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Rural Residents' Income Structure, Population Aging and Tourism Consumption: Evidence from China

Gaosong ZHAO¹

Abstract

Income is a major factor affecting the willingness to travel of rural residents. Against the background of increasing population aging, the level of tourism consumption of rural residents in China has become significantly weaker than that of urban residents. To explore the upgrading paths of rural residents' tourism consumption, the influence mechanism of their income structure and population aging on tourism consumption was analyzed using a fixed-effects model, random-effects model, and panel data of 30 provincial areas in China from 2010 to 2015. Results show that wage and operating income have significant positive impacts on the tourism consumption of rural residents. However, property and transfer income, which are not the main sources of income among rural residents, have little effect on tourism consumption. The different effects show significant regional differences. In addition, population aging has a significant negative moderating effect on the relationships between wage income and tourism consumption, and between operating income and tourism consumption. Findings provide a theoretical basis and decision-making reference for the government to formulate appropriate rural residents' income-increasing policies and optimize income structure policies.

Keywords: rural residents, income structure, population aging, tourism consumption.

Introduction

In July 2018, China Tourism Research Institute's Annual Report stated that tourism had become a new engine for China's economic growth, a new impetus for upgrading and expanding industrial system, and a new indicator of people's happiness. The report shows that China's domestic tourism scale and tourism revenue have remained between 13.5% and 19.3% annually since 2011. In 2017,

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China has recorded approximately 5.01 billion domestic tourists and tourism revenue reached 4.57 trillion RMB increasing between 12.8% and 15.9%. Among them, urban residents' tourism consumption accounts for 80%. It still remains in the absolute dominant position in China's tourism consumption. In comparison with the average travel expense of 1,115.2 RMB among urban residents, the average travel expense of rural residents is less at only 671.7 RMB. Thus, the level of tourism consumption is evidently insufficient. In addition, the decline of population fertility rate, improved pension conditions, and increase of average life expectancy have led to an increase in the elderly population and an increasingly serious problem of population aging. According to the statistics of the National Bureau of Statistics of China, the population of 60 years old and above in Mainland China reached 240.9 million by the end of 2017. This number accounts for 17.3% of the total population, of which 158.31 million were 65 years old and above, accounting for 11.4% of the total population. China's aging population has become an extremely serious social problem. It has serious effects on economic and social development and a great impact on tourism consumption. Therefore, with an aging population and seriously insufficient tourism consumption, identifying how to stimulate tourism consumption among rural residents and to improve the happiness index of residents is a topic worthy of attention.

In view of the influencing factors of tourism consumption, most existing studies have been based on the theory of consumer behavior in mainstream economics and hold the idea that income level is the main factor affecting tourism consumption (Bernini, Cracolici & Viroli, 2017). Most scholars have analyzed the relationship between the total income of rural residents and tourism consumption based on quantity. They have applied the concept of "resident income" in the overall sense. The relationship between residents' income and tourism consumption from the perspective of total volume is based on the basic assumption that the components of income make no difference in tourism consumption. In fact, this hypothesis ignores the basic fact that the components of rural residents' income are not completely substitutable. However, the incomes of different sources have different characteristics and growth trends, which lead to various components of income that may have differential impacts on the tourism consumption of rural residents to a certain extent. According to the statistics of the National Bureau of Statistics of China, the income of rural residents comes from four different sources: wage, operating, property, and transfer income. Sand (2002) believed that residents' consumption is not completely rational, and income from different sources has different impacts on residents' consumptive propensity due to their uncertainties and other aspects. Based on Thaler's (1990) psychological account theory, rural residents generally classify income from different sources into different mental accounts that are "nonsubstitutable". In addition, population aging is a major factor affecting consumption, and the intensification of aging process can change consumptive willingness (Xu, 2017). These findings encourage further thinking in this study. Because rural residents assign income from different sources to

different psychological accounts, how can the difference in income structure affect their tourism consumption? What is the contingency impact of population aging in this relationship?

To answer the above questions, this study takes rural residents' tourism consumption as a research object based on classical theory of economics, which states that income is the key variable affecting consumption. The relationships among rural residents' income, population aging, and tourism consumption in the context of population aging are explored. The impacts of rural residents' income structure on tourism consumption and the contingency effects of population aging in this relationship are analyzed. Moreover, the study seeks effective ways and measures to improve the tourism consumption level among rural residents in China.

