EXPENDITURE-BASED SEGMENTATION: TRAVEL EXPENDITURES OF BABY BOOMER SENIOR HOUSEHOLDS IN TAIWAN

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ABSTRACT

Because of the substantial size of senior population, the demand of senior population draws much attention and becomes the silver economy or senior market. Baby boomers, a specific focus of our research interest, refer to people who were born after World War II. The purpose of this paper is to estimate the socio-demographic and economic determinants of travel expenditures in baby boomer senior households in Taiwan. In this study, the traditional ordinary least square approach (OLS) together with the quantile regression analysis are adopted to capture both the mean and quantile behaviors of the baby boomer households’ travel expenditures, using the 2008 Survey of Family Income and Expenditure (SFIE) in Taiwan. The OLS model can be used to obtain the average (mean) expenditure behavior, while quantile regression analysis is able to capture the extreme behaviors of the two tails of baby boomer households’ travel expenditures. The estimation outcomes have important policy implications for travel marketers and operators in the tourism industry to understand the baby boomer senior consumers.

Keyword: Baby boomer, Travel expenditure, Quantile regression
1. INTRODUCTION

According to World Population Ageing 2009 reported by United Nations, approximately 737 million people were aged above 60 in 2009, comprising 11% of the total population. After the end of World War II in 1945, a significant number of babies, i.e., the generation of baby boomers, were born globally. As the baby boomer generation enters old age, the aging population phenomenon will be even more prominent. It is estimated that 2 billion people will be of old age by 2050, comprising 22% of the total population (UN, 2009, p.11). Taiwan is one of the countries with a rapid aging population. In 2010, people above 65 years old comprised approximately 10.7% of the population. The Council for Economic Planning and Development forecasted that the proportion of senior citizens will exceed 20% by 2025, meaning one of every five people will be a senior citizen (Council for Economic Planning and Development, 2010). Beginning in 2010, as the numerous baby boomers born after WWII started reaching 65 years old, the elderly population has been increasing rapidly (DaVanzo, 2001). This major transformation of demographics has attracted much attention regarding the demand of an aged population and how a silver economy or senior market is shaped and developed. The senior population born after WWII is expected to be the major consumers of the senior market.

Because of the generous pension and comprehensive social welfare system, the baby boomers born after WWII in the U.S. had greater consumption ability than preceding generations did (Mitchell, 2003, p.28). In Taiwan, this baby boomer generation experienced land reform in the 50s, witnessed Taiwan becoming one of the Four Asian Tigers due to successful industrialization in the 70s and 80s, and observed the flourishing of the high-tech industry in the 90s (Yuwa, 2007). This generation not only laid the foundations for Taiwanese economics but also amassed a fortune for the country and themselves. Consequently, their consumption ability was greater than that of the generation preceding them. Yuwa Hedrick-Wong, Chief Economic Adviser of MasterCard International Asia-Pacific region in Asia, while investigating data of the Asia region in MasterCard’s global database, found that the total consumption ability of elderly families was US$22.7 billion in 2005 and was estimated to reach US$47.5 billion by 2015; the annual growth rate was approximately 7.7% on average (Yuwa, 2007).

