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2010

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## Publication Details

Fernandes, C. & Karnik, A. 2010, 'Estimating elasticity of demand for tourism in Dubai?', *Tourism Analysis*, vol. 15, no. 1, pp. 57-69.

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## ESTIMATING ELASTICITY OF DEMAND FOR TOURISM IN DUBAI

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This study estimates the elasticity of demand for inbound tourism from 24 countries to Dubai with a view to understand the factors that influence this demand. The variables tourist arrivals, real per capita income, relative prices, and accommodation costs were tested for panel unit roots, and panel cointegration was employed to determine the specification of the models to be used. These models were estimated employing Fixed Effects and Random Effects approaches. The choice between Fixed and Random Effects models was made using the Hausman Test. Determinants of the elasticity of demand for the entire panel are consistent with theory. Within the subgroups there are differences. Arab countries and countries of the Indian subcontinent have an income elasticity of demand  $>1$ . Tourists from the developed countries seem to be the most sensitive to relative prices and the cost of accommodation is significant only for tourists from the Arab and Indian subcontinent countries. Income elasticity of tourism especially from Arab countries and countries of the Indian subcontinent is high, indicating that marketers should tailor their strategies accordingly. Accommodation costs have negative impact on demand, highlighting the need for more budget hotels. Relative increase in prices has a negative impact on tourism demand, highlighting the need to control domestic inflation.

Key words: Tourism elasticity of demand; Dubai tourism demand; Dubai tourism

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### Introduction

The United Arab Emirates (UAE) is a federation of seven Emirates with Dubai, perhaps, the most well known thanks to its iconic tourism projects. Burj Dubai (the world's tallest tower), The Palm (palm-shaped man-made islands that can be seen even from outer space), Burj Al Arab (the sail boat-shaped hotel in the sea that is also the world's tallest hotel), SkiDubai (an indoor ski resort), and the Dubai Shopping Festival when the country opens its doors to over 3 million tourists

over a 45-day period are some of Dubai's well-known tourist attractions. Dubai attracted over 6.44 million tourists in 2007 (Dubai Department of Tourism and Commerce Marketing [DTCM], 2007a) despite being located in the Middle East, which is often viewed as "unstable."

The UAE is the third most attractive destination in Middle East Asia with 7.9 million international visitors in 2006 (World Tourism Organization [WTO], 2007). Dubai accounts for more than 80% of these visitors (DTCM, 2007a). The number of visitors to Dubai is remarkable given that it is a

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new city with limited historic sites. However, Dubai is blessed with 365 days of sunshine, excellent beaches, liberal living, and a most modern city where the infrastructure supporting tourism—airlines, airports, hotels, transport, shopping malls, and entertainment activities—is world class.

Tourism plays a critical role in the economy of Dubai. Unlike the oil-rich Emirate of Abu Dhabi, oil accounted for less than 5% of Dubai's GDP and the need to diversify into non-oil areas is not out of choice, but necessity. One estimate is that tourism directly contributed 18% to Dubai's GDP and 29% indirectly (UAE Interact, 2007). Under the Dubai Strategic Plan 2007–2015 tourism has been identified as one of the six building blocks for future growth, thereby enabling Dubai's GDP to grow from US\$46.24 billion in 2006 to US\$107 billion in 2015 (Dubai e-Government, 2007).

The number of tourists visiting Dubai has grown exponentially over the years. Table 1 shows the number of visitors registered with hotels and hotel apartments in Dubai. In fact, the actual number of international visitors to Dubai is in excess of those registered with hotels and hotel apartments because many of them would be staying with friends and relatives. However, due to the lack of consistent data on this segment of international visitors, this study takes into consideration only those international tourists staying in hotels and hotel apartments.

Given the importance of tourism in Dubai's economy it is critical that the growth in tourist arrivals is sustained and that its position as the re-

gion's premier destination is maintained. In view of this, it is important to understand the factors that influence the demand for inbound tourism to Dubai. This will enable (a) planners to ensure that resources are allocated adequately, (b) policy makers to initiate tourist-friendly measures in time, and (c) marketers to use this information to streamline their marketing plans. The main purpose of this study is to identify the factors and estimate the elasticity of demand for inbound tourism to Dubai. The tourism industry in the Middle East and Dubai in particular has taken giant leaps in the last decade. However, no empirical study of factors determining the demand for tourism has so far been conducted. Do the well-established factors impacting tourism demand apply to the tourism industry in the Middle East? This study will endeavor to fill this gap.

This article is organized as follows. Section 2 provides the literature review related to modeling tourism demand. In Section 3, we provide a description of the data used in the study. Section 4 details the methodology employed for estimation and presents the estimated tourism demand models. Section 5 contains a discussion of our major results while Section 6 discusses the implications of our findings and concludes.