Literature Review and Research Hypothesis

Rural residents' income and tourism consumption

The rural revitalization and urbanization strategies implemented by the Chinese government have increased the income of rural residents. Furthermore, tourism, which reflects the happiness index, has gradually become an important lifestyle for rural residents. As such, scholars have begun to pay attention to rural residents' tourism and their consumption behaviors. Consumer behavior theory in mainstream economics argues that income level is an important variable influencing consumer spending and that income is a key influencing factor of tourism consumption (Witt & Witt, 1995; Aguiar & Bils, 2015; Bernini, Cracolici & Viroli, 2017). Existing studies have built a tourism consumption measurement model based on the consumption behavior theory. They have also empirically analyzed the relationship between rural residents' tourism consumption and its influencing factors. Consumption behavior theory claims that the increase in residents' income can increase tourism consumption and changes in income distribution structure can promote the stratification and diversification of tourism consumption. However, scholars have not reached an agreement on whether income affects the tourism consumption of rural residents or not. Relevant studies show that per capita net income (Diao, 2009; Yi and Nie, 2011), household disposable income (Zhou & Li, 2010), and migrant workers' income (Qiu, Zhang & Zha, 2011) affect the tourism consumption of rural residents. Moreover, tourism demand is influenced by other factors, such as Gini coefficient, tourism consumption tendency (Zhou & Li, 2010), educational level, insurance participation (Qiu et al., 2011), and spatial dependence (Deng & Wang, 2011; Yang & Wong, 2013). In addition, income from different sources results in different propensities to consume (Sand, 2002; Fang & Zhang, 2011), and the differences in income structure also have a differential impact on household consumption (Qi, 2010; Zhang & Liu, 2010). The impacts on consumer demand from different influences cannot be replaced because residents distinguish

different incomes inherently when making consumption decisions. Therefore, rural residents' incomes from different sources have different natures, structures, and marginal propensities to consume. The heterogeneity of income structure may have different impacts on tourism consumption (Yang, 2015). On the basis of the above analysis, this study proposes the following hypothesis:

Hypothesis 1: The different components of rural residents' income structure have various effects on tourism consumption.

China has a vast territory, diverse ethnic groups, and different traditions. The cultures of different ethnic groups are intermingled, and the tourism consumption demands of rural residents in different regions vary. The differences in the impacts of rural residents' income from different sources on tourism consumption are reflected in the effects and regional differences. Kraay (2000) and Modigliani & Cao (2004) used Chinese data to analyze consumers' behaviors by combining income and human life cycle. They found that consumers' behavior and demand change at different stages of life. Even in the same life stage, urban and rural consumers show different consumption behaviors and demand. Horioka & Wan (2007), Zhao & Wang (2018) also had come to a similar conclusion in their empirical research. Fan and Zhou (2016) also found that urbanization and aging have considerably different effects on consumption rates. On the basis of the above analysis, this study proposes the following hypothesis:

Hypothesis 2: The impacts of rural residents' income structure on tourism consumption have significant regional differences.

Population aging and tourism consumption

Existing studies have presented great differences on the relationship between population aging and consumption. Several scholars (Leff, 1969; Schultz, 2005; Wang, 2011; Xu, 2017) believe that compared with young people, the elderly have more time, higher savings, and stronger desire to make dreams come true; hence, they prefer compensatory consumption, which raises the level of consumer demand. The love of the elderly for tourism is a concrete manifestation of compensatory consumption, which shows the positive effects of population aging on tourism consumption. However, Clark & Spengler (1980), Modigliani & Cao (2004), Zhang & Lei (2011), and Wang (2011) held contrasting views. They believed that labor productivity, savings rate, and purchasing power of the elderly population are declining. Such a decline restricts their consumption habits and consumer desires, thereby showing the negative effects of population aging on consumption. Yu, Qian & Wang (2015) further used Chinese series data to prove that the increase in old-age dependency ratio inhibits the consumption of rural residents. The "altruistic" consumer psychology of the elderly in China is very serious, which inhibits tourism consumption demand and even leads to "zero consumption". Due to the positive and negative effects of population aging on consumption, several scholars (Yu & Sun, 2012; Mao, Sun & Hong, 2013) believe that the total effect

of population aging on consumption depends on the level of aging effect, which has dynamic variability. Kraay (2000), Horioka (2006) and Li, Xu & Ai (2008) even argued that the impacts of aging on consumption are insignificant. Existing studies have not reached an agreement on the relationship between population aging and tourism consumption, but they have not denied the correlation between them, indicating that population aging has an impact on tourism consumption. In particular, rural revitalization and urbanization strategy implemented in China have substantially increased the income of rural residents, which in turn may promote the improvement of tourism consumption. However, in the process of population aging, the income of rural elderly residents is drastically reduced. Moreover, as young rural labor force shifts to urban areas, the proportion of the elderly population greatly increases. Population aging likely weakens the effects of rural residents' income on tourism consumption. Therefore, this study proposes the following hypothesis:

Hypothesis 3: Population aging has negative moderating effects on the relationship between rural residents' income structure and tourism consumption.

Methodology

Modeling and variables

The proportions and quantities in rural residents' total income constitute their income structure. The income of rural residents generally refers to the total annual income obtained from various sources. It has four main components: wage, operating, property, and transfer incomes. Wage income refers to the laboring income gained from enterprises or other ways. Operating income is the productive income of rural residents as production and operational units. Property income is gained by providing financial or tangible nonproductive assets to institutions. Transfer income is fiscal income obtained by secondary distribution of rural residents. The difficulty, predictability, and continuity of income from various sources are different, which makes up the differences in proportions of tourism consumption. To verify *Hypothesis 1*, a relationship model between rural residents' income structure and tourism consumption is constructed as follows:

$$RTC_i = \alpha_0 + \alpha_1 RWI_i + \alpha_2 RBI_i + \alpha_3 RPI_i + \alpha_4 RTI_i + \lambda_i \sum Control_i + \varepsilon_i \quad (1)$$

To verify *Hypothesis 2*, this study conduct a subsample to examine the function and effect of income structure among different regions on tourism consumption based on Model (1). It divide China into three regions - Eastern China, Central China, and Western China - in accordance with the common standards of China's current

regional division. Eastern China consists of Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan. Central China is composed of Heilongjiang, Jilin, Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan. Western China comprises Sichuan, Chongqing, Guizhou, Yunnan, Shaanxi, Tibet, Gansu, Qinghai, Ningxia, Xinjiang, Guangxi, and Inner Mongolia.