Because the economics, education, and medical technology have improved significantly, the post-war baby boomers have greater consumption ability, education levels, and health conditions than previous generations did. Baby boomers are also a very active generation. Therefore, they have a more positive attitude towards retirement planning and a higher
acceptance of travel and recreation expenditures. Yuwa (2007), while examining the unnecessary expenditure of elderly families in Taiwan, found that unnecessary expenditures accounted for US$12.5 billion in 2005, and was estimated to reach US$19.1 billion by 2015. Traveling and leisure activities were the main unnecessary expenditure of elderly families, the amount spent in 2005 was US$7.2 billion and was estimated to reach US$11.2 billion by 2015, accounting for 57.6% and 58.6% of total unnecessary expenditure in 2005 and 2015. These figures suggested that traveling and leisure activities were regarded as one of the most important activities by elderly families (Yuwa, 2007). Moreover, the total consumption ability of Taiwanese elderly families indicated the total consumption ability will increase by US$24.8 billion dollars between 2005 and 2015; the unnecessary expenditure will increase by US$6.6 billion and expenditure on traveling and leisure activities by US$4.4 billion (Yuwa, 2007). In addition to the substantial increase in traveling expenses by elderly families, the data indicated people aged between 50 and 59 took approximately 960,000 trips abroad in 2000, increasing to 1.64 million trips in 2008; people aged above 60 made 830,000 trips abroad in 2000, increasing to 925,000 trips in 2008 (Taiwan Tourism Bureau, 2009). The data suggested that the elderly population not only travels domestically with enthusiasm, traveling abroad had also become a popular option. Travel and consumption by the elderly population were changing and increasing rapidly.

The silver consumers have had numerous varied experiences over the course of their life, thus, their demands and preferences tend to vary greatly (Moschis, 2003). Cai et al. (1995) analyzed senior travelers’ spending behaviors and found that when choosing and purchasing travel products and services, seniors are influenced by numerous socio-economic and cultural factors, resulting in many different spending behaviors. The authors believe the main reasons influencing the varied spending behaviors are health conditions and social and environmental differences. Considering Taiwan's economic development and the changes in medical technology and society, baby boomers were afforded better health conditions, economic opportunities, and education than the previous generation. Therefore, the consumption behavior of elderly baby boomers will differ from that of elderly people from previous generations.

The data on rapid population aging merely presents the overall social transformation phenomenon. As for the elderly, social norms and constraints will alter the style of their leisure activities. Modern society’s retirement system, in particular, will be a significant influence (McGuire et al., 2004, p. 137). Post-war baby boomers lived in a better society with improved policies. Their health, nutrition, and medical care were better than that of the preceding generations. In addition, this generation was the first to enjoy numerous automatic
products and television from childhood, enabling them to manage more active lives (Moschis, 2003; Jang and Ham, 2009). Gladwell and Bedini (2004) indicated that, as the post-war baby boomers are entering retirement, the leisure and tourism market has significant growth potential. In this phase of consumer market changes driven by demographic changes, elderly-related industries face significant challenges determining who their target consumers are and what their demand is. Therefore, the purpose of this study is to analyze and understand the market scale and consumer behavior of the elderly tourism market. This study examines the traveling expenditure of post-war baby-boomer families to explore factors that influence traveling expenditure of baby boomer senior households. The results can provide a reference for domestic and international travel-related industries establishing marketing strategies and developing new forms of traveling merchandise in this phase of rapid demographic change.

Previous studies related to leisure and travel expenditures can discuss and analyze consumer behavior and the crucial factors that influence the target market to provide an important reference and suggestions as companies creating travel and leisure marketing strategies and the government developing related policies. Frechtling (1994) indicated that since studies of travel expenditures provide detailed information to estimate the economic benefits of the travel industry, studying travel expenditures provide critical analysis of the travel economic impact model. In 1980, numerous researchers began to study and analyze leisure and travel expenses, investigating the influences of social, demographic, economic, cultural, life cycle characteristics, and travel features on travel expenditures (Jang and Ham, 2009). Household income and expenditure figures were often used by researchers as data for their studies.

The major purpose of this paper was to estimate the socio-demographic and economic determinants of travel expenditures in baby boomer senior households in Taiwan. The OLS model was commonly used in leisure and travel expenditure studies to capture the average (mean) expenditure behavior. Since not all households behaved like an average expenditure household, it was valuable to find out not only the average difference across groups but also the differences between the higher and lower ranges across the households. Knowing the behavior of higher-expenditure households in comparison to lower-expenditure spenders can help tourism planners establish marketing strategies. Unlike previous studies, therefore, the OLS together with the quantile regression analysis are adopted to capture both the mean and quantile behaviors of the baby boomer households’ travel expenditures, using the data of 2008 Survey of Family Income and Expenditure (SFIE) in Taiwan. Koenker and Hallock (2001) have indicated that quantile regression may be viewed as a natural extension of the
classical least squares estimation of conditional mean models to the estimation of an ensemble of models for conditional quantile functions.

