Evidence of habit formation is especially prevalent for commodities like tobacco and alcohol products as in Gallet (2007), Zhen, Wohlgenant, Karns, and Kaufman (2011), Fogarty (2010), Nelson (2014), Koksal and Wohlgenant (2016), Alexander and Neill (2017), and Goel and Saunoris (2018). These studies typically estimate a parameter that captures the degree of habit formation for tobacco and alcohol products. Relatively few studies on tourism focus directly on multiple parameter estimates for habit formation across sub-tourist industries, see Bakkal (1991), Divisekera (2003), and Lyssiotou (2000), and Cazanova, Ward, and Holland (2014).

This study examines the impact of habit formation across each of six U.S. tourist sub-industries using the rational dynamic approach of Spinnewyn (1981), Muellbauer and Pashardes (1992), Pashardes (1986), Lyssiotou (2000), Zhen et al. (2011), and Koksal and Wohlgenant (2016). In the rational dynamic habit formation approach, the impact of habits on current tourism expenditure is based on passed tourism expenditure and desired future service flows from tourism expenditure. Habit formation on current tourism expenditure can range from no impact on current expenditure to a significant impact on current expenditure due to much habit formation. A dynamic Almost Ideal Model demand system is used to estimate habit formation for each of the six sub-tourist industries. The impact that current tourism expenditure has on future utility allows for intertemporally rational consumer behavior where current preferences for tourism are based on past expenditures captured through preference endogeneity. The data are from Aratuo and Etienne (2019) who emphasize the importance of analyzing six sub-tourist industries because of the interaction between sub-sectors and the business cycle. They find that gross domestic product co-moves with accommodation and food and beverages but does not cointegrate with the remaining four sub-industries. They only find evidence of a long-run relationship between other transportation and air transportation and short-run evidence of unidirectional causality from GDP to the six sub-industries.

The estimates find that habits account for 33% of current tourist air transportation expenditure and around 24% for the three sub-tourist industries of shopping, accommodations, and other transportation. About 10% of expenditure on food and beverage and recreation and entertainment expenditure is determined by habits. Estimated uncompensated own-price elasticities are elastic for air transportation but inelastic for the remaining tourist sub-industries. In the long-run, shopping becomes elastic. While air transportation and other transportation are substitutes for each other, the majority of the remaining pairwise tourist sub-industries are gross complements. Based on the estimated budget elasticities, recreational expenditure is classified as a luxury in both the short-run and long-run. Air transportation becomes a luxury good in the long-run. The remaining tourist sub-industries are estimated as necessary goods. Tourist sub-industries that are relatively habit forming, necessities in use, or price inelastic tend to generate a consistent stream of revenue over time and can be a main target for tourist marketing and policy. In contrast, revenue is likely to decline during economic downturns for tourist sub-industries that have less evidence of habit formation, are luxuries in use, or are price elastic.

The remainder of the paper is as follows. Section 2 outlines the dynamic model of habit formation with the data being discussed in section 3, and the estimation and results examined in section 4. The last section concludes the paper and provides policy recommendations.

2. A dynamic flexible demand system

The forward looking dynamic model of Muellbauer and Pashardes (1992) and Lyssiotou (2000) is used to model habit formation where current expenditure on tourism (q_{it}) is determined by some desired level of tourism service flows ($\tilde{q}_{it}$) and from an amount of past spending on tourism (q_{it-1}):

$$q_{it} = \tilde{q}_{it} + \theta_i q_{it-1} \tag{1}$$

for i = 1, . . ., n, and $0 \leq \theta_i \leq 1$ captures habit formation. Habit formation has a larger impact on current tourism expenditure as $\theta_i \rightarrow 1$ and no impact of habit formation when $\theta_i = 0$. Preference endogeneity across sub-industry *i* is captured by the estimate of θ_i. The rational dynamic model has the user cost of a tourist sub-industry capturing the future costs of habit formation. Under static expectations and a real interest rate (r), Spinnewyn (1981) and Muellbauer and Pashardes (1992) show that the user cost is:

$$\tilde{p}_{it} = \left(\frac{1+r}{1+r-\theta_i}\right) p_{it} = \lambda_i p_{it} \tag{2}$$

