Demographic Structure and Household Tourism Decisions Based on Microdata

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Abstract. Due to the differences of demographic structure, household tourism preference and travel choice behavior are more microcosmic. Based on a large nationwide sample of micro-household survey data, some mathematical models are used to empirically study the influence of demographic structure on the decision-making behavior of household tourism in China. Our research shows that the relationship between the proportion of the elderly in a family and the tourism decision of the family is not always an inverse proportion, which only exists in the non-elderly families with younger heads. However, for the elderly families with older heads, the proportion of the elderly population is a positive factor to promote the increase of household tourism intention and tourism expenditure. It shows that the aging of the population has not only brought challenges to China's tourism industry, but also brought opportunities for sustainable development.

1. Introduction
Demographic structure is an important factor affecting China's current and future economic and social development. Demographic Change and Tourism, a report by the World Tourism Organization and the European Travel Commission in 2010, identified demographics as an important external factor affecting tourism demand and development[1]. It is generally believed that at different stages of life cycle, influenced by factors such as disposable income, leisure time and family relationship, people tend to have different travel motivations and thus make different tourism decisions. Lawson argues that based on the randomness of tourism expenditure and the complexity of tourist classification criteria, it is necessary to study tourism decision-making behavior based on family life cycle theory[2]. Oppermann believes that the life cycle of tourism research mainly involves changes in the behavior of individuals over their lifetime, which are generally related to changes in family structure[3]. At present, most of tourism research from the demographic perspective focuses on the analysis of market potential of specific groups and the development of related products, while there are relatively few studies on tourism expenditure preference based on the demographic characteristics based microscopic data. In this paper, based on the large sample of micro-household survey data in China, some quantitative models are used to analyze the tourism decision-making behaviors of groups with different population characteristics, focusing on the differences in the impact of family heterogeneity characteristics on household tourism expenditure decision-making.

2. Data and Model

2.1. Data
Our research is based on the micro household data from a large sample, which is mainly from the China Household Finance Survey (CHFS). CHFS is a nationwide sample survey conducted by China Household Finance Survey and Research Center to collect information on the micro level of household finance. Since 2011, China Household Finance Survey and Research Center has conducted sample surveys on households across the country every two years. At present, it has successfully conducted four surveys in 2011, 2013, 2015 and 2017 respectively. We adopt the latest national survey data in 2017.

2.2. Variable

Variables in this paper are mainly divided into the following three categories:

Bernini and Cracolice point out that there are two stages in a tourism decision: "Do you travel or not?" And "How much is the expenditure of travel?". Accordingly, the explained variable in this paper is set as two: one is the tourism incidence $I_{Tour}$. If the sample families have travel records in 2016, the value is 1; otherwise, the value is 0. The ratio of elderly population $Old$ is the core explanatory variable of this paper, which is the ratio of the number of elderly people over 60 years old in a family to the total family population. In order to further study the differences in the impact of family structure on tourism expenditure, we take the age of head of household $Age$ as the regulating variable and focus on whether there are differences in the impact of the proportion of elderly population on household tourism with the change of age of head of household. Referring to the existing literature on factors affecting household tourism expenditure, we also introduce the following control variables: (1) household economic status: $Income$ and $NetAssets$. Total household income is the sum of all the family members' wage income, operating income, property income and transfer income in the past year. Household net assets are the balance of total family assets deducting total family liabilities, which represents the assets truly belonging to family members. (2) household characteristics: $Child$. It means the number of children under the age of 16 in a family. (3) Characteristics of household head: $Male$ and $Marriage$. Wells and Gubar used the example of young men, who had more disposable income before marriage, but less related recreational activities after marriage due to increased expenditures on family responsibilities[4]. If the household head is male, then the variable $Male$ is set to 1, otherwise it is 0. The value of the variable $Marriage$ is 1 when the head of the household is married, and 0 in other cases.