The remainder of the paper is as follows. Section 2 introduces the econometric approaches and data set. The results of the empirical estimation are analyzed in Section 3. Finally, concluding remarks and policy implications are given in Section 4.

2. ECONOMETRIC APPROACHES AND DATA SET

2.1 Empirical models

OLS model has been commonly used in leisure and travel expenditure studies to capture the average (mean) expenditure behavior. Dardis et al. (1981), Davies and Mangan (1992), and Jang et al. (2004) used the OLS model to analyze travel and leisure expenditures. Dardis et al. (1981) analyzed the travel expenses provided by the Consumer Expenditure Survey conducted by the U.S. Bureau of Labor Statistics in 1972 and 1973 using the OLS regression model. Results suggested that the main factors influencing a family’s leisure expenses include income, number of adults in the family, age of the householder, race, and educational achievement of the householder. The study also suggested that the elderly might have a crucial impact on leisure industries, and recommended researchers to investigate leisure expenses using sample groups with different demographic variables in the future. In follow-up studies, Weagley and Huh (2004a, 2004b), Hong et al. (2005), and Jang and Ham (2009) analyzed the leisure expenses and factors influencing expenditure using U.S. data. They separated families into various sample groups based on the age of householders and different family characteristics, and then analyzed the data.

As for previous studies using Taiwanese subjects, Chen (2009) analyzed family leisure expenses based on the data of SFIE in Taiwan. This study classified leisure expenditures into the categories of “travel,” “entertainment services,” “books and magazines,” and “entertainment equipment and accessories,” and estimated family expenditure behaviors in each category separately. The results indicated that the age of household head is the major factor influencing expenses in each category. In addition, Yu and Hsu (2009) used the OLS model and the quantile regression model to analyze travel and leisure expenditure. They separated all samples into the three subject groups, including “all families,” “nuclear families,” and “non-nuclear families”, to investigate the families’ travel and leisure expenditure and conduct comparisons. In previous studies, no categorization based on the age of household heads were conducted targeting Taiwanese families, therefore, conclusions cannot be drawn on the impact of different factors on families where household heads are of
different ages.

In this study, the regression models were estimated to investigate the relationships between the household socio-demographic and economic characteristics and travel expenditures in baby boomer senior households in Taiwan. The equation can be expressed as follows:

\[ Y_i = \alpha_0 + \sum \beta_j X_{ij} + \epsilon_i \]  (1)

where \( Y_i \) is the total travel expenditure of the \( i \)th household in 2008; \( \alpha_0 \) is a constant term; \( \beta_j \) is a vector of coefficients of the \( j \)th independent variables, \( X_{ij} \) is a vector of the \( j \) independent variables, and \( \epsilon_i \) is the error terms.

Numerous literatures indicated that a variety of factors determine travel expenditure. In all studies, income was the most important factor. It was hypothesized that income would have a positive impact on travel expenditures based on previous studies by Cai et al. (1995), Dardis et al. (1981), Dardis et al. (1994) and Chen (2009). Home ownership was another important economic factor, which was hypothesized had a positive influence on travel expenditures (Cai et al., 1995; Dardis et al., 1981; Dardis et al., 1994; Jang and Ham, 2009; Chen, 2009). In addition, some studies showed that higher education level of household head had higher travel spending (Cai et al., 1995; Dardis et al., 1981; Dardis et al., 1994; Jang and Ham, 2009; Chen, 2009). Age of household head was also important factor, although the impact of this variable on travel expenditure did not generate consistent results (Cai, 1999; Dardis et al., 1994). The number of children in a family (Cai et al., 1995) was a negative factor, while the family size (Cai, 1999; Dardis et al., 1994) did not generate consistent results, either positive or negative, in senior household travel expenditure (Cai, 1999; Dardis et al., 1994). Finally, household Internet access was usually used as indicators of information accessibility and had a positive impact on travel expenditures (Hung et al., 2012).