#### Determinants of Tourism Demand

The demand for tourism in our study is defined as foreign tourism demand for Dubai as a destination. Most empirical models for estimating tour-

Table 1  
Hotel and Hotel Apartment Guests in Dubai

	Hotels	Hotel Apartments	Total	% Increase
1997	1,791,994 (84.73)	322,896 (15.27)	2,114,890	—
1998	2,184,292 (85.86)	359,797 (14.14)	2,544,089	20.29%
1999	2,480,821 (81.96)	545,913 (18.04)	3,026,734	18.97%
2000	2,835,638 (82.91)	584,571 (17.04)	3,420,209	13.00%
2001	3,064,701 (84.51)	561,924 (15.49)	3,626,625	6.04%
2002	4,107,236 (86.53)	649,044 (13.65)	4,756,280	31.15%
2003	4,342,341 (87.19)	637,887 (12.81)	4,980,228	4.71%
2004	4,724,543 (87.16)	696,181 (12.84)	5,420,724	8.84%
2005	5,294,485 (85.95)	865,518 (14.05)	6,160,003	13.64%
2006	5,473,509 (84.97)	968,161 (15.03)	6,441,670	4.57%

Values in parentheses are percentages of the total. Source: DTCM (2007a).

ism demand consider tourism as just another good and apply the general principles of consumer theory in estimating the demand. As such, the dependent variable is tourism arrivals/departures or tourism receipts/expenditures (Mevar & Payne, 2007). Factors impacting demand are real income or disposable income, price of the good or service, prices of substitute and complimentary goods, and other demand shift factors such as political instability or a one-off major event, such as a festival or sporting competition.

A vast body of empirical work relating to tourism demand modeling exists, although many of these studies relate to developed countries mainly in North America and Europe. Crouch (1994), Lim (1997), and Witt and Witt (1995) provide an extensive survey of tourism demand models. Song, Witt, and Jensen (2003) evaluate the accuracy of six alternative econometric models based on data on inbound international tourism for Denmark. Algieri (2006) estimated a tourism demand model for Russia; Han, Dubarry, and Sinclair (2006) modeled US tourism demand for European destinations; and Saayman and Saayman (2008) identify the determinants of inbound tourism to South Africa. Akis (1998) has developed a compact econometric model of tourism demand in Turkey while Tan (2000) has done a detailed study on the determinants of inbound tourism to Malaysia and Indonesia and has also provided an extensive survey of tourism demand modeling for East and Southeast Indian subcontinent countries.

Not much work has been done in modeling tourist demand in the UAE. Anwar and Sohail (2004) analyze the perception of first-time versus repeat visitors among tourists visiting the UAE during festivals. Henderson (2006) provides insights as to how Dubai has overcome barriers such as being located in the Middle East, lack of conventional attractions, limited promotion, and developed itself as a successful tourism destination. Balakrishnan (2008) uses a branding framework model to study how Dubai has successfully branded itself as a destination. No study thus far has attempted to empirically estimate the elasticity of demand for tourism in Dubai; we believe this study will help rectify this gap.

Traditionally, the factors that influence tourism demand relate to income, relative prices, transport

costs, exchange rates, supply constraints, marketing factors, and dummy variables to track major events (see Crouch, 1994; Li et al., 2005; Lim, 1997; Witt & Witt, 1995; for an extensive analysis of the determinants of tourism demand). A variety of alternative specifications of the tourism demand model exist. These include dynamic elasticities (Morley 1998), habit persistence (Lyssiotou, 2000), technology diffusion (Rosselló, Aguiló, & Riera, 2005), and sunshine days (Saayman & Saayman, 2008).

The specification of the tourism demand model for this study builds from the concept that tourism is an invisible good and its demand is analogous to international trade (Gunadhi & Boey, 1986). The quantity demanded of an invisible good will depend on income, exchange rate-adjusted relative prices, and, if relevant and required, some dummy variables to account for any major events impacting demand.

#### Description of Data

This study employs panel data modeling in its empirical exercises. Saayman and Saayman (2008) highlight some of the advantages of using the panel data techniques, which are: larger number of observations, more informative data, less multicollinearity, more degrees of freedom, and efficient estimates. In our exercises, we employ data from 24 countries over a 10-year period, giving us 240 data points to work with. Panel data are ordered in two directions:  $N$ , the number of cross-section units (24 in our case) and  $T$ , the number of time periods (10 in our case). The amount of data that we have employed, both for the entire set of countries and for subgroups (with the possible exception of the group of Indian subcontinent countries), seems more than adequate. For instance, Im, Pesaran, and Shim (2003) list out the critical values for cointegration tests (discussed below) for as few as five cross section units and five time periods. This gives us assurance that our dataset is large enough to draw meaningful conclusion. It may further be stated that none of the computer software that we used—STATA, RATS, or SHA-ZAM—generated any warning messages regarding paucity of data.

The pooling of cross section and time series

data does imply that standard estimation techniques cease to apply and special panel data estimation techniques, such as Fixed Effects (FE) or Random Effects (RE) models, have to be used. Given that we have a uniform number of observations for each country indicates that we employ a balanced panel. One final consideration while employing panel data is whether one should use a static panel or a dynamic panel. It is well known that once a lagged dependent variable is included as a regressor, standard estimation of FE or RE models introduces biases. This is especially true when the time dimension of the data is small. Judson and Owen (1997) point out that even with a time dimension as large as 30, the bias may be as high as 20% of the true value of the coefficient. The solution to this problem is using Generalized Method of Moments (GMM) estimation techniques developed by Arellano and Bond (1991) and Blundell and Bond (1998). The only problem with these techniques is that they are appropriate for large number of cross section units and, as these increase, the bias reduces substantially (Judson & Owen, 1997). In view of the fact that for our data neither the time dimension is large nor is the number of cross section very large, we have opted for static panel data models. The estimation techniques that we employ will be a FE model and a RE model and be guided by the Hausman Test regarding the correct choice of the model.