with p_{it} the price of tourist sub-industry *i* in period t and $\lambda_i = \left(\frac{1+r}{1+r-\theta_i}\right)$. Maximizing utility $u(\tilde{q}_{1t}, \ldots, \tilde{q}_{nt})$ subject to the budget constraint $\tilde{y}_t = \sum_i \tilde{p}_{it}\tilde{q}_{it}$, the rational dynamic forward looking model of Muellbauer and Pashardes (1992) gives:

$$q_{it} = g_{it}(\tilde{p}_t, u_t) + \theta_i q_{it-1} \tag{3}$$

which are converted into budget share equations w_{it} using $p_{it}/\sum_i p_{it}q_{it}$:

$$w_{it} = \tilde{w}_{it}(\tilde{y}_t/\lambda_i y_t) + \theta_i q_{it-1}(p_{it}/y_t) \tag{4}$$

where $w_{it} \equiv p_{it}q_{it}/y_t$ and $\tilde{w}_{it} \equiv \tilde{p}_{it}\tilde{q}_{it}/\tilde{y}_t$. Using quarterly data, and the user cost the dynamic Almost Ideal Model (AIDS) model is:

$$q_{it} = \left[\propto_i + \sum_j \gamma_{ij} \ln \tilde{p}_{jt} + \beta_i(\ln \tilde{y}_t - \ln \tilde{P}_t)\right]\left(\frac{\tilde{y}_t}{\lambda_i p_{it}}\right) + \theta_i q_{it-4} \tag{5}$$

where $\ln \tilde{P}_t = \propto_0 + \sum_i \propto_i \ln \tilde{p}_{it} + \frac{1}{2}\sum_i \sum_j \tilde{p}_{it}\tilde{p}_{jt}$. Adding up requires $\sum_i \alpha_i = 1$, $\sum_i \beta_i = 0$, $\sum_i \gamma_{ij} = 0 for all j, homogeneity requires $\sum_j \gamma_{ij} = 0$ for all i, and symmetry requires $\gamma_{ij} = \gamma_{ji}$ for all i and j and these across equations restrictions are imposed when estimating the system of equations. The budget share equations are:

$$w_{it} = \left\{\left[\propto_i + \sum_j \gamma_{ij} \ln \tilde{p}_{jt} + \beta_i(\ln \tilde{y}_t - \ln \tilde{P}_t)\right]\left(\frac{\tilde{y}_t}{\lambda_i p_{it}}\right) + \theta_i q_{it-4}\right\} p_{it}/y_t + \mu_{it} \tag{6}$$

and are used in the estimation to reduce heteroscedasticity and μ_{it} is a random error term. Following Lyssiotou (2000), the uncompensated elasticity of demand for tourist sub-industry *i* in period t is:

$$e_{ijt} = \left(\frac{1}{w_{it}}\right)\left[\xi_{ij}\left(\frac{\tilde{y}_t}{\lambda_i y_t}\right) + d_{ij}\theta_i\left(\frac{q_{it-1}}{y_t}\right)\right] - d_{ij} \tag{7}$$

where $\xi_{it} \equiv \frac{\partial \tilde{w}_{it}}{\partial \ln p_{jt}}$ with $d_{ij} = 1$ for i = j and $d_{ij} = 0$ for i ≠j. Since changes in log p_{jt} during period t impact tourist expenditure for k periods, the elasticity of q_{it+k} with respect to p_{jt} is:

$$e_{ijk} = \theta_i^k e_{ijt}(q_{it}/q_{it+k}) \tag{8}$$

giving the long run elasticity as k→∞:

$$e_{ij}^* = e_{ij}/(1-\theta_i) \tag{9}$$

with $q_{it} = q_{it+k} = q_i$ for all k and r = 0. The budget elasticities evaluated with $q_{it} = q_i$ for all t are:

$$e_i = (1-\theta_i)\left(\frac{\beta_i}{w_i} + 1\right) \tag{10}$$

giving long-run budget elasticities as in Lyssiotou (2000):

