Estimation of Tourism Demand Function in Selected Provinces: A case study of Iran

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ABSTRACT

Tourism as an economic sector with high profitability allocates an important place to itself in the current state of the world. Many countries have taken advantage from it for improving their status and overcome to their economic problems, such as low levels of per capita income, increase in unemployment and shortages of foreign exchange earnings. Our country stands among the foremost ten, five and three countries of the world respectively in terms of tourist attractions, diversity of tourism and variety of handicrafts. So Iran’s Tourism Industry has the potential to become a major tourism pole in this industry in such a manner that in medium and long term, its foreign exchange earnings propound as an effective counterweight in the scene of the non-oil economy. Therefore, the author intends in this article to show some effective factors on demand of tourism and share of each factor. In this case, 11 tourist provinces in a period of 2005 to 2010 were studied. By linear logarithm function and its estimation in panel data method, it was determined that the traveling costs in destination such as variable of total goods and services used (SHB) and ratio of price of hotel in that province to the family income of other provinces (NHN) are most efficient variable in total demands for domestic tourism. In addition, coefficient of variable of total local tourism attractions (TJ) and total tourism and travel agencies (TA) is positive, showing direct relationship of number of domestic passengers and two mentioned variables in that province.

Key words: tourism, Demand function, Panel Data, Price Index, Tourism Attractions.

Introduction

Today Tourism considered as one of the industries which can compete with the industries such as petroleum and automotive. Countries with tourist attractions, in terms of their natural views, culture and civilization, religious and ancient vestiges, have talents and abilities to attract tourists. According to the released statistics by the World Trade Organization in 2000, after India, Iran has the highest Tourism rating in South Asia (Fateh & Abbasi nezhad, 2005).

Due to the potential that exists in Iran's tourism industry, there is a hope that with the investment and planning in this industry, Iran becomes a major tourism pole in the area in such a manner that in medium and long term, its foreign exchange earnings propound as an effective factor in coming up from the Single-Product Economy.

On the other hand, many of the tourism activities accomplish in the domestic market and many of individuals and organizations work in local or national market of this sector. Therefore in the national economic cycle, domestic tourism has a special place. In this research the author intends to investigate the factors affecting on tourism demands in 11 selected provinces. The provinces have been selected based on the two criteria; the first is the number of tourists in the years before and the second is the number of tourist’s attractions. In this study the examination of the factors affecting domestic tourism demands was a documentary one which its results can be used to present macro strategies for policy-making in country's tourism pale.

Problem Statement:

Tourism industry is one of the biggest and most efficient economic activities in the world which creates the highest amount of added-value and directly or indirectly affects on other economical and cultural activities. Although it is said that tourism cannot lonely lead to countries’ development, but with the arrival of tourists,
gradually the need to change and make facilities for residence, relocation and other related activities occur and will lead to development (Dowlatabadi and Yaghubzadeh, 2009, p15).

As the existence of tourism potential in the countries cause to attract significant foreign exchange earnings, governments take it into consideration. On the other hand, it is also favored by the countries which don’t have desirable industrial productions for export or resources like oil to earn foreign exchange income (Romilly, 1998).

Iran due to its diverse climatic conditions, ancient civilizations and vestiges, exquisite sights and natural landscapes, the art of architecture, handicrafts and other cultural advantages and especially the specific geographical location in the area, has a potential for attracting tourists and changing into a major pole in its area (Alvani, 2006, p36).

According to the type of tourists, Tourism industry is noteworthy in two dimensions: foreign and domestic tourists. Foreign tourists with entering foreign exchange to the country and changing it into the national currency or spending it directly in the tourism pale can improve the country’s foreign exchange income. So the presence of foreign tourists is important for any country. On the other hand, a significant proportion of each country’s tourists belong to domestic tourists. However those tourists do not earn foreign exchange for the country but from the viewpoint of creating job openings and spending costs in tourist areas they become important (Papoli Yazdi et al, 2006, p152).