Employing panel data notation, we express the demand for tourism as:

$$\text{TAPC}_{jt} = \alpha_0 + \alpha_1 \text{RGDP}_{jt} + \alpha_2 \text{RELPRICE}_{jt} + \alpha_3 \text{ACCOM}_{jt} + \alpha_4 \text{DUM} + \alpha_5 \text{DIRAQ} + u \quad (1)$$

where

$\text{TAPC}_{jt}$  = ratio of tourist arrivals from country  $j$  to Dubai in period  $t$  to population of country  $j$  in period  $t$

$\text{RGDP}_{jt}$  = real per capita GDP of country  $j$  in period  $t$

$\text{RELPRICE}_{jt}$  = ratio of GDP deflator of UAE in period  $t$  to GDP deflator of country  $j$  in period  $t$  multiplied by the reciprocal of the nominal exchange rate. Nominal exchange rate is understood as number of units of the Dirham that can be purchased with one unit of country  $j$ 's cur-

rency (note: we had to use the GDP deflator of UAE because a deflator for Dubai is not available)

$\text{ACCOM}_{jt}$  = cost of hotel stay plus cost of hotel apartment stay for tourists from country  $j$  in Dubai in period  $t$  as a ratio to per capita real GDP of country  $j$  in period  $t$ . Cost computed using average length of stay in each kind of accommodation. It may be noted that even though this variable and the previous one ( $\text{RELPRICE}_{jt}$ ) appear to measure inflation (broadly defined) and inflation in accommodation prices, the correlation between the two is quite low. It is as low as 0.3005 for the entire dataset, 0.2570 for the group of developed countries, -0.1050 for Arab countries, and 0.1415 for Indian subcontinent countries.

$\text{DUM}$  = A dummy variable that takes on a value of one from 2002 onwards and zero for earlier years. The dummy is meant to capture any post-9/11 effects on tourism. We expect that, because entry into the USA has become very strict and stringent, especially for tourists from the South Asian and Arab regions, such tourists have preferred to other destinations, including Dubai. There has been significant anecdotal evidence to suggest that visitors to the USA from this region have faced intense security issues which has made the country slightly less attractive to tourists. The growing number of rules and regulations for obtaining tourist visas for entry into the USA has made entry difficult for foreigners. Added security measures at US embassies around the world has meant that visa applicants have to wait in long lines (see Bonham, Edmonds, & Mak, 2006, for a detailed analysis of the effect of 9/11 attacks in tourism into the US).

$\text{DIRAQ}$  = A dummy variable that takes a value of 1 for 2003, the year in which the multinational force invaded Iraq.

$u, e$  = Disturbance terms

$\alpha_0 \dots \alpha_5$  = Parameters to be estimated.

Our expectations for the signs of the parameters are:

$\alpha_0 > 0$ : Increase in real income will boost tourist demand

$\alpha_2 < 0$ : Increase in relative prices will push down tourist demand

- $\alpha_0 < 0$ : An increase in the cost of accommodation stay as a proportion of per capita real GDP will lower the number of tourists coming into Dubai
- $\alpha_0 > 0$  or  $< 0$ : We are unable to anticipate the effect of 9/11 on tourism in Dubai. We have reasons to believe that it would be positive but we maintain an agnostic position.
- $\alpha_0 < 0$ : It is expected that the uncertainty in the Middle East region due to the Iraq war will act as a deterrent to tourism.

As in conventional methodology of modeling tourist demand, a double-log specification of Equation (1) is adopted. The great advantage of using a double-log specification is that the coefficients of the independent variables are elasticities (see Kreps, 2004; Wooldridge, 2006). Hence, in the above model, each coefficient is an elasticity of demand with respect to the relevant independent variable. The dependent variable for this study is the ratio of tourist arrivals to the population of the country of nationality of the tourists. Using this ratio instead of tourist arrivals effects a normalization that allows a comparison of tourist arrivals from countries with widely different population levels. Data on tourist arrivals were obtained from DTCM (2007a). To reiterate a point made earlier: we measure tourist arrivals into Dubai in terms of guests staying in Dubai hotels and hotel apartments, which would underestimate total tourist arrivals because it excludes tourists staying with friends and relatives. Additionally, using data according to nationalities does pose a minor problem for tourists who may normally be resident in countries other than their country of nationality. Such tourists will be assumed to have originated in the country of their nationality and will also be assumed to be affected by the same factors as their compatriots who are resident in their country of nationality.