Therefore, in this paper, the travel expenditure equation of baby boomer senior household is given as

\[ Y_i = \alpha_0 + \beta_0 \text{Income}_i + \beta_1 \text{HE}_1 + \beta_2 \text{HE}_2 + \beta_3 \text{HE}_3 + \beta_4 \text{Age}_i + \beta_5 \text{Sex}_i + \beta_6 \text{Pop}_i \\
+ \beta_7 \text{Children}_i + \beta_8 \text{Internet}_i + \beta_9 \text{House}_i \]  (2)

where

\( Y_i \): Travel expenditure of the household in 2008

\( \text{Income}_i \): Family income in 2008 (Unit: NT$1000)
HE_{ij}, HE_{2j}, HE_{3j}: Education of household head. We set four categories and there are three dummy variables to label the categories, i.e., $HE_{ij}, HE_{2j}, HE_{3j}$. $HE_{ij} = 1$, $HE_{2j} = 1$, and $HE_{3j} = 1$ mean the household head has junior high school, high school, and college degrees, respectively.

$Age_i$: Age of household head (age in years)

$Sex_i$: Sex of household head 1 if male, 0 if female.

$Pop_i$: Household size. The number of household members

$Children_i$: The number of children (All individuals below twelve years of age were treated as children.)

$Internet_i$: Household Internet access. 1 if the family has internet access, 0 otherwise.

$House_i$: Home ownership. 1 if homeowner, 0 otherwise.

Equation (2) can be estimated using OLS. We will normally obtain OLS results that are based on the conditional mean where the focus is only on the mean expenditure behavior. However, as a policy-maker or a tourism marketer, they are not merely interested in the conditional mean expenditure behavior but also the extreme consumption behavior. To obtain a more complete picture of the different quantiles, we can also consider several different regression curves that correspond to the various percentage points of the distributions and not only the conditional mean distribution which neglects the extreme relationship between variables. The empirical results based on the quantile regressions lead to much more meaningful and interesting policy implications. Thus, the quantile regression methodology of Koenker and Basset (1978) will be applied to equation (2) in this study.

Based on the study of Koenker (2005), a general method for estimating models of conditional quantile functions can be expressed as the solution to a simple optimization problem underlying the least squares model. If the least regression model is set as in equation (3):

$$y_i = x_i \beta + u_i$$

Then the estimation of $\beta$ can be expressed by solving the following function:

$$\min_{\beta} \sum_{i=1}^{n} (y_i - x_i \beta)^2$$

Similarly, Koenker and Bassett (1978) point out that the $\tau$th sample quantile, $\hat{\alpha}(\tau)$, can be found by solving equation (5).
\[
\min_{\beta \in \mathbb{R}^p} \sum_{i=1}^n \rho_\tau(y_i - x_i' \beta) \tag{6}
\]

The estimation of \( \hat{\beta}(\tau) \) raises two problems. First, the estimator is constrained by the objective function, eq. (6), which is not a continuous function. Koenker and d’Orey (1987) propose using a linear programming method to facilitate the parametric estimation of the quantile regression. Second, the nuisance parameters of the covariance matrix are constrained so that different quantiles have different covariance matrices to be estimated. Moreover, for each quantile, one should estimate a sparsity function which is the reciprocal of the disturbance density function in the estimating quantile. Thus, the estimation of the quantile regression asymptotic solutions is quite involved. In the following, we employ the reliable bootstrap method of XY-pair bootstrap to build the confidence interval for \( \hat{\beta}(\tau) \).