In terms of object, this study is an applicable research and in terms of the nature of the case and research method, it’s a descriptive-analytical research and correlation. In this study, among the top provinces in terms of the number of tourists and tourist attractions between the years 2005-2010, 11 provinces have been selected. These provinces are Guilan, Mazandaran, Isfahan, Fars, Khorasan, Kermanshah, Qom, Golestan, East Azarbaijan, Ardebil and Yazd.

Research Objectives and Hypotheses:

The main purpose of the author in this research is to examine the amount of effective factors on tourism demand in selected provinces. According to the said purpose and on the basis of the selected variables, the following hypotheses were examined in this study:

Hypothesis 1:

The number of tourist attractions in the selected province has a significant and positive correlation with the number of inbound tourists to each province.

Hypothesis 2:

The number of tourism travel and service agencies in selected provinces has a significant and positive correlation with the number of inbound tourists to each province.

Hypothesis 3:

The number of inbound tourists to each province has a significant and negative correlation with the total price index of goods and services in urban households.

Hypothesis 4:

The hotel price in comparison to other provinces’ household income has a significant and negative correlation with the number of inbound tourists to the province.

Theoretical framework and model introduction:

The domestic tourism demand theory is based on the consumer behavior and the starting point of the consumer behavior theory is the consumer rational behavior. It is assumed that the consumer among all goods which are available choose those cause the maximum satisfaction to him. It shows that consumers are aware of all options and be able to evaluate them. In other hand, the consumer choice is limited by his budget. In these circumstances people seek the best choices. Economic theorists generally believe that analyzing the consumer’s behavior requires that consumer be able to rank products based on his preference. The consumer after ranking goods and services based on his taste and regarding to income limits, chooses a combination that has the highest utility for him (Henderson & Quandt, 2001, p15).
Demands functions can be extracted from the analysis of utility maximization. According to theoretical discussions of microeconomics, in the following part the extraction of demand function by the use of utility maximization (the dominant constraint on optimization is the limitation of individual’s budget) is discussed (Summary, 1987).

We assume that in a space of two-commodity, the consumer consumes a tourism good “qtourism” and the other good “q" as a sample of other goods and services. The tourism demand function obtains from the consumer’s Maximization utility (which is the result of consumption of both goods “qtourism” and q”) and the constraint budget is obtained as follows.

\[
\text{Max: } u = u(q_{\text{tourism}}, q) \quad (1)
\]

Subject to: \( y = p_{\text{tourism}} q_{\text{tourism}} + p q \) (Rasekhi Nezhad, 2009) \quad (2)

After forming the Lagrange function and solving the systems of equations, the tourism demand function is obtained as follows:

\[
q_{\text{tourism}} = f\left(y, p_{\text{tourism}}, p\right) \quad (3)
\]

Since analyzing the elasticity of price, income and intersecting of demand is the purpose of estimating the demand function, it is more suitable that the demand function estimates logarithmically. So if the initial shape of the demand function is as follows:

\[
q_{\text{tourism}} = \beta_0 (y)^{\beta_1} (p_{\text{tourism}})^{\beta_2} p^{\beta_3} \epsilon \quad (4)
\]

We’ll have:

\[
\ln q_{\text{tourism}} = \ln \beta_0 + \beta_1 \ln y + \beta_2 \ln p_{\text{tourism}} + \beta_3 \ln p + U_t \quad (5)
\]

In this case each of the coefficients will be directly an estimation of elasticity’s income, price and cross of demand. In the demand function, the said elasticity is stable (Maraseli, 1995). According to the previous studies on the field of domestic tourism, the structure of this model made in a way that can describe both the need factors and the factors which affect on the selected provinces’ tourism demand. Regard to the used data consisted of the combination of time and cross-sectional series, the model is estimated using panel data. Thus, the implicit form of the estimable model for the domestic tourism demand function is:

\[
TT = f(TJ, TA, SHB, NHN) \quad (6)
\]

TT = number of inbound tourists to the province, TJ = number of province’s tourist attractions, SHB = total index of consumer goods and services.