Next, we divided all sample families into elderly families and non-elderly families according to whether the head of household was elderly or not. Table 1 gives descriptive statistics of the classification of the two types of families. If the head of a family is an elderly person over 60 years old, we treat the family as an elderly family, otherwise, it is considered as a non-elderly family. In Table 1, "Full" represents all sample families, "Non-OldH" represents non-elderly families and "OldH" represents the sample of elderly families. As can be seen from Table 1, among the 40,011 families, there are 16,052 elderly families, accounting for 40%. There were 23,959 non-elderly households, accounting for 60%. In terms of the age of the head of household, the average age of the head of household in China is 55 years old, which means that there is indeed a large number of elderly families in China. According to the tourism decision-making data of Chinese families, the incidence of household tourism in the whole sample is only 21%, which is generally at a low level. It can be seen from the comparison of the two kinds of household tourism decision data that the difference is also quite obvious. We further analyze the travel consumption data of Chinese families, and the average travel consumption is 2,128 yuan, which is actually a relatively low number. The average travel spending of elderly families was only 1,671 yuan, 31 percent lower than that of non-elderly families. In terms of family income, elderly families are also significantly lower than non-elderly families. The annual income of elderly families is 64,400 yuan, 39 percentage points lower than that of non-elderly families. We take total household assets minus total liabilities to get household net worth, and in terms of household net worth, non-elderly households are also 19% higher than elderly households.

|       | Full | Non-OldH | OldH  | Diff  |
|-------|------|----------|-------|-------|
| Obs   | 40011| 23959    | 16052 | -33%  |
| $I_{Tour}$ | 0.21 | 0.23     | 0.18  | 5%    |
2.3. Model Design
Due to the incidence of travel (question: have you ever traveled in the past year?) \( I_{Stour} \) is a discrete variable. Probit model is adopted in this paper to investigate the incidence of household tourism. The specific form of the model is as follows:

\[
I_{Stour_i} = \frac{1}{1 + e^{\exp(-\alpha + \sum \beta_i x_{ij})}}
\]  

(1)

In equation (1), \( I_{Stour_i} \) represents the probability that the family chooses to travel and \( X_{ij} \) represents explanatory variables, which mainly include the proportion of old population, age of the head of the household, household total income, household net asset, number of children, gender and marriage of head of the household. To further consider the influencing factors of household tourism expenditure, we also establish a multiple linear regression model to investigate the household tourism expenditure. The model is as follows:

\[
Tourism_i = \beta_0 + \beta_1 Old_i + \beta_2 Age_i + \beta_3 Old_i \times Age_i + Control_i + \varepsilon_i
\]  

(2)

In both equation (1) and equation (2), we introduce the interaction term between the proportion of the elderly and the age of the head of the household \( Old_i \times Age_i \) to investigate whether the moderating effect of the age of the head of the household is valid.

In order to reduce the possible heteroskedasticity in the model estimation, we took the logarithm of family travel spending \( Tourism \), family income \( Income \) and family net assets \( NetAssets \). At the same time, the model was tested by multicollinearity in this paper, and it was found that the mean variance inflation factor (VIF) was 1.5, far lower than the multicollinearity criterion of VIF equal to 10. At the same time, the absolute value of correlation coefficient between all variables is below 0.3, which can exclude the existence of multicollinearity in the model.

3. Estimated results

3.1. Incidence of household tourism
The estimated results of tourism incidence based on the Probit model are shown in Table 2. One, two and three asterisks denote significance at the 10%, 5% and 1% levels, respectively. Model (1) and model (2) are all household estimation results that take account of the cross term of the elderly population proportion and the age of head of household. It can be seen that the estimation coefficients of the two are basically consistent in terms of symbol, size and significance. The results show that both the proportion of the elderly population and the age of the head of the household have a significant influence on the household tourism decision in China (both are significant at the level of 1%). The coefficient sign of the proportion of the elderly population is negative, indicating that the possibility of household tourism is inversely proportional to the proportion of the elderly population in the family. The more the elderly population is,
the less likely the family is to make tourism decisions. According to the above analysis, the more old people in a family, the greater economic pressure of the family will be, while the free leisure time of the family will be reduced because the elderly need care, both of which are important variables hindering the decision of household tourism. In the model (2), we need to pay attention to the cross term \( \text{Old} \times \text{Age} \), results show that the overlapping coefficient is negative and highly significant at the 1% level, which shows that the householder age indeed played a regulation role. It weakened the negative impact of the aging population proportion on domestic tourism travel possibilities with householder age increasing to some extent.