### 2.2 The data

Data of household income and expenditure provides information regarding household income, society, demographics, and the economy of a particular country. The U.S. Bureau of Labor Statistics indicated that the survey results of household income and expenditure of U.S. families are frequently used in research of consumer economics (U.S. Department of Labor, 2005). In this study, the data was obtained from 2008 SFIE in Taiwan.

This study analyzed the expenditures of the sub-sample populations, i.e. elderly families of post-war baby boomers in Taiwan, to provide more detailed information for further reference. The American Association of Retired Persons (AARP) defined post-war baby boomers as people born between 1946 and 1964 (AARP, 2004). The survey data used in this study was collected in 2008, and people born between 1946 and 1964 would have been between 45 and 64 years old in 2008. Therefore, the baby boomer senior households were defined as households headed by those 45-64 years old.

Among the 6,154 baby boomer households, 5,154 reported positive travel expenditures in 2008, meaning that 83.8% traveled and 16.2% did not. If a high ratio of the observed consumption expenditure was restricted to zero, the samples were not normally distributed. If the large number of zero travel expenditures included in samples, using the OLS model to
estimate the socio-demographic and economic determinants of travel expenditures might cause the results to be biased and inconsistent (Jang and Ham, 2009; Wu et al., 2004). The data of this study, therefore, were excluded the households of zero travel expenditure to avoid the biased and inconsistent estimated results. The final effective sample included 5,154 observations in this paper, which were reported positive travel expenditures.

3. RESULTS

3.1 Data description

Data of this research was obtained from 2008 SFIE in Taiwan, complied by the Directorate-General of Budget, Accounting and Statistics, Executive Yuan. The baby boomer senior households were defined as households headed by those 45-64 years old in 2008 in this study. Among the 6,154 baby boomer households, 5,154 reported positive travel expenditures in 2008, while 1,000 households reported zero travel expenditure. In order to avoid the biased and inconsistent estimated results, which were resulted from too many zero expenditure, therefore, the data of this study were excluded the households of zero travel expenditure. The final effective sample included 5,154 observations in this paper. Descriptive statistics of the variables can be found in Table 1.

The mean travel expenditure of the baby boomer group was NT$ 28,628.5. The mean annual household income of baby boomers was NT$ 1,400,652. Mean age of household head for baby boomers was 52.5. An average baby boomer household consisted of 3.6 persons, so 74.9% of baby boomer households had 3 or more members. Most boomers were evidently a less educated group, with 70.3% having a high school education or less. Most of the households in the sample reported that they owned their homes (90.4%) and had Internet access in their houses (75.4%).

Table 1 Descriptive Statistics of Sample (n=5,154)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (%)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Expenditure</td>
<td></td>
<td>NT$ 28,628.5</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td>NT$1,400,652</td>
</tr>
<tr>
<td>Education of household head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than senior high school</td>
<td>1,068 (20.7%)</td>
<td></td>
</tr>
<tr>
<td>Senior high school</td>
<td>969 (18.8%)</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>1,586 (30.8%)</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>1,531 (29.7%)</td>
<td></td>
</tr>
<tr>
<td>Age of household head</td>
<td></td>
<td>52.5</td>
</tr>
<tr>
<td>Sex of household head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variables</td>
<td>Frequency (%)</td>
<td>Mean</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Male</td>
<td>3,962 (76.9%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1,192 (23.1%)</td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>1 member</td>
<td>349 (6.8%)</td>
<td></td>
</tr>
<tr>
<td>2 members</td>
<td>941 (18.3%)</td>
<td></td>
</tr>
<tr>
<td>3 or more</td>
<td>3,863 (74.9%)</td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Yes</td>
<td>3,886 (75.4%)</td>
<td></td>
</tr>
<tr>
<td>(No)</td>
<td>1,268 (24.6%)</td>
<td></td>
</tr>
<tr>
<td>Home Ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4,661 (90.4%)</td>
<td></td>
</tr>
<tr>
<td>(No)</td>
<td>493 (9.6%)</td>
<td></td>
</tr>
</tbody>
</table>