TA = the number of travel and tourism services agencies in destination province, NHN = ratio of the province’s hotel price than other province s’ income.

This function shows the relation between tourism demand and factors affecting on their demand, so after the estimation of economic relations model, the identification and distinction of each factor’s impact can be possible.

Since the purpose of this study is “evaluation of the effects of each of these factors changing on the selected provinces’ tourism demand”, it is necessary to calculate the demand elasticity toward to each of these variables. Thus the most appropriate form of tourism demand function can be the Cup Douglas function which is a non-linear function.

\[
TT = \beta. TJ^{\beta_1} TA^{\beta_2} SHB^{\beta_3} NHN^{\beta_4} \quad (7)
\]

Now can turn it into a linear function by taking its logarithm, so the final form of the model is as follows:

\[
\log TT_{it} = \beta_0 + \beta_1 \log TJ_{it} + \beta_2 \log TA_{it} + \beta_3 \log SHB_{it} + \beta_4 \log NHN_{it} \quad (8)
\]
This model is estimated for the 11 provinces which are: Ardabil, Esfahan, East Azarbaijan, Guilan, Mazandaran, Golestan, Fars, Khorasan, Kermanshah, Yazd and Qom. As the used data were in a both form of “cross-section” and “time series data”, to estimate this model, the panel data method used and the model estimated for the period of 2005-2010.

The estimation of model:

The tourism demand function in the previous section was obtained as follows:

\[ \log TT_t = \beta_0 + \beta_1 \log TJ_t + \beta_2 \log TA_t + \beta_3 \log SHB_t + \beta_4 \log NHN_t \]

The above model is estimated and its initial outputs are shown in Table 1.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>coefficient</th>
<th>T statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>16.09</td>
<td>7.85</td>
<td>0.0012</td>
</tr>
<tr>
<td>LOG (TJ)</td>
<td>0.14</td>
<td>4.43</td>
<td>0.1137</td>
</tr>
<tr>
<td>LOG (TA)</td>
<td>0.67</td>
<td>9.22</td>
<td>0.0000</td>
</tr>
<tr>
<td>LOG (SHB)</td>
<td>-1.45</td>
<td>-2.79</td>
<td>0.0036</td>
</tr>
<tr>
<td>LOG (NHN) 1384</td>
<td>-0.49</td>
<td>-0.14</td>
<td>0.0999</td>
</tr>
<tr>
<td>LOG (NHN) 1385</td>
<td>-0.52</td>
<td>-2.86</td>
<td>0.0021</td>
</tr>
<tr>
<td>LOG (NHN) 1386</td>
<td>-0.55</td>
<td>-2.95</td>
<td>0.0011</td>
</tr>
<tr>
<td>LOG (NHN) 1387</td>
<td>-0.61</td>
<td>-3.11</td>
<td>0.0004</td>
</tr>
<tr>
<td>LOG (NHN) 1388</td>
<td>-0.64</td>
<td>-3.2</td>
<td>0.0002</td>
</tr>
<tr>
<td>LOG (NHN) 1389</td>
<td>-0.66</td>
<td>-3.22</td>
<td>0.0002</td>
</tr>
<tr>
<td>F statistic</td>
<td>149.3128</td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.95999</td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td>0.198229</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen, all coefficients are significant and their signs are also compatible with the theory. The value of \( R^2 \) represents the high explanatory power of independent variable. Meanwhile, the value of F statistic is higher than its tabled value, so we can claim that the whole of regression is significant.

To determine the presence or absence of a separate intercept for each province, the Limer test was examined and used to test among the accumulated and non-accumulated data (stable or random effects). In that test, the hypothesis \( H_0 \) indicates the similarity of intercepts (the combined method) and the hypothesis \( H_1 \) indicates the dissimilarity of intercepts (the Panel method).

The needed Statistic for the above test is F statistic. If the computed F with the degrees of freedom (n-1) and (nt-n-k) is bigger than the table’s F, then the hypothesis H0 is rejected. So the regression is not valid and various intercepts should be considered within the estimation (Ledesma et al, 2001, Lee & chang, 2008, Mobasher, 2011)

Table 2: Test Results of verisimilitude test.