$$e_i^* = e_i/(1-\theta_i) \tag{11}$$

3. Tourism data

The quarterly real tourism data have been used by Tang and Jang (2009) and Aratuo and Etienne (2019) and are from the Bureau of Economic Analysis (BEA). The six tourism industries used by Aratuo and Etienne (2019) are air transportation, food and beverage, recreation and entertainment, shopping, travelers' accommodations, and other transportation-related commodities. Food and beverages are transactions in restaurants and

places that sell food and beverages. Recreation and entertainment cover leisure-time activities like gambling, amusement parks and arcades, museums, historical sites, skating rinks, ski lifts, day camps, sporting goods, and so on. Shopping are expenditure by tourists of nondurable commodities except gasoline. Travelers' accommodations includes hotels, motels, and all other forms of lodging used by tourists. Rail, water transport, intercity bus, local bus, taxi, car rental, travel arrangement and reservation services, gasoline, and so on are part of other transportation. Tourist expenditures across all six industries declined from 2001–2003 and 2009–2011 with the largest decreases for accommodations and air transportation industries. The real tourism output are estimates of domestically produced goods and services sold to travelers and the seasonally adjusted quarterly real tourism data cover the period 1998.1 through 2017.3. Aratuo and Etienne (2019) provide a detailed explanation for each sub-industry. The estimates may be more representative of local travel since domestic tourism is about 80% of total U.S. tourism (OECD, 2018).

4. Estimation and results

The share equations were estimated using TSP International 5.1 FIML with the across equations restrictions imposed to ensure adding up, homogeneity, and symmetry. The parameter estimates are in Table 1 and most of the parameters are statistically significant at the 1% or 5% level. The model fits the data well with relatively high R-squares, low root-mean-square errors, and the Berndt and Savin (1975) test for fourth order serial correlation with the across equation restrictions imposed fail to detect serial correlation.

The parameters measuring habit persistence (θ_i) are all statistically significant at the 1% level. The largest degree of habit persistence is for air transportation. Habits account for 33% of current tourism expenditure on air transportation, and around 24% for the three sub-tourist industries of shopping, accommodations, and other transportation. For food and beverage, and recreation, habits account for only 11% and 10% of tourism expenditure, considerably less than the other tourism sectors. Lyssiotou (2000) also finds

Table 1. Parameter estimates.

	α_i	β_i	γ_{i1}	γ_{i2}	γ_{i3}	γ_{i4}	γ_{i5}	γ_{i6}	θ_i
Accommodations	0.1933	−0.0051	0.0384	−0.0008	−0.0076	−0.0243	−0.0041	−0.0016	0.2428
	0.0555	**0.0010**	**0.0198**	**0.0002**	**0.0023**	**0.0056**	**0.0030**	**0.0004**	**0.0589**
Food and beverage	0.1231	−0.0812	−0.0008	0.0429	−0.0133	−0.0013	0.0414	−0.0688	0.1129
	0.0847	**0.0275**	**0.0003**	**0.0101**	**0.0038**	**0.0013**	**0.0098**	**0.0132**	**0.0343**
Shopping	0.1938	−0.0081			0.0454	−0.0022	0.0013	−0.0236	0.2499
	0.0598	**0.0025**			**0.0110**	**0.0003**	**0.0012**	**0.0059**	**0.0391**
Air transportation	0.2232	0.0234				0.0655	−0.0439	0.0062	0.3258
	0.0426	**0.0054**				**0.0203**	**0.0520**	**0.0009**	**0.0513**
Recreation	0.1409	0.0796					0.0343	−0.0290	0.1025
	0.1090	**0.0375**					**0.0079**	**0.0292**	**0.0233**
Other transportation	0.1256	−0.0085						0.1168	0.2398
	0.0356	**0.0120**						**0.0374**	**0.0618**

[a]Estimation using TSP International 5.1 FIML.
[b]Standard errors are boldface and most of the parameters are statistically significant at the 5% or 10% level.
[c]R-squares Food and beverage (0.837), Shopping (0.824), Air transportation (0.868), Recreation (0.856), Other transportation (0.841).
[d]Food and beverage (0.0243), Shopping (0.0122), Air transportation (0.0143), Recreation (0.0264), Other transportation (0.0354)
[e]Test for serial correlation P-value = 0.868, Berndt and Savin (1975).

important evidence of habit persistence for international tourism of 36% for France, 24% for both USA–Canada and Spain–Portugal, and a smaller degree of 18% for Greece–Italy.