Table 2 shows the number of tourists by nationality for 2006 from our sample countries and shows the percentage to the total number of international hotel guests. For the year 2006, our sample covers 67% of the total hotel guests in Dubai, developed countries account for 31.2%, AGCC and Arab countries 26.93%, and Indian subcontinent countries 9.43%. Interestingly, India accounts for only 6.06%, Pakistan 2.74%, and Bangladesh

Table 2  
Hotel Guests by Nationality: 2006

	2006	% Total Tourists
<b>Developed Countries</b>		
Canada	72,098	1.12
Denmark	13,210	0.21
Finland	14,699	0.23
France	103,821	1.61
Germany	252,977	3.93
Italy	79,016	1.23
Japan	81,346	1.26
Netherlands	64,558	1.00
Norway	18,430	0.29
Russia	276,921	4.30
Spain	17,112	0.27
Sweden	23,261	0.36
UK	687,138	10.67
US	313,004	4.86
<b>Total developed countries</b>	<b>2,017,591</b>	<b>31.32</b>
<b>Indian subcontinent countries</b>		
Bangladesh	41,245	0.64
India	389,262	6.04
Pakistan	177,094	2.75
<b>Total Indian subcontinent countries</b>	<b>607,601</b>	<b>9.43</b>
<b>Arab countries</b>		
AGCC	1,040,939	16.16
Egypt	109,247	1.70
Iran	341,876	5.31
Jordan	70,743	1.10
Lebanon	84,080	1.31
Sudan	41,035	0.64
Syria	47,095	0.73
<b>Total Arab countries</b>	<b>1,735,015</b>	<b>26.93</b>

Source: DTCM Reports.

0.64% of hotel guests in Dubai while these nationalities comprise of over 80% of the total resident population of Dubai (DTCM, 2007b). One explanation for this discrepancy is that a large number of international visitors from these Indian subcontinent countries stay with friends and relatives rather than as hotel guests.

Before we present our estimated models, some comments about the exact nature of the data used are in order:

1. Real per capita GDP of the originating country converted to US\$ was used to represent the income variable.
2. Relative prices in the origin countries and UAE were measured using the GDP deflator in each of the countries. Ideally, the consumer price index (CPI) would have been a better measure of

relative prices; however, data on CPI were not available for many of the countries over the entire time period of our analysis.

3. Accommodation costs were computed separately for hotels and hotel apartments based on the average length of stay in each and average tariffs in each.
4. A dummy variable for the year 2002 onwards has been introduced to capture any changes in tourism demand post-9/11. Increase in demand for tourism to Dubai post-2001 could be due to the stringent visa restrictions and travel measures for tourists going to developed countries. The number of tourists coming into Dubai between the years 2001 and 2002 increased by 25% from AGCC countries, by 45% from India, by 23% from Arab countries, and, surprisingly, by 30% even from the developed countries. Part of this increase could also be attributed to the promotions done by Dubai Department of Tourism and Commerce Marketing (DTCM) using the iconic Burj Al Arab Hotel, which opened in 2000 and put Dubai on the tourist map.
5. A dummy variable has been introduced to capture the possible negative effect of the Iraq war.

#### Methodology and Estimated Tourism Demand Models

In this section we estimate tourist demand functions for Dubai. Panel data technique was used to estimate tourism demand model; Proença and Soukiazis (2005), Roget and Gonzalez (2006), Van der Merwe, Saayman, and Krugell (2007), and Saayman and Saayman (2008) are some of the recent studies that have used this technique. The tourist demand model given in Equation (2) is estimated using a panel of 24 countries listed in Table 2. The time period for our data is 1997 to 2006, yielding for the full panel 240 observations. We employed the FE approach and RE effects approach to estimate the model and all our variables were transformed to logs. The advantages of transforming the variables to logs are well known. The most important advantage is that the estimated coefficients of the model are elasticities of the dependent variable with respect to the relevant independent variable (Wooldridge, 2006). After having

estimated the FE and RE models, the Hausman test was used to help us choose between the two.

#### *Fixed Effects (FE) Approach*

An FE model is written as:

$$y_{jt} = x'_{jt}\beta + \alpha_j + \varepsilon_{jt} \quad (2)$$

The subscript  $j = 1 \dots N$  denotes the cross section unit and the subscript  $t = 1 \dots N$  denotes the time period. In equation (2),  $y$  is the dependent variable and the  $x$ 's are the independent variables. This approach takes the  $\alpha_j$  to be the group-specific constant term in the regression model. However, the slope coefficients  $\beta$  are uniform for all groups or cross section unit. Note that this approach, by introducing the  $\alpha_j$ , has the great advantage of controlling for all observable and unobservable group-specific variables. The FE coefficient absorbs all the across-group variation and one is left with what happens within each group (see Greene, 2003, for details). A drawback of the approach is that, if the unobservable effects vary over time, the introduction of  $\alpha_j$ , which is time invariant, will still not resolve the problem of omitted variables.

#### *Random Effects (RE) Approach*

The FE approach is seen as being valid only to the groups included in the study and not additional ones outside the sample (Greene, 2003). This may be relevant for our study wherein we have chosen some countries in our sample but the model may well be appropriate for all countries. If this view is correct (i.e., the sampled groups have been drawn from a large population), then the individual group-specific constant may be modeled as being randomly distributed across groups. Remembering that the FE approach estimates as many constant terms as there are groups in addition to the slope parameters, the RE approach, if justified, will greatly reduce the number of parameters that have to be estimated. However, we need to be sure whether the FE or RE approach is the most appropriate. The Hausman test is used for deciding which one of the two approaches is the correct one to use.