To further examine the possible moderating effects of population aging on the relationship between rural residents' income structure and tourism consumption, referring to Fang's study (2015), the interactive items of aging and income structure are added to Model (2). Hence, *Hypothesis 3* is verified.

$$\begin{aligned}
 RTC_{it} = & \alpha_0 + \beta_1 IC * OLD + \beta_0 OLD + \alpha_2 RWI_{it} + \alpha_3 RBI_{it} \\
 & + \alpha_4 RPI_{it} + \alpha_5 RTI_{it} + \lambda_i \sum Control_{it} + \varepsilon_{it}
 \end{aligned}
 \tag{2}$$

In Models (1) and (2), dependent variable RTC_{it} indicates i province t year tourism consumption of rural residents, which is mainly measured by per capita expense (*Expense*) and per capita travel rate (*Travelrate*). To test the robustness of the model, other explained variables that can reflect rural residents' tourism consumption are selected, such as one-day travel expenses (*DTE*), overnight travel expenses (*OTE*), one-day travel rate (*DTR*), and overnight travel rate (*OTR*).

The main explanatory variables RWI_{it} , ROI_{it} , RPI_{it} , and RTI_{it} stand for the proportions of various incomes in total income in i province t year, including rural wages income, rural operating income, rural property income, and rural transfer income. Old-age dependency ratio (*OLD*) is the proxy variable of aging. $IC * OLD$ is the interaction term between aging and income structure, including $RWI * OLD$, $ROI * OLD$, $RPI * OLD$, and $RTI * OLD$. α_1 , α_2 , α_3 , α_4 , and β_0 are the above-mentioned variable coefficients. Thus, when RWI , ROI , RPI , and RTI change at 1% and OLD increases by 1%, rural residents' tourism consumption changes α_1 , α_2 , α_3 , α_4 , and β_0 , respectively. α_0 is a constant term, whereas ε_{it} is an error term.

$\sum Control_{it}$ is a series of control variables, and λ_i is its coefficient. Chinese residents' tourism consumption has its particularity. Therefore, various influencing factors should be considered. The gap between national income and resident income is an important factor affecting residents' consumption (Fang & Zhang, 2011). Per capita GDP and Engel coefficient are important indicators of a country or a region's economic development and the living standards of residents. As a kind of enjoyable consumption of rural residents, tourism has material and spiritual functions. Tourism consumption is the consumption choice, which exists only after the low-level demand is met. Productive fixed assets are the basis of agricultural production and rural residents' income. Housing assets have evident wealth effects on household consumption. Providing live security and reducing uncertainty risks

improve rural residents' tourism consumption (Xie, 2012). In addition, if other conditions keep the same level, then the changes in tourism consumer price index affect rural residents' willingness to consume. On the basis of the above analysis, a series of control variables reflecting the living conditions of rural residents in China is added to Models (1) and (2), including Engel's coefficient (*Engel*), per capita GDP (*Pgdp*), per capita housing area (*House*), productive fixed assets (*Asset*), and tourism consumer price index (*Trcpi*).

Data sources and descriptive statistical analysis

The panel data from 30 provincial areas in Mainland China from 2010 to 2015 are collected, excluding Hong Kong, Macau, Taiwan, and Tibet. The explained variables reflecting the tourism consumption of rural residents are derived from *China Tourism Statistics Yearbook* and *China Domestic Tourism Sample Survey Data* from 2011 to 2016. The main explanatory and control variables are derived from *China Statistical Yearbook*, *China Rural Statistical Yearbook*, and *China Demographic Yearbook* from 2011 to 2016. Descriptive statistics for each variable are shown in *Table 1*.

Table 1. Descriptive statistics of major variables

VarName	Obs	Mean	SD	Min	Max
Expense	180	406.24	184.48	156.84	1092.14
Travelrate	180	50.84	18.72	16.60	102.45
DTE	180	168.64	80.23	55.05	769.27
OTE	180	643.85	350.85	190.40	1970.97
DTR	180	76.52	32.71	17.80	167.20
OTR	180	25.16	14.69	0.00	64.00
RWI	180	2035.60	1750.71	195.50	9605.70
ROI	180	2280.22	742.71	589.70	4307.10
RPI	180	179.52	219.07	16.80	1339.90
RTI	180	356.45	355.70	52.70	2812.20
OLD	180	12.52	2.51	7.40	20.00
Engel	180	0.43	0.06	0.31	0.58
House	180	31.58	10.29	18.00	62.30
Asset	180	372.81	293.02	142.90	2017.30
Trcpi	180	101.37	4.75	88.20	115.90
Pgdp	180	24477.01	15298.94	5052.00	76074.00