The uncompensated price elasticities calculated at the mean of the data are statistically significant at the 5% level and are in Table 2. Tourism expenditure on air transportation is the only sub-industry that is price elastic (−1.255). Expenditure on air transportation is often a significant share of travel expenditure and tends to be more price elastic, especially when consumers have less expensive alternative options like cars, rail, and other forms of transportation. The meta-analysis of Peng et al. (2015) found that the average own-price

elasticity estimate for international air transportation was inelastic at −0.920 while the estimate of Divisekera (2010) is inelastic at −0.52 and Ahn et al. (2018) elastic at −3.40. The price elastic estimate for air transportation may also be due to accounting for habit persistence. Other modes of transport are relatively price inelastic at −0.430 and similar to Divisekera (2010). Certain local attractions may not be accessible by air transportation so that other transportation may become price inelastic. Tourism expenditure on food and beverages is the most price inelastic (−0.217) which is expected as these commodities are typically considered necessary expenditures. However, Ahn et al. (2018) found evidence of elastic demand for food and beverages. Shopping expenditure in this study includes a wide range of nondurable goods that are typically less costly items. For shopping, the price elasticity is inelastic at −0.876 and slightly less inelastic than Divisekera (2010). Wu et al. (2012) found that shopping can be elastic or inelastic in demand for their analysis of tourist spending by Chinese, Japanese, or Taiwanese tourists and Ahn et al. (2018) have an elastic demand for Korean tourism. Accommodation is a necessary expenditure and often price inelastic. For accommodations, the price elasticity is −0.675 and similar to the average price elasticity for accommodation at −0.727 of Peng et al. (2015), −0.52 of Divisekera (2010), −0.37 of Wu et al. (2012), and Ahn et al. (2018) −0.5. For recreation and entertainment, the price elasticity is −0.654. Since the data are more representative of local U.S. travel, some expenditure on recreation and entertainment may involve relatively short trips and consumer demand may be price inelastic. The inelastic estimate may reflect that the recreational and entertainment tourist sub-industry consists of a range of activities from typically more expensive

Table 2. Uncompensated price elasticities.

	Accommo-dations	Food and beverage	Shopping	Air transportation	Recreation	Other transport
Accommodations	−0.675	−0.329	−0.187	−0.593	−0.207	−0.328
	0.193	**0.156**	**0.193**	**0.139**	**0.067**	**0.063**
Food & beverage	−0.099	−0.217	−0.133	−0.103	0.077	−0.188
	0.019	**0.062**	**0.113**	**0.035**	**0.024**	**0.201**
Shopping	−0.033	−0.088	−0.876	−0.067	0.383	−0.023
	0.011	**0.099**	**0.250**	**0.016**	**0.116**	**0.008**
Air transportation	−0.729	−0.033	−0.218	−1.255	−0.302	1.347
	0.208	**0.043**	**0.066**	**0.180**	**0.099**	**0.630**
Recreation	−0.264	0.093	0.143	−0.109	−0.654	−0.017
	0.087	**0.074**	**0.129**	**0.040**	**0.249**	**0.008**
Other transportation	−0.427	−0.247	−0.259	0.736	−0.088	−0.430
	0.080	**0.295**	**0.264**	**0.137**	**0.044**	**0.112**

[a] ε_{ij} is the long run unconditional elasticity of substitution between goods i and j for a price change in good j.
[b] Standard errors are boldface.

options like amusement parks, museums, ski lifts, and gambling that tend to be more price elastic to typically less costly activities like arcades, historical sites, skating rinks, and sporting goods that are often less price elastic. The price elasticity estimate for recreation and entertainment is less inelastic than the entertainment elasticity estimates for the U.S., New Zealand, Japan, and UK. of Divisekera (2010) but Ahn et al. (2018) has an elastic demand for Korean tourism.

