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A study of the income difference between tourism formal and informal employment in China

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ABSTRACT

Income is an important indicator to test whether the labor market is equal. Based on the data of Chinese General Social Survey (CGSS) from 2010、2013 and 2015, this paper uses JMP decomposition method to decompose the income difference between formal and informal employment in tourism. The results show that the income difference between the formal employed and the self-employed increased by 17.4% from 2010、2013 and 2015, while the income difference between the formal employed and the informal employed decreased by 16.4%. The former is attributed to the difference in predicted gap, while the latter is attributed to the quantity effect, price effect and difference in residual gap. In view of the relevant conclusions, it is of great significance to improve the human capital of tourism informal employees to narrow the income gap.

1. Introduction

At the same time of paying attention to employment, income is also a major issue of concern to the society and the government. Reasonable income distribution is an important indicator of social equity.

As a labor-intensive industry, tourism has the characteristics of large driving coefficient and many employment opportunities, which can absorb a large number of labor and provide a new way to solve the employment problem. Before the reform and opening up, due to the implementation of the planned economic system in China, the tourism industry was basically in a monopoly state. Until the reform and opening up, some private enterprises had the opportunity to enter the tourism industry, and the tourism informal sector gradually emerged. Compared with formal employment, tourism informal employment is mainly concentrated in the lowest end of the tourism industry. The employees are faced with problems such as low wages, long working hours, high labor intensity, poor working environment and social welfare. Formal employment has a complete set of rules and procedures in the employment and assessment of employees, which requires high educational background of employees and has a high threshold for entry. However, the informal employment groups mainly include farmers and laid-off workers, and their educational level is generally not high. Therefore, It is difficult for tourism informal employees to move up to the formal sector. Under the influence of urban and rural systems, China's tourism labor market is divided into two parts: Tourism formal employment and informal employment. The division caused by this non-competitive factor leads to the income gap between the two employment groups. In the 21st century, with the progress of science and technology, the structure of tourism industry is facing adjustment and upgrading, resulting in market gap in the change of industrial structure. Many individuals take the initiative to seize the opportunity and enter informal employment. Although the segmentation effect of the labor market is gradually weakening, the unequal treatment of formal and informal tourism employment still exists.

At present, the research on tourism employment mainly focuses on employment statistics (Leiper, 1999; Baldigara & Mamula, 2012; Saluveer et al., 2020), employment elasticity(Seetaram et al., 2016; Schiff & Becken, 2011), employment effect (Fang et al., 2016; Dogru et al., 2020) and so on. Income is an important indicator to test whether the labor market is equal. According to China's statistical yearbook, there are only 2.427 million tourism formal employees in 2011. The number of tourism informal employees was 20.404 million, far exceeding the total amount of formal employment. Due to the large proportion of tourism informal employment in Chinese tourism employment market, in-depth investigation of the income differences between tourism formal and informal employment is conducive to understanding the income distribution of various sectors in the tourism labor market; further exploration of the causes of income differences is more conducive to

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providing reference for the adjustment of relevant policies of income distribution. Therefore, based on the data of Chinese General Social Survey (CGSS) from 2010、2013 and 2015, this paper adopts JMP decomposition method to decompose the income difference between formal and informal tourism employment, trying to find out the factors affecting the income difference and the extent of their influence.

2. Theoretical background

Labor market segmentation theory, which was first put forward by Piore (1971), is an important theoretical basis for the study of wage differences and labor allocation. The main empirical hypothesis of labor market segmentation theory is that wage difference is not the result of potential skill difference, but the direct result of "dual" nature of labor market. The labor market is divided into two parts because of non-competitive factors such as institutional and structural factors, namely, the main labor market and the secondary labor market. Generally speaking, the main labor market has a high wage level, a high return on human capital, a stable employment relationship, a small unemployment risk, many opportunities for promotion, good welfare treatment and a good working environment; while the secondary labor market has a low wage level, a low return on human capital, an unstable employment relationship, a large unemployment risk, few opportunities for promotion, poor welfare treatment and a relatively poor working environment(Form, 1977; Piore, 1971). Moreover, the main labor market and the secondary labor market follow different operating mechanisms respectively (Li, 2007; Zhang et al., 2018). The former takes the structural internal labor market as the main body, and usually has a set of detailed rules and procedures to guide the employment of workers. Its wages and allocation of labor resources are regulated by institutional rules, and market forces basically do not play a role. Its work is mainly concentrated in the core formal sector. The latter increases or decreases the number of employees according to the comparison between the marginal contribution of labor and marginal cost, and pays remuneration according to the marginal contribution of labor or market wage. Its work is mainly concentrated in the marginal informal sector (Li, 2015). Form (1977) and Piore (1971) question the view that wage competition model can accurately and comprehensively describe the operation of labor market. They believe that jobs in high wage sectors are not allocated by strict standards, and the return on human capital investment in each sector is different; some people who are qualified and eager to work in the primary sector cannot obtain employment opportunities because institutional problems hinder cross sector flows. With the emergence of the dualism in the industrial structure, the corresponding dualism also appears in different working environment, wage structure and the flow mode between different working departments.