As shown in *Table 1*, the per capita tourism, day trip, and overnight travel expenses of 30 provincial areas in China from 2010 to 2015 are 406.24 RMB, 168.64 RMB, and 643.85 RMB, respectively. The per capita travel rate, per-day travel, and average overnight travel rate are 50.84, 76.52, and 25.16, respectively. However, tourism expenditure and per capita travel rate are not only different among

provincial areas, but they also vary greatly in different years in the same province. The average of wage and operating incomes are 2035.60 RMB and 2280.22 RMB, respectively. Such amounts account for a large proportion of the total income of rural residents and are the main sources of income for rural residents in China. Property and transfer incomes account for a small proportion of the total income of rural residents, with an average proportion of 3.1% and 6.8%, respectively. The proportion of property income increases alongside the advancement of China's economic development and urbanization. However, transfer income is declining. Property and transfer incomes also have large heterogeneity among different provincial areas. The average old-age dependency ratio is 12.52% and the maximum ratio is 20%. Thus, population aging is a serious problem in China.

Result Analysis

Basic regression test

In this study, macroeconomic panel data are used as rural residents' tourism consumption data. Therefore, before conducting a formal metrological analysis, the variables *Expense* and *Travelrate* must be examined using Levin–Lin–Chu (LLC) unit root test, Im–Pesaran–Shin (IPS) unit root test, and collinearity diagnosis via variance inflation factor method. The results show that, in the LLC unit root test, the adjusted t values of *Expense* and *Travelrate* are -27.0849 and -17.4849, respectively. However, the corresponding ADF and p -value are both 0. In the IPS unit root test, the ADF values of *Expense* and *Travelrate* are all 0, and their corresponding p -values are 0 and 0.0311, respectively. The LLC and LPS unit root tests indicate that the original hypothesis of the unit root should be rejected. Thus, the data are stationary data sequence without a unit root. In the collinearity test of the variance expansion factor, the maximum VIF is 7.99 and the mean VIF is 4.47. Therefore, no multi-collinearity exists between the explanatory variables.

Model data selection analysis is then performed on panel data. For explained variable, per capita resident travel cost, after adding control variable, compared with mixed regression using the simple method, $\rho=0.7720$ of the fixed-effects model is close to 1 and is significant at the 1% level. Therefore, the fixed-effects model is better than the mixed-effects model. $\sigma=0.1713$ and $\rho=0.3429$ of the random-effects model indicate that random effects exist in each province-level region, but the effects are not strong. In Wald test, p -value is 0, indicating that random effect is weak but significant at the 1% level. Random-effects model is evidently better than mixed-effects model. Using Hausman testing fixed-effects and random-effects models, the results show that p -value is 0.0281. Thus, the original hypothesis of random effects is strongly rejected, and the fixed-effects model is selected. Therefore, this study analyzes the influencing factors of rural per capita tourism expenditure by fixed-effects model. For resident travel rate, interpreted

variable, after adding control variable, compared with mixed regression using the simple OLS method, $\rho=0.8442$ of the fixed-effects model is close to 1 and significant at the 1% level, indicating that the fixed-effects model is evidently superior than mixed-effects model. In the random-effects model, $\sigma=0.2821$ and $\rho=0.5786$, which indicates strong random effects in each province-level region. Moreover, in Wald test, p -value is 0, thereby indicating that random effect is significant at the 1% level, and random-effects model is significantly better than the mixed-effects model. By Hausman fixed-effects and random-effects models, the results show that p -value is 0.0913. Thus, the original hypothesis with random effects is accepted. Therefore, this study selects the random-effects model to analyze the influencing factors of rural residents' travel rate. Thus, fixed-effects model is selected when the explanatory variable is per capita tourism cost. By contrast, the random-effects model is selected when the explanatory variable is resident travel rate. The empirical results are shown in *Table 2*.

Table 2. Measurement results of the impact of income from different sources on rural residents' tourism consumption

Dependent Variable	Expense (FE Model)	Travelrate (RE Model)
RWI	0.220** (0.056)	0.104 (0.118)
ROI	0.247*** (0.052)	0.308*** (0.049)
RPI	0.076 (0.040)	0.058 (0.100)
RTI	0.175** (0.048)	0.361*** (0.039)
Engel	-0.036 (0.138)	-0.568*** (0.170)
House	0.511*** (0.102)	0.043 (0.183)
Asset	-0.095 (0.070)	-0.056 (0.063)
Trcpi	-0.501 (0.684)	0.117 (0.596)
Pgdp	0.726*** (0.120)	0.133 (0.203)
_cons	3.985 (3.196)	0.706 (3.948)
N	180	180
F/Chi2	27.840	32.370

Note: Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

The results in *Table 2* show that wage income increases the tourism consumption of rural residents in China. The effects of wage income on per capita expense are significantly positive at the 5% level. Therefore, every 1% increase in wage income increases the per capita tourism expense of rural residents by 0.22%. However, the impacts on per capita travel rate are not evident. Therefore, the tourism demand of rural residents in China is still in its infancy, and its tourism consumption capacity

needs to be improved further. The effects of operating income on per capita expense and travel rate are significantly positive at the 1% level. For every 1% increase in operating income, the per capita tourism expenditure of rural residents increases by 0.247% and the travel rate increases by 0.308%. The increase in rural residents' operating income is mainly attributed to the diversified operations and specialized operations brought about by the development of rural economy.