The cross-price elasticities show that air transportation and other transportation are elastic substitutes for price changes in air transportation (1.347) but inelastic substitutes for price changes in other related transportation (0.736). In times of increasing prices for air transportation, tourism marketing may be better focused on other transportation instead of air transportation. There is generally little other evidence of substitution across tourist sub-industries. Shopping and recreation are inelastic substitutes for each other while food and recreation are highly inelastic substitutes for each other as in Divisekera (2010).

The remaining pairwise tourist sub-industries are all complementary in use. The estimated cross-price elasticities find air transportation and accommodation to have the highest degree of complementarity in use. Food and beverage are complements in use for changes in the price of accommodations (−0.329) but less so for changes in the price of food and beverage

(−0.099). Estimated cross-price elasticities for shopping and the other tourist sub-industries are generally highly inelastic. In contrast, Wu et al. (2012) found that shopping, accommodation, and meals are substitutes using data from Hong Kong. Estimates show that other forms of transportation and accommodation are also complements in use. Aggregate estimates across four countries from Divisekera (2010) find accommodation, food, transportation, shopping, and entertainment as gross complements. Ahn et al. (2018) only found a statistically significant relationship of complementarity between transportation and food. Divisekera and Deegan (2010) find food is a gross complement to logging, transportation, shopping, and sightseeing.

The short-run and long-run budget and price elasticities are statistically significant at the 1% level and displayed in Table 2 and Table 3. Habit persistence drives up the

Table 3. Price and budget elasticities.

	LR Price Elasticity (e^*_{ij})	SR Budget Elasticity (e_i)	LR Budget Elasticity (e^*_i)
Accommodations	−0.892	0.737	0.973
	0.235	**0.185**	**0.243**
Food and beverage	−0.244	0.374	0.422
	0.064	**0.127**	**0.112**
Shopping	−1.168	0.717	0.956
	0.255	**0.113**	**0.192**
Air transportation	−1.862	0.782	1.160
	0.346	**0.150**	**0.183**
Recreation	−0.729	1.500	1.671
	0.172	**0.500**	**0.515**
Other Transportation	−0.565	0.730	0.961
	0.132	**0.115**	**0.180**

[a]Long-run price elasticities are from equation (9)
[a]Long-run budget elasticities are from equation (11)

absolute values of the long-run price elasticities and most notably shopping is price inelastic in the short-run

(−0.876) but price elastic in the long-run (−1.168). This has important implications for investment in tourism because in a growing economy, tourists are likely to increase shopping expenditure in the long-run. Air transportation is considerably less price inelastic in the long-run and reflects the importance of a relatively high estimate of habit persistence and thus for tourist marketing in the growth phase of the business cycle. Recreation, which includes commodities that are relatively more expensive, and accommodation are also less price inelastic in the long-run.

The estimated budget elasticities have recreation as a luxury good in both the short-run and long-run. This is not surprising since recreation includes pricey goods like gambling, amusement parks, museums, historical sites, skating rinks, ski lifts, and day camps. Costa (1997) also found the estimated income elasticities above unity for recreational goods whereas Ahn et al. (2018) estimate is 0.87. Air transportation becomes a luxury good in the long-run with an elasticity of 1.160 and is lower than the average international air income elasticity of 1.605 from the meta-analysis of Peng et al. (2015) and also the income elastic estimate in Ahn et al. (2018).

Accommodation is close to being a luxury good in the long run with an estimated long-run budget elasticity of 0.973 which is slightly lower than Peng et al. (2015) who find that international accommodation has an income elasticity of 1.166. Wu et al. (2012) found that mainland Chinese tourists consider accommodation as a luxury good in Hong Kong but a necessity in other destinations. Divisekera (2010) and also finds accommodation to be a luxury good but Ahn et al. (2018) find accommodation in Korea a necessity and Divisekera and Deegan (2010) a necessity for British tourism. Food and beverages have inelastic estimated budget elasticities in both the short-run and long-run and are necessary goods as in Divisekera and Deegan (2010). In contrast, Wu et al. (2012) found that food consumption outside of hotels is a luxury good by Chinese tourists which is the same result using Korean data by Ahn et al. (2018). The estimated short-run and long-run budget elasticities find shopping to be a necessity as in Divisekera (2010) and Ahn et al. (2018). Divisekera and Deegan (2010) find shopping is a luxury good in their British model.