The essential meaning of the whole labor market segmentation theory is that people with the same ability cannot get the same remuneration due to the different jobs they are engaged in. In addition, due to the influence of various factors such as the system, workers in different departments cannot move freely, resulting in the long-term existence of wage differences (Qu, 2014). At present, the theory of labor market segmentation has become an important theoretical basis for the study of wage differences and labor allocation. However, the labor market segmentation theory is a product of the western economic background, whether it is applicable to the study of China's labor market remains to be tested.

In the 1990s, the theory of labor market segmentation was introduced into China and attracted the attention of Chinese researchers. Cai (1990) first introduced the theoretical background, main views and latest progress of the labor market segmentation theory to the domestic academic community in detail, and put forward the idea of examining China's labor market from the perspective of dual labor market. Subsequently, domestic scholars have used micro survey data to test the theory of dual labor market segmentation (Deng & Ding, 2012; Li, 2012; Li & Gu, 2011). For example, according to the income level of different occupations, Guo (2004, pp. 43–49) divided the labor market into primary and secondary labor markets, calculated their work characteristics and minser income function, and verified the existence of labor market segmentation in China. Zhang and Qian (2011) constructed a labor market urban-rural segmentation index and measured that the total urban-rural segmentation degree of urban labor market was about 2.78%. Qiao et al. (2009) use 2006 CHNS data, according to the results of switching regression model, it is proved that China's labor market is divided, and household registration is an important factor limiting rural workers to enter the main labor market. Jin (2009) analyzed the human capital effect and monopoly effect in the industry wage gap, measured and tested the contribution of different variables to the industry wage gap, and finally found that China has the industry segmentation of labor market. These empirical results confirm that China's labor market has obvious institutional segmentation (Guo & Ding, 2005; Li & Liu, 1999).

3. Literature reviews

3.1. The income difference between formal and informal employment

Income is the most direct and typical difference between formal employment and informal employment. Based on the micro survey data of different countries, scholars found that due to the institutional barriers restricting labor mobility, the wage level of formal employees is significantly higher than that of informal employees under the same labor productivity. Tansel (2000) and Pagan et al. (2000) conducted an empirical study using the data of Turkey household consumption survey and Mexico micro survey respectively, and found that the wage premium of formal sector employment is more obvious for male workers, but not for female workers. Gong et al. (2002) found that the number of years of education is one of the main reasons for the wage differences among groups. The level of return on education of the informal employment group is significantly lower than that of the regular employment group, and the wage difference between the two groups shows an expanding trend with the increase of the number of years of education. At the same time, some scholars believe that there are certain "threshold" access restrictions in the labor market, especially in the formal employment market. For example, the wage difference between the two forms of employment is as high as 47% in Spain and about 17% in Germany. Moreover, the unemployment rate of informal employees outside the "threshold" is significantly higher than that of regular employees (Dolado et al., 2002; Farber, 1999). Bargain et al. (2011) found that the wage difference between the two employment groups was quantile effect, and the wage premium of formal employment was more significant at the middle and low levels of wage distribution. Günther et al. (2012) analyzed the choice behavior of informal employment by using counterfactual estimation method based on the micro data of Ivory Coast, and found that some groups with lower income belong to "survival choice", and choose to engage in informal employment under the pressure of life and survival difficulties, the proportion is about 44.8%. Radchenko (2014) conducted an empirical analysis based on the relevant data of Egyptian labor market, and found that the rate of return on human capital and employment selection mechanism are the important reasons for wage differences between the two forms of employment.