Property and transfer incomes are two non-primary sources of income for rural residents. As shown in *Table 2*, the impact coefficients of property income on rural residents' per capita expense and travel rate are positive but insignificant. Thus, the impacts of property income on rural residents' tourism consumption are not evident. Transfer income can significantly increase the tourism consumption of rural residents. For every 1% increase, the per capita tourism expense in rural areas increases by 0.175% at the 5% level, and residents' travel rate increase by 0.361% at the 1% level. The Chinese government has launched a rural revitalization strategy and a rural reform plan, implemented a series of subsidies for supporting agriculture and agriculture, gradually improved the rural social security system, increased the income of rural residents, lowered the cautiousness of their consumption psychology, and played a certain role in increasing the demand for tourism consumption.

These results show that the increase in income levels can considerably promote the tourism consumption of rural residents. Judging from the perspective of per capita expense, except to the property income, the increase in wage, operating, and transfer incomes significantly increase the per capita tourism expenditure of rural residents. Judging from the perspective of travel rates, the increase in operating and transfer incomes can substantially increase the travel rate of rural residents. However, the impacts of wage and property incomes are not evident. However, if other invariants remain the same, then the incomes from various sources have positive effects on tourism expense and travel rate. Therefore, the increase in income level has significantly promoted the tourism consumption of rural residents, which is consistent with the general views of scholars.

Judging from the perspective of control variables, the per capita housing area of rural residents has curbed consumer demand, and the impacts on per capita tourism expense are significant. Thus, for every 1m² increase of per capita housing area, the per capita tourism cost of rural residents can be significantly reduced by 0.511%. Rural residents have a strong preference for housing consumption. Rural children must solve the housing problem first after adulthood. The rise of urban housing prices has increased rural housing costs. Most of the incomes are invested in housing construction, which has squeezed the demand for tourism consumption. The Engel coefficient has a negative effect on tourism consumption of rural residents. However, the decline of Engel's coefficient can substantially increase the travel rate of rural residents, but it cannot considerably increase the per capita tourism expense. The decline of Engel's coefficient can stimulate the tourism consumption of rural residents to a certain extent, but its overall effect

is not evident enough, mainly resulting from the diversity of rural expenditure. Rural households have many expenditure items. Except for basic daily expenses, such as eating, living, wearing, and medical care, they must give priority to ensure expenditure on production materials and education, which greatly reduces tourism consumption space of rural residents. In addition, the impacts of productive fixed assets and tourism special indices on rural residents' tourism consumption are not evident.

Regional difference test

To control the heterogeneity of rural residents' tourism consumption in different regions, the functions and effects of income structure in different regions on tourism consumption are identified.

Table 3. Rural residents' income structure and tourism consumption (by region)

Dependent Variable	Eastern China		Central China		Western China	
	Expense	Travelrate	Expense	Travelrate	Expense	Travelrate
RWI	0.560 (0.383)	0.186 (0.322)	0.120 (0.344)	2.301*** (0.548)	1.068* (0.555)	0.409 (0.686)
ROI	0.309 (0.224)	0.280 (0.163)	0.361** (0.163)	0.401* (0.207)	0.443** (0.193)	0.730*** (0.266)
RPI	0.431 (0.548)	0.193 (0.914)	-0.094 (0.666)	0.640 (0.828)	-0.674 (1.140)	0.152 (0.475)
RTI	-0.190 (0.200)	-0.013 (0.292)	0.248 (0.186)	0.194 (0.153)	0.152 (0.121)	-0.225 (0.211)
Engel	0.044 (0.720)	-1.520 (0.941)	-0.563 (0.979)	-2.182* (1.066)	-0.515 (0.605)	-1.361* (0.776)
House	3.435** (1.257)	0.874 (1.719)	0.591 (0.720)	6.689* (3.164)	0.731 (0.730)	0.186 (0.455)
Asset	0.693* (0.376)	0.427 (0.600)	0.074 (0.863)	-2.278 (1.441)	0.031 (0.459)	0.166 (0.577)
Trcpi	1.135*** (0.232)	-0.414 (0.477)	0.423 (1.342)	-0.562 (1.494)	-0.349 (0.664)	0.375 (0.676)
Pgdp	-0.969 (1.144)	-0.802 (1.100)	-0.069 (0.542)	-1.123** (0.438)	0.928 (0.845)	-0.206 (0.462)
_cons	-1.405 (3.355)	0.671 (5.261)	2.292 (6.291)	26.413 (14.281)	6.195 (3.864)	0.812 (5.579)
N	66	66	48	48	66	66
F/Chi2	1346.873	56.744	859.473	56.832	219.067	56.744

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 3 shows that wage and operating incomes of rural residents have a significant impact on tourism consumption in Central and Western China. By contrast, the tourism consumption in all regions has no close relationship with

property and transfer incomes. In comparison with other incomes, wage income has more significant impacts on the travel rate of rural residents in Central China, which is significantly positive at the 1% level, with an elastic effect of 2.301%. The impact of operating income on the per capita tourism expense of rural residents in the Central and Western China is significantly positive at the 5% level. In comparison with Central China, operating income has a more significant impact on the travel rate of rural residents in Western China, and the elastic effect is 0.3% higher than that of Central China. The results show that property and transfer incomes have little effect on the tourism consumption of rural residents. However, in comparison with Eastern China, the impacts of wage and operating incomes on tourism consumption in Central and Western China are relatively significant. The effects of rural residents' wage income on travel rate in Central China are greater than those in Western China. The effects of operating income on tourism consumption of rural residents in Western China are significantly higher than those in Central China.