### Hausman Test

The Hausman test is based on the idea that under the null hypothesis both the FE and RE parameter estimates are consistent but the FE estimates are inefficient. However, under the alternative hypothesis FE estimates are consistent but RE are not. Hence, if the null hypothesis is accepted, we select the RE model while if the null hypothesis is rejected, we employ the FE model (see Greene, 2003, for details).

### Panel Unit Roots

Before we estimated the models that we have discussed, we tested the variables for unit roots (i.e., if the series has a unit root it is nonstationary and inferences based on such series are unreliable). On the other hand, if the series are stationary, standard tests of inference are valid. Thus, unit root testing is of vital importance when one is dealing with time series data. If two time series ( $y_t$  and  $x_t$ ) have strong trends (a trend is understood as a persistent increase or decline in the time series), a linear regression of one time series on the other is likely to result in a spurious regression problem (Wooldridge, 2006). This problem exists when there is, in fact, no underlying theoretical relationship between  $y_t$  and  $x_t$ , and yet the estimated regression displays excellent qualities. To avoid the problem of spurious regressions, it is important to examine if the time series have strong trend element, a process known as unit root testing. Such testing is required even for panel data of the kind we use in this article.

Table 3 reports unit root results for all countries and subgroups. The tables report the  $W_{t\text{-bar}}$  and  $t\text{-bar}$  statistics of Im et al. (2003). The null hypothesis for all tests is that a unit root is present while the alternative hypothesis suggests the absence of a unit root. All tests are carried out in levels or original values of the logged variables. In case the presence of a unit root is suggested, first differences of the logged variables are taken and the tests carried out again. We employed a uniform 5% level of significance for rejecting the null hypothesis. In order to reject the null hypothesis of a unit root, at least one of the  $W_{t\text{-bar}}$  or  $t\text{-bar}$  statistics should be significant.

A summary of the unit root results is given in

Table 4. It may be noted that variables in the I(1) column of this table will be tested for cointegration.

### Panel Cointegration

Subsequent to unit root testing, we carried out panel cointegration tests to determine which models may be estimated. Cointegration is an evaluation technique introduced by Engle and Granger (1987) to judge whether any meaningful results can be drawn from a regression involving time series that have a unit root. If cointegration is discovered in a pair (or more) of time series, then the residuals from a regression involving these time series will be truly random and free of a unit root (Wooldridge, 2006). Testing for cointegration is thus an important step in discovering the nature of the relationship between dependent and independent variables and, more importantly, in judging whether the relationship is spurious or genuine. The essential idea of cointegration carries over to panel data as well and tests have been devised for the purpose as discussed below. Bearing in mind the importance of cointegration, we need to remember that even though we have specified our preferred model as Equation (1) above, this equation will be valid only if it is a cointegrated equation. Moreover, it is possible that the cointegrating equation may not be identical for all the subgroups that we have created.

Pedroni (1999) discusses the construction of seven panel cointegration tests, which are listed in the first column of Table 5. For each test, the null hypothesis is one of absence of cointegration. A note to Table 5 lists the rules for accepting or rejecting the null.

### Estimated Tourist Demand Models

The results of Table 5 allow us to identify the following cointegrating equations

1. All countries: TAPC→RGDP, RELPRICE, and ACCOM
2. Developed countries: TAPC→RGDP and RELPRICE
3. Arab countries: TAPC→RGDP and ACCOM
4. Indian subcontinent countries: TAPC→RGDP and ACCOM



Table 3  
Panel Unit Roots

	Levels		First Difference	
	$W_{t-bar}$	$t$ -bar	$W_{t-bar}$	$t$ -bar
All countries <sup>a</sup>				
TAPC*	2.136 (0.98)	-0.80 (>0.05)	-1.973 (0.02)	-1.80 (>0.05)
RGDP*	1.454 (0.93)	-0.97 (>0.05)	-4.395 (0.00)	-2.30 (<0.05)
RELPRICE*	0.041 (0.52)	-1.31 (>0.05)	-8.693 (0.00)	-3.43 (<0.05)
ACCOM*	-1.477 (0.07)	-1.68 (>0.05)	-2.025 (0.02)	-1.81 (>0.05)
Developed countries <sup>b</sup>				
TAPC*	1.596 (0.95)	-1.37 (>0.05)	-7.75 (0.00)	-4.56 (<0.05)
RGDP*	0.459 (0.68)	-1.76 (>0.05)	-2.51 (0.01)	-2.77 (<0.05)
RELPRICE*	2.47 (0.99)	-1.07 (>0.05)	-8.48 (0.00)	-4.80 (<0.05)
ACCOM	-2.36 (0.00)	-2.72 (<0.05)	—	—
Arab countries <sup>c</sup>				
TAPC*	-0.355 (0.36)	-1.48 (>0.05)	-1.150 (0.13)	-1.84 (>0.05)
RGDP*	0.929 (0.82)	-1.47 (>0.05)	-1.243 (0.11)	-2.51 (<0.05)
RELPRICE	-7.624 (0.00)	-5.59 (<0.05)	—	—
ACCOM*	-0.824 (0.21)	-1.69 (<0.05)	-2.158 (0.02)	-2.29 (<0.05)
Indian subcontinent countries <sup>d</sup>				
TAPC*	-0.187 (0.43)	-2.05 (>0.05)	-12.973 (0.00)	-11.47 (<0.05)
RGDP	0.677 (0.75)	-1.42 (>0.05)	-0.810 (0.21)	-2.51 (<0.05)
RELPRICE	1.955 (0.98)	-0.48 (>0.05)	0.751 (0.77)	-1.36 (>0.05)
ACCOM*	-0.996 (0.16)	-2.65 (<0.05)	-4.952 (0.00)	-5.56 (<0.05)