### 3.2 Empirical Results

As explained in Section 2.1, we investigated the socio-demographic and economic determinants of travel expenditures in baby boomer senior households using both OLS model and quantile regression analysis. The traditional OLS model could obtain the average expenditure behavior, while quantile regression analysis was used to capture the extreme behaviors of the two tails of baby boomer households’ travel expenditures. The econometric software applied to complete the OLS and quantile estimations is the EViews 7.0. The estimations for the quantiles were $\tau = 0.10, 0.25, 0.50, 0.75, 0.90$, and the reliable bootstrap method of XY-pair bootstrap was used to build the confidence interval for $\hat{\beta}(\tau)$. We employed 100 bootstrap replication samples in this study. Table 2 reports the results of the travel expenditure analyses for baby boomer senior households using OLS and quantile regressions. The effects of the independent variables were discussed below.

**Income.** In the OLS estimate, the mean effect of income was found to be significantly positive which indicated that higher income was the positive factor of baby boomer households with higher travel expenditures. Such finding was consistent with the studies by Cai *et al.*, (1995), Dardis *et al.* (1981), Dardis *et al.* (1994) and Jang and Ham (2009). In addition, the quantile estimates showed that the minimum effect of income was in the 0.1 quantile, while the maximum effect was in the 0.9 quantile. The policy implication for the important economic factor indicated that the positive impacts of income on travel expenditure for higher-expenditure households were stronger than those for lower-expenditure households.
Table 2 Estimates of Travel Expenditure t to OLS and Quantile Regressions

<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS</th>
<th>Quantile Regressions</th>
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<th></th>
<th></th>
<th></th>
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<tr>
<td></td>
<td>Quantile $\tau$</td>
<td>0.10</td>
<td>0.25</td>
<td>0.50</td>
<td>0.75</td>
<td>0.90</td>
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</tr>
<tr>
<td>Intercept</td>
<td>-21719.88**</td>
<td>-840.36</td>
<td>-2846.00**</td>
<td>-7698.60**</td>
<td>-15756.57**</td>
<td>-28976.17**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-2.65)</td>
<td>(-1.01))</td>
<td>(-2.71)</td>
<td>(-3.61)</td>
<td>(-4.28)</td>
<td>(-2.87)</td>
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</tr>
<tr>
<td>Income</td>
<td>29.42**</td>
<td>2.60**</td>
<td>6.41**</td>
<td>14.64**</td>
<td>34.69**</td>
<td>59.20**</td>
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</tr>
<tr>
<td></td>
<td>(35.71)</td>
<td>(10.23)</td>
<td>(16.75)</td>
<td>(17.82)</td>
<td>(18.19)</td>
<td>(15.16)</td>
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<tr>
<td>$HE_1$</td>
<td>2832.99</td>
<td>155.09</td>
<td>660.27**</td>
<td>691.15**</td>
<td>1404.19**</td>
<td>5515.34**</td>
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<tr>
<td></td>
<td>(1.33)</td>
<td>(0.95)</td>
<td>(3.07)</td>
<td>(1.92)</td>
<td>(2.13)</td>
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<tr>
<td>$HE_2$</td>
<td>3221.07*</td>
<td>168.98</td>
<td>497.85**</td>
<td>1082.77**</td>
<td>2533.13**</td>
<td>6525.44**</td>
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<tr>
<td></td>
<td>(1.65)</td>
<td>(1.05)</td>
<td>(1.99)</td>
<td>(2.45)</td>
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<tr>
<td>$HE_3$</td>
<td>11906.51**</td>
<td>1149.53**</td>
<td>2105.53**</td>
<td>4330.29**</td>
<td>14293.64**</td>
<td>32604.68**</td>
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<tr>
<td></td>
<td>(5.64)</td>
<td>(5.14)</td>
<td>(5.41)</td>
<td>(5.47)</td>
<td>(5.58)</td>
<td>(7.27)</td>
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<tr>
<td>Age</td>
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<td>17.79</td>
<td>42.29**</td>
<td>118.82**</td>
<td>279.82**</td>
<td>567.27**</td>
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<tr>
<td></td>
<td>(2.52)</td>
<td>(1.26)</td>
<td>(2.40)</td>
<td>(3.45)</td>
<td>(4.59)</td>
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<tr>
<td>Sex</td>
<td>-4116.35**</td>
<td>-83.35</td>
<td>-149.03</td>
<td>-558.86</td>
<td>-2059.90**</td>
<td>-6024.81**</td>
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<td></td>
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<td>(-0.53)</td>
<td>(-0.76)</td>
<td>(-1.59)</td>
<td>(-3.20)</td>
<td>(-2.87)</td>
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</tr>
<tr>
<td>Pop</td>
<td>-4456.84**</td>
<td>-78.43</td>
<td>-470.27**</td>
<td>-1394.01**</td>
<td>-4247.29**</td>
<td>-7641.02**</td>
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<tr>
<td></td>
<td>(-7.74)</td>
<td>(-0.89)</td>
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<td>Children</td>
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<td>526.29*</td>
<td>1661.52**</td>
<td>3114.34**</td>
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</tr>
<tr>
<td></td>
<td>(1.12)</td>
<td>(-0.09)</td>
<td>(1.56)</td>
<td>(1.49)</td>
<td>(2.72)</td>
<td>(2.39)</td>
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<td>Internet</td>
<td>3880.81**</td>
<td>495.73**</td>
<td>351.75</td>
<td>414.76</td>
<td>-166.67</td>
<td>1268.40</td>
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<tr>
<td></td>
<td>(2.25)</td>
<td>(3.34)</td>
<td>(1.55)</td>
<td>(1.19)</td>
<td>(-0.23)</td>
<td>(0.70)</td>
<td></td>
</tr>
<tr>
<td>House</td>
<td>2161.69</td>
<td>159.76</td>
<td>222.08</td>
<td>286.84</td>
<td>-374.93</td>
<td>1518.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.99)</td>
<td>(1.04)</td>
<td>(1.21)</td>
<td>(0.91)</td>
<td>(-0.57)</td>
<td>(0.99)</td>
<td></td>
</tr>
</tbody>
</table>