Moderating effect test

The results of the moderating effect of population aging are shown in *Tables 4 and 5*.

Tables 4. The moderating effect of aging on rural residents' tourist expense

	(1)	(2)	(3)	(4)	(5)
	Expense	Expense	Expense	Expense	Expense
RWI*OLD		-0.018*** (0.003)			
ROI*OLD			-0.044** (0.020)		
RPI*OLD				0.003 (0.013)	
RTI*OLD					0.015 (0.017)
RWI	0.287*** (0.106)	0.068 (0.114)	0.031 (0.086)	0.010 (0.090)	0.017 (0.095)
ROI	0.394*** (0.074)	0.240*** (0.090)	0.223*** (0.080)	0.225** (0.087)	0.219*** (0.082)
RPI	0.136** (0.053)	-0.005 (0.082)	-0.009 (0.083)	0.000 (0.083)	0.003 (0.082)
RTI	0.389*** (0.065)	0.309*** (0.079)	0.311*** (0.080)	0.301*** (0.077)	0.294*** (0.077)
OLD	-0.005 (0.009)	0.043*** (0.011)	0.049*** (0.010)	0.047*** (0.010)	0.051*** (0.011)

Engel	-0.048 (0.170)	0.518** (0.219)	0.567** (0.221)	0.529** (0.227)	0.530** (0.222)
House	0.629*** (0.133)	-0.150 (0.139)	-0.079 (0.136)	-0.123 (0.135)	-0.120 (0.133)
Asset	-0.029 (0.102)	-0.043 (0.115)	-0.010 (0.115)	-0.045 (0.120)	-0.034 (0.116)
Trcpi	-0.048 (0.423)	0.154 (0.559)	0.290 (0.530)	0.239 (0.549)	0.363 (0.555)
Pgdp	0.739*** (0.161)	-0.103 (0.182)	-0.050 (0.160)	-0.051 (0.162)	-0.029 (0.169)
_cons	3.514* (2.074)	-0.011 (0.028)	-0.003 (0.025)	0.000 (0.025)	0.003 (0.025)
N	180	180	180	180	180
F/Chi2	25.151	10.108	11.217	10.238	10.372
R-Square	0.476	0.322	0.327	0.318	0.320

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Tables 5. The moderating effect of aging on rural residents' travel rate

	(1)	(2)	(3)	(4)	(5)
	Travelrate	Travelrate	Travelrate	Travelrate	Travelrate
RWI*OLD		-0.006** (0.003)			
ROI*OLD			-0.050** (0.019)		
RPI*OLD				0.021 (0.021)	
RTI*OLD					-0.010 (0.024)
RWI	1.085** (0.482)	1.190** (0.550)	1.188** (0.493)	1.190** (0.516)	1.140** (0.533)
ROI	-0.466 (0.391)	0.430 (0.404)	0.696* (0.363)	0.490 (0.403)	0.468 (0.403)
RPI	-0.065 (0.126)	-0.076 (0.121)	-0.087 (0.130)	-0.059 (0.127)	-0.068 (0.124)
RTI	0.158 (0.117)	-0.142 (0.128)	-0.147 (0.121)	-0.139 (0.122)	-0.157 (0.118)
OLD	-0.046 (0.028)	-0.057* (0.033)	-0.044 (0.026)	-0.063* (0.034)	-0.053 (0.033)
Engel	-0.464 (0.460)	-0.505 (0.490)	-0.357 (0.468)	-0.457 (0.460)	-0.446 (0.448)
House	-1.528 (1.664)	-1.405 (1.788)	-1.253 (1.696)	-1.225 (1.718)	-1.356 (1.862)
Asset	-0.233 (0.479)	-0.310 (0.525)	-0.228 (0.489)	-0.374 (0.566)	-0.280 (0.525)

Trcpi	-0.277 (0.312)	-0.371 (0.396)	-0.199 (0.364)	-0.340 (0.342)	-0.333 (0.375)
Pgdp	0.048 (0.676)	0.015 (0.680)	0.060 (0.662)	0.043 (0.647)	0.016 (0.696)
_cons	6.419 (3.937)	-0.010 (0.017)	-0.003* (0.002)	0.004 (0.004)	-0.002 (0.005)
N	180	180	180	180	180
F/Chi2	5.015	4.487	5.116	5.009	4.586
R-Square	0.382	0.385	0.391	0.388	0.383

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The results show the following: After the interactive items of aging and income structure are added to Model (2), the coefficients of variables *RWI*OLD* and *ROI*OLD* are significantly negative at the 1% and 5% levels, respectively. The coefficient of variable *OLD* is insignificant. Therefore, population aging has a significant moderating effect on the relationship between rural residents' income and tourism consumption. The increase in population aging inhibits the positive effects of rural wage and operating incomes for tourism consumption. Compared with the absence of interactive items, population aging mainly reduces the stimulating effects of wage income on tourism consumption, but it has limited impacts on operating income.