Numbers in parentheses are  $p$ -values. For the  $t$ -bar statistic, the critical value tabulated by Im et al. (2003, pp. 61–62) at the 5% level has been used. For  $W_{t-bar}$  the level of significance assumed is 5%. In order to reject the null hypothesis of a unit root at least one of  $W_{t-bar}$  or  $t$ -bar should be significant.

<sup>a</sup>Critical value for  $T=26$  and  $N=10$ . Relevant  $t$ -bar statistic = 1.99.

<sup>b</sup>Critical value for  $T=14$  and  $N=10$ . Relevant  $t$ -bar statistic = 2.02.

<sup>c</sup>Critical value for  $T=7$  and  $N=10$ . Relevant  $t$ -bar statistic = 2.06.

<sup>d</sup>Critical value for  $T=3$  and  $N=10$ . Relevant  $t$ -bar statistic = 2.42.

The cointegrating equations reported above (and in Table 5) advise us regarding the tourist demand models that we can estimate for each group of countries. We estimated the FE model and the RE model for each subgroup. It may be noted that in addition to the regressors indicated by the cointegrating equations, we included in each model two dummy variables: one, to capture

the effects of the 9/11 attacks on New York city and, two, the effects of the Iraq war. The choice of model—whether FE or RE—for each subgroup was guided by the Hausman test. We shall report only the model that was suggested by the Hausman test. Table 6 presents the estimated equations.

The major results to emerge from our estimation are:

Table 4  
Summary of Unit Root Results

	Variables That Are I(0)	Variables That Are I(1)	Variables Whose Order of Integration Is More Than I(1)
All countries	—	TAPC, RGDP, RELPRICE, ACCOM	—
Developed countries	ACCOM	TAPC, RGDP, RELPRICE	—
Arab countries	RELPRICE	TAPC, RGDP, ACCOM	—
India subcontinent countries	—	TAPC, RGDP, ACCOM	RELPRICE

I(0) variables are stationary in their original level values; I(1) variables are stationary in first differences.

Table 5  
Panel Cointegration Results: Dependent Variable: TAPC

	All Countries	Developed Countries	Arab Countries	Indian Subcontinent Countries
Regressors→	RGDP, RELPRICE, ACCOM	RGDP, RELPRICE	RGDP, ACCOM	RGDP, ACCOM
Panel v-stat	1.5291	0.7483	1.8293	-1.3941
Panel rho-stat	3.5528	1.5346	1.0386	0.8051
Panel pp-stat	-6.2654*	-5.0200*	-3.0646*	-3.5124*
Panel adf-stat	-3.9097*	-4.0581*	-2.6009*	-2.8354*
Group rho-stat	5.4883	2.9184	2.2311	1.5686
Group pp-stat	-6.3378*	-5.7288*	-2.3366*	-3.3015*
Group adf-stat	-7.4491*	-5.3935*	-2.8837*	-3.6224*

The panel v-stat, under the alternative hypothesis, diverges to positive infinity. Hence, large positive values imply that the null of no cointegration is rejected. All other test statistics listed above diverge to negative infinity under the alternative hypothesis. Hence, large negative values imply that the null of no cointegration is rejected.

\*Significant value of the relevant statistic, indicating that the regressors listed in each column along with TAPC form a cointegrating equation.

1. The Hausman test for the equations estimated for all countries and developed countries subgroups suggests that RE models are adequate while FE models are appropriate for the other two groups.
2. All the equations reported in Table 6 yield good but dissimilar results across the subgroups of countries. The within-transformation  $R^2$  are seen to be reasonably high for all the equations.  $F$ -statistics for group effects (in the

case of equations C and D) are also highly significant; this tells us that it is appropriate to distinguish among the countries in each equation and that estimating a pooled OLS without group effects would have been inappropriate.