In order to further clarify the differences between elderly families and non-elderly families in tourism decision-making behavior, we respectively give the Probit model estimation results of two types of families. Model (3) is a non-elderly family, and model (4) represents an elderly family. By comparing the coefficients of all variables in model (3) and model (4), it is found that, except for the core explanatory variable \( \text{Old} \), the coefficients and symbols of all other variables have not changed significantly. For non-elderly families, the coefficient and symbol of \( \text{Old} \) are basically consistent with the estimated results of the full sample, but the coefficient symbol of \( \text{Old} \) in model (4) becomes positive and highly significant at the 1% level, indicating that the influence of the proportion of the elderly population on household tourism decision is substantially different between the two families. This result means that for elderly families with the head of household over 60 years old, the more elderly in the family, the more likely the family is to participate in travel.

Table 2. Tourism incidence estimation based on Probit model

| Variable | Model (1) | Model (2) | Model (3) | Model (4) |
|----------|-----------|-----------|-----------|-----------|
| \( \text{Old} \) | \(-0.599**\*\*\*\*\*\*\(-4.96)\) | \(-0.607**\*\*\*\*\*\*\(-4.46)\) | \(-0.611**\*\*\*\*\*\*\(-7.45)\) | \(0.294**\*\*\*\*\*\*\(5.84)\) |
| \( \text{Age} \) | \(-0.018**\*\*\*\*\*\*\(-21.98)\) | \(-0.019**\*\*\*\*\*\*\(-19.36)\) | \(-0.022**\*\*\*\*\*\*\(-17.97)\) | \(-0.018**\*\*\*\*\*\*\(-8.56)\) |
| \( \text{Old} \times \text{Age} \) | \(0.012**\*\*\*\*\*\*\(6.60)\) | \(0.014**\*\*\*\*\*\*\(6.97)\) | \(0.312**\*\*\*\*\*\*\(16.47)\) | \(0.312**\*\*\*\*\*\*\(16.47)\) |
| \( \text{Income} \) | \(0.251**\*\*\*\*\*\*\(21.81)\) | \(0.218**\*\*\*\*\*\*\(15.47)\) | \(0.218**\*\*\*\*\*\*\(15.47)\) | \(0.172**\*\*\*\*\*\*\(17.03)\) |
| \( \text{NetAssets} \) | \(0.235**\*\*\*\*\*\*\(32.96)\) | \(0.291**\*\*\*\*\*\*\(30.89)\) | \(0.291**\*\*\*\*\*\*\(30.89)\) | \(0.172**\*\*\*\*\*\*\(17.03)\) |
| \( \text{Child} \) | \(-0.130**\*\*\*\*\*\*\(-10.77)\) | \(-0.129**\*\*\*\*\*\*\(-8.74)\) | \(-0.129**\*\*\*\*\*\*\(-8.74)\) | \(-0.164**\*\*\*\*\*\*\(-6.22)\) |
| \( \text{Male} \) | \(-0.175**\*\*\*\*\*\*\(-8.60)\) | \(-0.228**\*\*\*\*\*\*\(-8.81)\) | \(-0.228**\*\*\*\*\*\*\(-8.81)\) | \(-0.084**\*\*\*\*\*\*\(-2.48)\) |
| \( \text{Marriage} \) | \(-0.095**\*\*\*\*\*\*\(-3.68)\) | \(-0.135**\*\*\*\*\*\*\(-3.69)\) | \(-0.135**\*\*\*\*\*\*\(-3.69)\) | \(-0.103**\*\*\*\*\*\*\(-2.52)\) |
| \( \text{Constant} \) | \(0.126**\*\*\*\*\*\*\(3.12)\) | \(-5.440**\*\*\*\*\*\*\(-42.97)\) | \(-5.567**\*\*\*\*\*\*\(-34.89)\) | \(-5.230**\*\*\*\*\*\*\(-24.80)\) |
| \( Pseudo R2 \) | \(0.0173\) | \(0.177\) | \(0.188\) | \(0.165\) |
| \( Obs \) | \(40,000\) | \(37,700\) | \(22,364\) | \(15,336\) |