Robustness test

Due to the differences in geography, culture, values, and family structure, the tourism consumption of rural residents in China experiences heterogeneity. The impact of the abovementioned different sources of income on tourism consumption and its effects must be tested. Therefore, based on the differences in travel preferences and time, tourism types of rural residents are divided into one-day and overnight travels. They are further subdivided into one-day travel expenses (*DTE*), one-day travel rate (*DTR*), overnight travel expenses (*OTE*), and overnight travel rate (*OTR*), which are separately measured to verify that the above conclusions are robust. The results of the robustness test are shown in *Table 6*.

Table 6. A robust test of the impact of rural income structure on tourism consumption

Dependent Variable	DTE(FE)	OTE(FE)	DTR(RE)	OTR(RE)
RWI	0.111 (0.076)	0.238*** (0.052)	0.059 (0.154)	0.241*** (0.086)
ROI	0.090** (0.025)	0.343*** (0.068)	0.188*** (0.053)	0.687*** (0.079)
RPI	0.092** (0.028)	0.084 (0.049)	-0.067 (0.101)	-0.042 (0.093)
RTI	0.072* (0.033)	0.224** (0.065)	0.235*** (0.030)	0.803*** (0.077)

Engel	-0.135* (0.062)	0.156 (0.194)	0.010 (0.209)	1.764*** (0.186)
House	0.098 (0.144)	0.612*** (0.098)	0.073 (0.215)	-0.157 (0.106)
Asset	-0.196* (0.083)	-0.053 (0.095)	0.122* (0.074)	-0.407*** (0.136)
Trcpi	-0.446 (0.772)	-0.430 (0.703)	0.400 (0.766)	-1.126** (0.497)
Pgdp	0.490*** (0.085)	0.767*** (0.126)	-0.193 (0.275)	-0.334* (0.183)
_cons	2.996 (3.524)	4.297 (3.231)	0.490 (5.027)	4.632* (2.502)
N	180	180	180	179
F/Chi2	59.99	10.42	14.42	218.61

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The results of the robustness test show that, although the wage income of rural residents has no significant effects on *DTE* and *DTR*, its effects on *OTE* and *OTR* are significantly positive at the 1% level. A 1% increase in wage income of rural residents can significantly increase *OTE* and *OTR* by 0.238% and 0.241%, respectively. This finding shows that the wage income of rural residents in China can substantially promote tourism consumption. Unlike *DTE*, wage income mainly increases *OTE* and *OTR*, and the effect is significantly higher than its effect on per capita tourism expense and travel rate. Operating income has a significant effect on *DTE*, *OTE*, *DTR* and *OTR*. The impacts on *OTE* and *OTR* are significantly higher than the impacts on *DTE* and *DTR*, which is consistent with previous conclusions. Property income has significantly improved *DTE* to a certain extent, but the effect is limited. China's rural residents have narrow access to property income even if they have limited property income by holding financial assets or tangible nonproductive assets. The growth is also slow, and the ability to withstand financial systemic risks is poor. Transfer income has different positive effects on tourism expense and travel rate of rural residents. Moreover, the effects on tourism travel rate are greater but are lower than those of wage income on tourism consumption. The possible reason for this difference is that the Chinese government's various policy measures, such as home appliances going to the countryside, agricultural machinery to the countryside, and agricultural subsidies, have relatively brought back the income level of rural residents. Moreover, these measures have stimulated rural residents' willingness to consume. Based on the results of the robustness test, the impacts of the four sources of income of rural residents on tourism consumption in China are consistent with the previous analysis, and the results are stable.

Discussion

In accordance with the results of empirical analysis, *Hypotheses 1, 2, and 3* are verified. Hence, the incomes from different sources of rural residents in China have different effects on tourism consumption in terms of effect and regionality. In addition, population aging has a negative moderating effect on the relationship between income structure and tourism consumption.

First, the results in *Tables 2 and 6* show that wage income generally improves the tourism consumption of rural residents in China. However, the country's tourism consumption level is still in its infancy, which is consistent with the findings of Qi (2010) and Yang (2015). The potential reasons are the growth of macro economy, improvement of urbanization level, and upgrading of industrial structure. On the one hand, the agricultural labor force is transferred to the nonagricultural industry, and the wage income represented by the income from labor services has become a major part of the income structure of rural residents in China. The proportion of this income has shown a steady upward trend in the total income, thereby stimulating the tourism consumption of rural residents and increasing the consumption expenditure of tourism. On the other hand, the development of rural tourism has also brought an increasing number of rural residents close to tourism, which has also stimulated the demand for tourism consumption of rural residents. However, the growth of wage income of rural households in China is relatively slow, coupled with the increase in the uncertainty of the external environment brought by the urbanization process. Precautionary considerations have increased preventive savings. Chinese rural residents tend to choose economic tourism, such as visiting relatives, and self-service tourism. The consumption concept of "advocating frugality and living within the limits" has become an obstacle to rural residents' tourism consumption, thereby reducing the desire for tourism consumption. In addition, operating income is an effective guarantee for improving the tourism consumption of Chinese rural residents. China's rural economic reform has promoted agricultural modernization and agricultural economic development. The internal industrial structure of China's rural areas has been rapidly adjusted. The diversified operation based on service industry has effectively promoted the growth of family operating income and agricultural professional cooperatives, among others. The new rural business entity has created a new format and model of rural economic management, which has promoted the persistence of rural residents' income and the diversification of source channels, thereby providing effective protection for rural tourism consumption expenditure and substantially improving the tourism consumption desires of Chinese rural residents.