3. For the all countries group (Eq. A, Table 6), we have been able to estimate the most elaborate model (i.e., only for this group were we able to include all the independent variables—RGDP, RELPRICE, ACCOM, and DUM—in

Table 6  
Estimated Tourist Demand Models

Regressors	All Countries (Eq. A)	Developed Countries (Eq. B)	Arab Countries (Eq. C)	Indian Subcontinent Countries (Eq. D)
RGDP	0.2422 (0.12)	0.1368 (0.50)	2.5419 (0.00)	1.9650 ((0.00)
RELPRICE	-0.0693 (0.00)	-0.0572 (0.08)	—	—
ACCOM	0.0029 (0.97)	—	-0.3456 (0.00)	-0.4713 (0.00)
DUM	0.6284 (0.00)	-0.7136 (0.00)	-0.3181 (0.00)	-0.1674 (0.01)
DIRAQ	-0.1673 (0.02)	-0.2186 (0.03)	—	—
INTERCEPT	-8.9488 (0.00)	-8.7315 (0.00)	—	—
Within transformation $R^2$	0.5891	0.5842	0.8184	0.8482
Significance of group effects: $F=$	Not relevant	Not relevant	1395.00 (<0.01)	192.39 (<0.01)
Hausman test	7.33 (0.20)	7.33 (0.11)	9.89 (0.02)	-0.01 <sup>a</sup>
Model chosen	RE	RE	FE	FE
No. of observations	240	140	70	30

Values in parentheses are  $p$ -values. All variables (except DUM and DIRAQ) are logged. For a fixed effects model with dummies for each country, the intercept term is suppressed to avoid perfect multicollinearity.

<sup>a</sup>The Hausman test for Eq. D was inconclusive due to the paucity of observations. The coefficients reported are for FE model. It may be noted that the coefficients for the RE model were very similar to those reported.

the equation). The decision to include all the variables was guided by the cointegration tests (Table 4), which indicated that all these independent variables along with the dependent variable formed a cointegrating equation. The elasticity of tourist demand with respect to RGDP (also called income elasticity of demand because RGDP is a measure of income) is significant only at the 12% level of significance. A possible reason for this low elasticity is that this group consists of 14 developed countries (accounting for 31% of all tourist arrivals in 2006 as per Table 2), which have a uniformly high level of income and this is unlikely to be a relevant factor in the demand for tourism for these countries as we shall see below. The elasticity with respect to RELPRICE is negative, indicating that an increase in RELPRICE would lead to a fall in the dependent variable (i.e., TAPC). On the other hand, the elasticity with respect to ACCOM is not significant. (Note: If the variable is not significant, it indicates that statistically its effect on the dependent variable is negligible while if the elasticity is negative, it means that if the independent variable rises the dependent variable would fall and vice versa.)

4. For the developed countries group (Eq. B, Table 6), the elasticity of tourist demand with respect to RGDP is relatively low at only 0.14 and the coefficient is not significant. The elasticity with respect to RELPRICE is expectedly negative and the coefficient is significant. ACCOM was not a relevant variable as far as this group was concerned.
5. For the Arab group of countries (Eq. C, Table 6), the elasticity with respect to RGDP (also called income elasticity of demand) is as high as 2.54. This is not only numerically larger than unity but is in fact statistically significantly greater than unity. Elasticity of unity indicates that a 1% increase in the independent variable will raise dependent variable by exactly 1% while elasticity greater than unity would imply an increase in the dependent variable of more than 1%. These are standard concepts from the theory of demand and supply in economics (see Kreps, 2004; Mankiw, 2004; see also Wooldridge, 2006, for an econometric

explanation). The elasticity with respect to ACCOM is significantly negative. This suggests that an increase in accommodation costs would adversely affect tourism demand in Dubai.

6. The model that we are able to estimate for the Indian subcontinent countries (Eq. D, Table 6) is similar to that estimated for Arab countries. The elasticity with respect to RGDP is as high as 1.96. This, like in the previous group, is numerically larger than unity and statistically significantly greater than unity. The elasticity with respect to ACCOM at  $-0.47$  is significantly negative.
7. The dummy variable (DUM), which captures the effect of the 9/11 attacks on tourist demand, was significantly positive for all groups of countries. However, the results with respect to the dummy variable related to the Iraq war (DIRAQ) were mixed. While the variable was negative and statistically significant (pointing to the adverse fallout of the war on tourism) for the all countries and the developed countries groups, it was not significant for the other two groups. Because DIRAQ was not important for equations C and D in Table 6, we have excluded it.

#### Discussion and Implications

The estimated equations reported in Table 6 show clearly that our findings are consistent with theory with regards to income, relative prices, exchange rates, and cost factors. For Arab Countries the income elasticity of demand is 2.54 while for countries of the Indian subcontinent it is almost equal to 2. Marketers should focus their attention on the countries of these two regions as per capita incomes, especially in the Gulf Cooperation Countries (Saudi Arabia, Kuwait, Oman, Qatar, and Oman) and in India, are increasing at a fast pace and the demand for tourism from these areas will see an exponential growth.

The two groups—Arab countries and countries of the Indian subcontinent—seem to be the most sensitive as far as accommodation prices are concerned. There is an urgent need to make available affordable accommodation in the budget hotels segment. In addition, to meet the increased de-

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mand, Dubai must ensure that the tourism infra-  
structure is ready to cope with it if it is to meet its  
target of attracting 15 million visitors a year by  
2015. There are a large number of tourism-related  
projects under way (e.g., the Bawadi Hotel Devel-  
opment is a Las Vegas-style strip of 51 hotels and  
6,000 hotel rooms, in addition to 40,000 square  
feet of retail space that should be ready by 2011)  
(Bawadi, 2008). Dubailand, which will add 3 bil-  
lion square feet of world class theme parks as well  
as projects related to Culture, Well being, Sports,  
Shopping, Hospitality, and Entertainment, is set to  
launch its first phase in December 2010 (Dubai-  
land, 2008). In addition to these large-scale proj-  
ects, a number of hotel chains will begin opera-  
tions that will increase accommodation capacity  
tremendously.