3.2. Household Tourism Expenditure

The estimation results of household tourism expenditure based on the multivariate linear model are given in Table 3. It is found through model (5) and model (6) that the proportion of elderly population in a family has a negative impact on household tourism expenditure. The larger the proportion of the elderly in a family, the greater the economic pressure of the family and the less free leisure time for the family. All these will have an inhibitory effect on the flexible tourism expenditure. However, we also find that the interaction term coefficient between \( \text{Old} \) and \( \text{Age} \) is positive and highly significant, indicating that the age of household head plays a certain role in regulating. The older the household head is, the weaker the restraining effect of the proportion of elderly population on household tourism expenditure will be. This conclusion is further confirmed in model (7) and model (8). Model (7) shows that the proportion of elderly people in non-elderly families will inhibit household tourism expenditure, while model (8) shows...
that the increase of the proportion of elderly people in elderly families will promote the further increase of household tourism expenditure. The results in Table 2 and Table 3 are generally consistent.

Table 3. Tourism expenditure based on OLS

| Variable | (5) simple | (6) Full | (7) Non - OldH | (8) OldH |
|----------|------------|----------|---------------|----------|
| Old      | -1.902***(-6.58) | -2.003***(-6.99) | -1.314***(-7.91) | 0.544***(5.55) |
| Age      | -0.050***(-22.84) | -0.046***(-21.55) | -0.052***(-18.77) | -0.032***(-8.71) |
| Old*Age  | 0.036***(8.44) | 0.043***(9.98) |                |          |
| Income   | 0.439***(33.22) | 0.432***(24.00) | 0.437***(22.88) |          |
| NetAssets| 0.483***(49.94) | 0.645***(44.61) | 0.331***(26.42) |          |
| Child    | -0.267***(-12.66) | -0.278***(-10.25) | -0.312***(-8.14) |          |
| Male     | -0.470***(-9.97) | -0.623***(-9.80) | -0.253***(-3.66) |          |
| Marriage | -0.170***(-3.34) | -0.322***(-4.16) | -0.076(-1.11) |          |
| Constant | 4.338***(38.44) | -6.087***(-32.72) | -7.528***(-28.75) | -4.931***(-16.03) |
| Obs      | 39,826 | 37,542 | 22,280 | 15,262 |
| R-2      | 0.021 | 0.173 | 0.200 | 0.140 |

There is a significant difference between the two types of families in the influence of the proportion of elderly population on the household tourism expenditure. On average, if other variables remain unchanged, an increase of 10 percentage points in the proportion of the elderly in non-elderly households will lead to a decrease of 13.14 percent in the travel expenditure spent by such households. However, if this is an elderly family with the head of household over 60 years old, a 10% increase in the proportion of elderly population in the family will lead to an increase of 5.44% in the consumption of the family on travel, with a difference of about 18 percentage points. Considering that tourism expenditure is a service commodity with great elasticity, this difference is also significant in economic sense. The influence of other control variables on tourism expenditure is also consistent with the conclusions of mainstream literature. The estimated results of model (6) in Table 3 show that when the total family income increases by 1%, it may bring about an increase of 0.44% in household tourism expenditure. Similarly, one percentage change in household net worth would lead to a corresponding 0.48 percentage point change in travel spending. The estimates in Table 3 show that, on average, for every increase in the number of children in a family, the travel expenditure of the family decreases by 26.7%. Hong et al. have found that married families without children are the most active participants in leisure travel activities[5], and we have reached a similar conclusion.

4. Conclusion

We test the relationship between family demographic structure and household tourism decision making behavior, thanks to the detailed nationwide microhousehold data provided by the China Household Financial Survey. The empirical research comes to the following main conclusions: First, the aging of the family population on the whole will have an inhibitory effect on household tourism intention and travel consumption. The older the household head is, the lower the travel intention and travel consumption will be. The aging of the population does pose a certain challenge to the sustainable development of China’s tourism industry. Second, for the elderly households with older heads, the proportion of the elderly population in the household is a positive factor to promote the increase of household tourism intention and tourism expenditure. As the head of an elderly household who is a tourism decision maker, at this time, the factors restricting household tourism such as income and leisure time will be alleviated to a large extent. On the contrary, elderly households will become an important force to promote the
development of tourism. Therefore, the aging population will generate more opportunities for the sustainable development of China's tourism industry in the future.

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