Second, the results in *Tables 2, 3, and 6* further show that property and transfer incomes have limited impact on the tourism consumption of rural residents in China, which is consistent with the findings of Yang (2015). Such a result is possibly caused by the unique urban-rural dual economic structure of China; lack of rural property rights system, such as the false ownership of agricultural land

property rights; failure of trading rights mechanisms; and imperfect land acquisition compensation mechanism. These issues disable rural household resources to be converted into capital, increase the uncertainty of nonagricultural income of rural residents in China, and weaken the growth of property income, thereby curbing the increase in tourism consumption. Transfer income belongs to “non-productive income” and “temporary income”. In addition, the proportion of the total income of rural residents is still low. The expenditure is not arbitrary and is excluded in the consumption plan of rural residents. The limited increase in transfer income cannot make a leap in demand for tourism consumption of rural residents. Therefore, for Chinese rural residents, property and transfer incomes take a small proportion of rural residents’ income, which are the nonprimary source incomes of rural residents in China. Nonpersistent property income and nonproductive transfer income have large uncertainties. Chinese rural residents who have strong precautionary savings tend not to take the two types of income into their consumption plans. Therefore, the pulling effect on tourism consumption is not evident enough.

Third, the subsample regression results in *Table 3* show that wage and operating incomes have substantial impacts on rural residents’ tourism consumption demand in Central and Western China. Thus, the findings of Horioka (2006), Fan & Zhou (2016), Zhou & Wang (2018) were verified. The possible reason for this result is that Eastern China has developed economy, high urbanization rate, and optimized internal industrial structure. The wage income, operating income, and tourism consumption of rural residents are higher than those in Central and Western China. The rural residents in the region have less willingness to increase their tourism consumption demand. By contrast, in Central and Western China where income levels and tourism consumption are not high, the increase in wage and operating incomes has more significant effects on tourism consumption than that in Eastern China. The implementation of China’s Western Development Strategy has increased the income of households and stimulated the tourism consumption of rural residents in Central and Western China. In addition, the effects of operating income on tourism spending and travel rate of rural residents have become significant. However, the strategies on the rise of Central China and undertaking industrial transfer have greatly increased the household income of rural residents in the area. In addition, differences exist in the geographical environment and cultural customs between Central and Western China. These differences made the effects of wage and operating incomes on the tourism consumption of rural residents in the Central and Western China vary.

Fourth, the results of *Tables 4* and *5* show that population aging has limited moderating effects on the relationship between property income and tourism consumption and transfer income and tourism consumption. However, its moderating effects on the relationship among wage income, operating income, and tourism consumption are significant. The negative moderating effects of population aging are also a new finding in this study. The results show that rural population aging inhibits the positive impacts of wage and operating incomes on

tourism consumption. The possible reason for this result is that population aging further increases the data of rural elderly population. The increase of age leads to the weakening of individual production efficiency, which leads to the decline of the productivity of the whole rural elderly population, wage income, and operating income. As a result, the increase in tourism consumption levels is inhibited. Therefore, in the context of population aging, rural social security system must be improved further, and the negative moderating effects of population aging on the relationship between rural residents' income and tourism consumption must be reduced by improving the economic status of the rural aging population.

Conclusion

In this study, the relationships among rural residents' income structure, population aging, and tourism consumption were examined with the panel data of 180 samples from 30 provincial areas in Mainland China from 2010 to 2015, excluding Hong Kong, Macao, Taiwan, and Tibet. The following conclusions are drawn: (1) Wage and operating incomes significantly increase the tourism consumption of rural residents in China, whereas the impacts of property and transfer incomes are relatively limited. The impacts of different income sources on rural residents' tourism consumption vary; (2) In comparison with Eastern China, wage and operating incomes have more significant impact on tourism consumption in Central and Western China. The wage income of Central China has a greater impact on travel rate than that of Western China. The impact of operating income on tourism consumption in Western China is higher than that in Central China; (3) Population aging significantly inhibits the positive impacts of rural residents' wage and operating incomes on tourism consumption.

Under the background of population aging, the conclusions confirm that the development of rural economy and increase of rural residents' income are the preconditions for improving tourism consumption. They also provide decision supports for Chinese government, including the ways to break through institutional barriers and formulate population policies in rural revitalization strategy and urbanization strategy, slowing down the aging process, raising the income level of rural residents, optimizing the income structure of rural residents, and increasing the tourism consumption demand of rural residents. However, this study has certain limitations. Other unobservable factors may affect the tourism consumption demand of rural residents in China, and only six years of provincial panel data may affect the consistency and effectiveness of the estimates.

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