<table>
<thead>
<tr>
<th>Effects Test</th>
<th>Statistic</th>
<th>d.f.</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>section F-Cross</td>
<td>150.5282</td>
<td>(10.46)</td>
<td>0.0000</td>
</tr>
<tr>
<td>square-section Chi-Cross</td>
<td>232.200</td>
<td>10</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

As the value of computed F statistic is equal to 150.52 and bigger than the table’s F statistic, with the confidence level of 95% can be said that the null hypothesis rejects, so the regression is not valid and various intercepts (stable or random effects method) should be considered within the model. The Hausman test is used to examine the stable or random effects.

Table 3: The results of Hausman test.

<table>
<thead>
<tr>
<th>Test Summary</th>
<th>Statistic</th>
<th>d.f.</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>random-Cross</td>
<td>9.1299</td>
<td>9</td>
<td>4254.0</td>
</tr>
</tbody>
</table>

As seen, the obtained Chi-square statistic “9.12” is less than its tabled value and its probability is more than 0.05 (0.42) therefore the null hypothesis based upon the use of stable effects method with the probability of more than 95% rejected. And random effects method for estimating the model was confirmed and used. The results obtained are as follows:

\[
\begin{align*}
\log (t)_{2004} &= 27.99 + 0.29 \log (TJ) + 0.34 \log (TA) - 2.91 \log (SHB) - 0.02 \log (NHN) \\
\log (t)_{2005} &= 27.99 + 0.29 \log (TJ) + 0.34 \log (TA) - 2.91 \log (SHB) - 0.06 \log (NHN) \\
\log (t)_{2006} &= 27.99 + 0.29 \log (TJ) + 0.34 \log (TA) - 2.91 \log (SHB) - 0.12 \log (NHN)
\end{align*}
\]
\[ \log(\text{tt})_{87} = 27.99 + 0.29\log(\text{tJ}) + 0.34\log(\text{TA}) - 2.91\log(\text{SHB}) - 0.21\log(\text{NHN}) \]

\[ \log(\text{tt})_{88} = 27.99 + 0.29\log(\text{tJ}) + 0.34\log(\text{TA}) - 2.91\log(\text{SHB}) - 0.26\log(\text{NHN}) \]

\[ \log(\text{tt})_{89} = 27.99 + 0.29\log(\text{tJ}) + 0.34\log(\text{TA}) - 2.91\log(\text{SHB}) - 0.30\log(\text{NHN}) \]

Table 4: The result of random effects.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Coefficient</th>
<th>T statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>27.99</td>
<td>4.78</td>
<td>00.0</td>
</tr>
<tr>
<td>LOG(tJ)?</td>
<td>0.29</td>
<td>6.43</td>
<td>00.0</td>
</tr>
<tr>
<td>LOG( TA)?</td>
<td>0.34</td>
<td>5.91</td>
<td>00.0</td>
</tr>
<tr>
<td>LOG( SHB)?</td>
<td>-2.91</td>
<td>-2.98</td>
<td>00.0</td>
</tr>
<tr>
<td>LOG(1384)</td>
<td>-2.91</td>
<td>-2.98</td>
<td>00.0</td>
</tr>
<tr>
<td>LOG(1385)</td>
<td>-0.06</td>
<td>-0.48</td>
<td>0.62</td>
</tr>
<tr>
<td>LOG(1386)</td>
<td>-0.12</td>
<td>-0.98</td>
<td>0.32</td>
</tr>
<tr>
<td>LOG(1387)</td>
<td>-0.21</td>
<td>-1.78</td>
<td>0.08</td>
</tr>
<tr>
<td>LOG(1388)</td>
<td>-0.26</td>
<td>-2.32</td>
<td>0.02</td>
</tr>
<tr>
<td>LOG(1389)</td>
<td>-0.3</td>
<td>-2.86</td>
<td>0.00</td>
</tr>
<tr>
<td>F-statistic</td>
<td>8.46</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.57</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Durbin-Watson stat</td>
<td>0.9</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

As seen in table 4, all coefficients, except the variable of hotel price than other provinces’ income during the first 4 years of the study, are significant and their signs are also compatible with the theory. The value of \( R^2 \) represents the high explanatory power of independent variable. Meanwhile, the value of F statistic is higher than its tabled value. So we can claim that the whole of regression is significant.