Note: ** and * denote significance at the 5% and 10% levels, respectively. Numbers in parentheses are $t$-values. The $t$-values of the quantile regressions are obtained by employing the bootstrapped standard errors of XY-pair bootstrap.

**Education of household head.** The estimated results from OLS model indicated that the mean effects of the household head’s education level are most significantly positive. The mean effects are 3221.07 and 11906.51 when the household heads have high school and college degrees, respectively. Dardis et al. (1981) indicated that higher education levels could provide training and preparation for some type recreation activities. In addition, higher education levels allowed better access to obtain information and knowledge about travel and recreation activities (Cai et al., 1995). Our results are in agreement with previous studies by Dardis et al. (1981), Cai et al.(1995), and Jang et al. (2004). Moreover, the quantile
regression results showed that the impacts of the householder’s education level were both positive and increasing along with increasing alternative quantiles. The increasing trends implied that the effect of the householder’s education level was stronger in the higher quantiles.

**Age of household head.** With regard to the relationship between age and travel expenditure, the OLS estimated results showed that older households’ families spent more than younger households’ families. Moreover, the quantile regression results indicated that the impact of the age of household head was both positive and increasing along with increasing alternative quantiles. The increasing trends showed that the effect of the householder’s age was stronger in the higher quantiles. The 2009 Report of the Survey of Senior Citizens’ Condition, that was an important report regarding to elderly persons in Taiwan, showed that 66.41% seniors (55-64 years old) reported well health and body conditions (Ministry of the Interior, 2009). Although people born between 1946 and 1964 would have been between 45-64 years old in 2008, better public health, nutrition and medical advances might make this generation of seniors healthier. Along with increasing age, the baby boomer generation did not pay less money for traveling and recreation. On the contrary, because older boomers became retired or near-retired, they were willing to pay more money for better value and traveling.