It does seem that Dubai is ready to double its  
tourist numbers by 2015 and has invested in the  
infrastructure to make it happen. However, the  
success of these projects hinges on quick and rela-  
tively cheap transport options that should be avail-  
able to the tourists.

One of the issues of concern in Dubai is the  
rapidly rising prices. UAE inflation rate of 11% in  
2007 ("UAE Sets," 2008) will diminish the attrac-  
tiveness of Dubai as a tourist destination. Tourists  
from the developed countries seem to be the most  
sensitive to relative prices, as seen from Equation  
A (Table 5). Given that tourists from developed  
countries are almost one third of total tourist arriv-  
als, this sensitivity to rising prices in the UAE  
needs careful attention in the form of policy initia-  
tives to control domestic inflation. The impact of  
relative inflation will be felt all the more if the  
Dirham strengthens against most developed coun-  
tries' currencies. The impact of relative prices on  
the Arab countries group is not significant. One  
reason for this could be that other factors such as  
proximity or difficulty in traveling to alternative  
Western destinations dominate. For the Indian  
subcontinent countries group as well, relative  
prices are not significant. Perhaps this could be  
due to the fact that the majority of the visitors in  
the Indian subcontinent group in our sample possi-  
bly travel for business and shopping is not their  
prime motivation to undertake the trip. This, of  
course, should not lull the UAE into thinking that

inflation will not deter tourists from the Indian  
subcontinent.

The cost of accommodation is significant for  
tourists from the Arab and Indian subcontinent  
countries but possibly not for those from devel-  
oped countries. For the time period under consid-  
eration, currencies of most of the developed coun-  
tries appreciated over 30% when compared to the  
UAE Dirham and, hence, perhaps the rise in ac-  
commodation costs was largely mitigated. Dubai  
had the highest average room rate of US\$280 ac-  
cording to SR Global Consultancy ("Dubai Tops,"  
2008). From a policy point of view what this calls  
for the development of hotel accommodation not  
only at the higher end but also to cater to those  
who are looking for more economic options, espe-  
cially if Dubai has to attract price-sensitive tour-  
ists. Currently, there is a paucity of affordable ac-  
commodation and the consultancy firm Lodging  
Econometrics estimates just 15% of hotels in the  
Middle East region can be classified as Budget hot-  
els ("Budget Hotel Boom," 2008).

The dummy variable for post-2001 is signifi-  
cant for all groups. This is indicative of two forces  
in operation: one, post-9/11 tourism to the region  
increased from Arab and Indian subcontinent  
countries and, two, the success of Dubai in aggres-  
sively marketing itself, especially in Western  
countries, has led to an increase in demand for  
tourism during this period. Finally, the negative  
impact of the Iraq war shows that demand for  
tourism is sensitive to perceptions of stability in  
the region and this has significant implications for  
tourism from developed countries.

### Conclusions

The main purpose of this article was to estimate  
the demand elasticities for tourism to Dubai. We  
are also interested in segmenting tourists accord-  
ing to their point of origin and investigating if  
there are important behavioral differences. Import-  
ance of these differences would mean that appro-  
priate tourism promotions would have to be tar-  
geted at specific segments of tourists.

Our results indicate that the demand for tourism  
in Dubai by and large follows the conventional  
theoretical expectations, although there may be  
differences across subgroups. Demand is seen to

be highly income elastic especially for tourists from the Arab and South Asian regions. With incomes rising rapidly in this region, tourism demand seems set to grow. Tourism planners need to ensure that culturally appropriate tourism infrastructure is in place to meet the demands of tourists. Marketing planners should increase their marketing efforts in this region, especially during an economic downturn, in order to minimize the impact of falling incomes on tourism demand.

Tourists from the developed countries are price sensitive, which suggests that policies that moderate inflation in the UAE will see some benefits. This is important because the local currency, the UAE Dirham, is pegged to the US dollar, and when it strengthens, prices in the UAE in terms of other (i.e., non-US) currencies increase.

Accommodation costs are significant in determining demand for tourists from the Arab world and from the Indian subcontinent group of countries. If Dubai has to meet its target of 15 million tourists by 2015, hotels that cater to the budget traveler will need to be available for tourists from this region.

This study is one of the first attempts in estimating the elasticity of demand for tourism in Dubai and can be used as a starting point for more in-depth studies. International visitors that stay with friends and relatives constitute an important segment and efforts should be made to include such tourists in the model as well. Of course, data availability is likely to be an important stumbling block. To measure relative prices, the construction of a shopping price index would be more useful because it would measure relative prices more accurately. Finally, as far as revenues from tourism are concerned, another area to focus on is the amount spent by tourists from each country and, based on these expenditures, appropriate marketing strategies could be put in place.

#### Acknowledgments

The authors would like to thank an anonymous referee and the editor for making numerous valuable suggestions for improving the paper.

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