The coefficient of consumer goods and services’ total index variable (SHB) with the number 2.91 is the most effective variable in the rate of domestic tourism demand. It means if policymakers decrease 1% of the consumer goods and services’ total index, 2.91% of the domestic trips will increase. Therefore, the domestic passengers are so sensitive about the costs which paid in the destination than other variables in the model.

After the consumer goods and services’ total index variable, the highest coefficient belongs to the ratio of the province’s Hotel price than other provinces’ income (NHN). As can be seen the coefficient of this variable increased severely during the years 2005-2010 which means that the price elasticity of this good for domestic tourists has increased over the studied years. The increase of “t” statistic in the last 2 years has been highly significant. The growth rate of Hotel prices has increased than the other provinces’ growth rate of households’ income. The negative sign clearly indicates that there is an inverse relation between the said variables and the number of inbound travelers to the province.

The coefficient of the number of tourist attractions variable is positive and is equal to 0.29. Its sign is consistent with the theory and indicates that there is a direct relation between the number of domestic travelers and the number of tourist attractions of that province. The number of travel and service agencies’ coefficient (TA) is positive and is equal to 0.34. Therefore, this indicates that if 1% of the number of tourism travel and service agencies increase, domestic travel to that province will increase 0.34%.

Conclusion:

Due to the importance of tourism in countries’ economy and earning the high foreign exchange from this area, the author was determined to examine the effective factors on tourism demand. Although this study did not separate the domestic tourism from the foreign tourists but the effective factors can be significant for both types of tourists. Therefore, 11 provinces were selected and their relevant data were collected during the years 2005-2010. Two criteria were considered for selecting the provinces. The first criterion was the number of inbound tourists to these provinces during the study period and the second criterion was related to the number of tourist attractions of each province. These discussed provinces are: Guilan, Mazandaran, Isfahan, Fars, Khorasan, Kermanshah, Qom, Golestan, East Azarbaijan, Ardebil and Yazd.

The introduced model to estimate in this paper was presented as follows:

\[ \log(\text{TT}) = \beta_0 + \beta_1\log(\text{tJ}) + \beta_2\log(\text{TA}) + \beta_3\log(\text{SHB}) + \beta_4\log(\text{NHN}) \]

The above model estimated based on random effects. All coefficients are significant except the variable of hotel price than other provinces’ income during the first 4 years of the study. The signs of all coefficients are also compatible with the theory. The value of \( R^2 \) represents the high explanatory power of independent variable. Meanwhile, the value of F statistic is higher than its tabled value. So we can claim that the whole of regression is significant.
The coefficient of consumer goods and services’ total index variable (SHB) with the number 2.91 is the most effective variable in the rate of domestic tourism demand. It means 1% decrease in the total index of consumer goods and services will increase 2.91% of the domestic trips. So the third hypothesis is confirmed.

After this variable, the highest coefficient belongs to the ratio of the province’s Hotel price than other provinces’ income (NHN). The coefficient of this variable increased severely during the years 2005-2010 which means that the price elasticity of this good for domestic tourists has increased over the studied years. The existence of negative sign clearly shows that there is an inverse relation between the said variable and the number of inbound travelers to the province. So this result confirms the fourth hypothesis of this study.

The coefficient of the number of tourist attractions variable is positive and is equal to 0.29. Its sign is consistent with the theory and indicates that there is a direct relation between the number of domestic travelers and the number of tourist attractions of that province. So the first hypothesis is confirmed. The number of travel and service agencies’ coefficient (TA) is positive and is equal to 0.34 which means the second hypothesis is confirmed.

References