The estimated budget elasticities differ in the short-run and long-run and across tourist sub-industries. Tourist sub-industries can be necessities in the short-run but luxuries in the long-run. Homogenous estimates for tourism typically find some evidence that international travel is a luxury good, as in Crouch (1995), Smeral (2004), Li, Song, and Witt (2004), Garin-Munoz (2007), Li, Song, Cao, and Wu (2013), Dogru, Sirakaya-Turk, and Crouch (2017). Using a homogenous indicator for tourism masks information that is important for investment in tourism in the short-run and long-run as well as considering the impact on tourism expenditure from habit formation across industry sub-sectors. The estimated long-run budget elasticities of Lyssiotou (2000) and Li, Song, and Witt (2004) across countries were also more elastic compared to the short-run elasticities.

5. Conclusion

Habit persistence, price elasticities, and budget elasticities are estimated across six U.S. tourism sub-industries using a dynamic forward looking model. The estimates

show that current expenditure across the sub-tourist industries is largely determined through habit persistence. Habits account for a third of current expenditure for air transportation and around a quarter of current tourism expenditure on shopping, accommodation, and other transportation. In contrast, habits only account for around 10% of the two sub-industries of food and beverage, and recreation. Habit persistence has an important impact on the magnitude of both the short-run and long-run price and budget elasticities.

The estimated uncompensated price elasticities find that air transportation is the only sub-industry that is price elastic. In the long-run, air transportation becomes even more price elastic. While shopping is price inelastic in the short-run, it becomes price elastic in the long-run. Accommodation is price inelastic in both the short-run and long-run. Food and beverages are the most price inelastic in both the short-run and long-run, which is not surprising since they are necessities in use based on the estimated budget elasticities. Estimated cross-price elasticities find air transportation and other transportation are elastic substitutes for price changes in air transportation but inelastic substitutes for price changes in other related transportation. The only other sub-industry sectors where there was evidence of substitution were between shopping and recreation as well as food and beverage, and recreation. Estimates find that the remaining pairwise tourist sub-industries are all gross complements in use with air transportation and accommodation having the highest degree of complementarity in use. The budget elasticities show that recreation is a luxury good in both the short-run and long-run since more expensive types of recreation are included in this sub-industry. Air transportation becomes a luxury good in the long-run with accommodations close to being a luxury good in the long-run.

The estimates demonstrate the importance of accounting for habit persistence across tourist sub-industries, especially for policy makers and tourist marketing. Sub-tourist industries that have relatively high degrees of habit formation such as air transportation, accommodation, shopping, and other transportation should be targeted by marketing companies especially in times of economic growth. Private investment should create incentives to ensure consumers continue to develop habits for these sectors. Investment in tourism should consider differences in expenditure in the short-run and long-run. The estimated short-run and long-run budget elasticities find recreation to be a luxury good, which suggests that investment in tourist attractions near amusement parks, museums, and historical sites may generate more revenue during economic growth but are a less attractive investment during an economic slowdown. Air transportation is a necessity in the short-run but a luxury in the long-run, so the goal of long-term tourist investment in times of an economic expansion may be very beneficial. From the estimated cross-price elasticities, increases in air transportation expenditure during an expansion induce more spending on accommodation, food and beverages, shopping, and recreation which are complements in use, but a decline in expenditure for other transportation which is a substitute. The estimates for food and beverage expenditure are price inelastic and necessities in both the short-run and long-run and are thus relatively unresponsive to changes over the business cycle and generally to expenditure across the other tourist sub-industries. During an economic slowdown, the estimates suggest that tourist agencies should focus more on local tourism that does not typically require relatively high air transportation costs.

This research is limited to the six sub-tourist industries and the data are more representative of local U.S. tourism. Future analysis could use household data to gain further insight into habit formation and across more sub-tourist industries. The impact of habit formation involving international travel would also provide policy makers and private firms more insight into the types of tourist industries that can be targeted for future investment.

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Notes on contributor

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