**Sex of household head.** The OLS estimate showed that female-headed households had a significant and negative effect on travel expenditure. The quantile regression estimates of Table 2 showed that there were significant effects on 0.75 and 0.9 quantiles. The results of quantile regressions implied that higher-expenditure households with a female head spent less on traveling behavior.

**Household size.** The number of family members in the household had significant and negative impacts in OLS results and most alternative quantile regression models. Crawford and Godbey (1987) indicated that household size was a representative indicator of the so called *interpersonal barriers*. Numerous researches showed that the household size played an important and negative role in travel expenditure decisions, as large family size restricted traveling spending (Eymann and Ronning, 1997; Nicolau and Más, 2005).

**The number of children.** The OLS results showed that the average expenditures are not significantly affected by *Children* as the households increased the number of children by one child. However, the quantile regression estimates of Table 2 showed that there were significant effects on 0.5, 0.75 and 0.9 quantiles, which implied that the travel expenditures of higher-expenditure households were affected positively when they had more children.
**Household Internet access.** The OLS estimated outcome showed that the average expenditures are significantly positive affected by *Internet* as the households had Internet access. However, the quantile regression estimates presented that there is only significant positive effect on 0.1 quantile, which implied that those households’ expenditures were affected when these lower-expenditure households had Internet access. This result provides an interesting point which implies that the household Internet access influences the lower-expenditure households, but does not significantly affect the higher-expenditure households.

**Home ownership.** In some studies, home ownership was another positive and important economic factor for household travel expenditure (Cai, 1999). However, both the OLS and quantile regression results showed that the expenditures were not significantly affected by home ownership in the travel expenditures of baby boomer households in Taiwan.

### 4. CONCLUDING REMARKS AND POLICY IMPLICATIONS

With such a large demographic shift, the senior market, especially for baby boomers, has become one of the most important consumer segments. It is important that senior travel industries must to obtain the information or knowledge as to who their consumers are and what their consumers need. The main purpose of this study was to investigate the socio-demographic and economic determinants of travel expenditure in baby boomer senior households using both OLS and quantile regression approach to catch the behaviors of two tails of households’ expenditures. There were some differences in the impacts of the independent variables on the mean and alternative quantile behaviors of the baby boomer households’ travel expenditures suggesting that it was appropriate to estimate each quantile behavior separately. There were certain implications for policy based on the above empirical results and findings.

First, there were two economic factors included in this study, namely income and home ownership. As to the relationship between income and travel expenditures, the OLS results showed that the mean effect of income was found to be significantly positive, while the quantile estimates presented that the minimum significant effect of income lies in the 0.1 quantile, while the maximum significant effect was in the 0.9 quantile. The results implied that the positive impacts of income on travel expenditure in all quantiles, and the effects on higher-expenditure households were stronger than those on lower-expenditure households. When travel expenditure was considered those baby boomer seniors who have more money might be the better target market for travel marketers.
The second major findings in this study indicated that education level of household head was another major and positive variable, while older households spent more on travel activities than younger households, particular for higher-expenditure households. Female headed households spent less than male households. Thus, an increase in the proportion of older households or the rising levels of education would increase expenditure on travel activities. However, these two positive effects might be offset by the increase in the proportion of female headed households in the future.

Finally, the results showed that the number of family members in the household had significant and negative impacts both in OLS and in most alternative quantile regression models. This implied that the large family size might restrict traveling spending. On the other hand, the results of quantile regression estimates showed that there were significant positive relationships between the number of children and travel expenditures in higher-expenditure households. Marketers could target the baby boomer households which had children when probability of travel was considered. This finding was also useful in developing marketing strategies, such as products and services positioning and promotion. As for practical application to the products and services positioning and promotion, the service and activity which was designed suitably for both elderly and children could increase the traveling demands of baby boomer households.

REFERENCES