3.2. The income difference in tourism employment

Compared with other industries, tourism employment market has large capacity, strong inclusiveness and rich job levels. The division between formal employment and informal employment is more obvious (Hu & Liu, 2008). This structural division leads to the dislocation of the allocation of tourism labor resources, and then causes the income difference of the employees in different sectors.

Tourism formal employment provides employees with a stable working environment, good welfare security and more training opportunities, and the income of the whole group is relatively stable. While

tourism informal employment is easily affected by the slack season, and the instability of work directly results in the instability of income (Cukier & Wall, 1994). In the tourism informal sector, the employed are the most, the self-employed are the second, and the employers are the least (Choy, 1995; Zhong et al., 2016). They have significant differences and discretions in working hours and salary income. In the study of Cukier and Wall (1994), it is pointed out that most of the informal tourism employees work more than 8–10 h. Although working for a long time, about 90% of the employees still belong to the low-income group whose monthly income is less than 5000 RMB (Liang et al., 2015). In contrast, the working hours of self-employed tourists are not only more flexible, but also have the highest income (Guo et al., 2012; Guo Wei et al., 2016).

In the tourism labor market, gender discrimination is an important factor affecting the income gap of the employees (Casado-Díaz & Simón, 2016). Santos and Varejão (2006) pointed out that 45% of the wage gap among employees of Portugal's tourism agencies was due to employers' discriminatory attitude towards women. Employers tend to "rationally" choose women for positions with relatively low dependence on experience or skills, such as hotel secretaries, receptionists, cleaners, etc., in order to avoid women's withdrawal from work due to childbearing or family burden, thereby reducing the return on training investment (Casado-Díaz & Simón, 2016). Male employees are mostly responsible for tourism management or professional and technical posts. Janta et al. (2011) found that women in different positions in the U.S. hotel industry earn less than men. Even if women with more experience and higher education than men want better job opportunities, they still face difficulties. The results of the study of Muñoz-Bullón (2009) confirm that the average wage of male workers in the tourism industry is 6.7% higher than that of female workers. When men and women are the same age, men receive 4.45% more than women (Guimarães & Silva, 2016). In a word, due to gender discrimination, men's income is generally higher than women's (Form, 1977).

To sum up, it can be found that most of the existing articles on tourism employment income focus on exploring how gender factors affect the income of the whole employment group. Little attention is paid to the specific income situation of formal or informal tourism employment groups, and few scholars analyze the income gap between them from the perspective of market segmentation. On the other hand, in the study of wage difference between formal employment and informal employment, it is totally based on the whole labor market in China, which is too macro and the policy recommendations are not targeted. Therefore, the research scope of this paper is narrowed to the tourism labor market, and JMP decomposition method is used to explain the income difference between formal and informal tourism employment.

4. Method

4.1. Data and descriptive statistics

This paper uses the data of Chinese General Social Survey (CGSS) in 2010, 2013 and 2015 for quantitative analysis. The survey started in 2003 and is the first national, comprehensive and continuous academic survey project in China. CGSS includes not only the basic information of tourism employment, but also the relevant variables such as gender, age, education level, marriage status, health, social security and personal annual total income, which are consistent with the research content of this paper. At present, the data of CGSS has become the most important data source for the study of Chinese society, which is widely used in scientific research, teaching and government decision-making.

With reference to the industry classification code in the international standard classification of occupations, 2941 workers engaged in tourism were finally screened out, including 869 in 2010, 1051 in 2013 and 1021 in 2015. See Table 1 for details.

Table 2 briefly describes the coding of variables. The explained variable is the logarithm of income, which is calculated from the questionnaire "how much is the total income of an individual for the whole year last year". The core explanatory variable is the type of tourism employment, which is based on the questionnaire "what is the current job?" "Which of the following situations is more suitable for work?" According to the answers to the questions, the tourism employment can be divided into three types: the formal employed, the self-employed and the informal employed. The first type represents tourism formal employment. The latter two types of employment represent tourism

Table 1
Number of workers engaged in different tourism jobs.

Classification code	Jobs	In 2010	In 2013	In 2015
1224	production and operations department managers in wholesale and retail trade	2	7	4
1225	production and operations department managers in restaurants and hotels	1	16	10
1226	production and operations department managers in transport, storage and communications	2	5	5
1227	production and operations department managers in business services	0	2	4
1314	general managers in wholesale and retail trade	37	34	3
1315	general managers of restaurants and hotels	52	74	11
1316	general managers in transport, storage and communications	3	8	0
1317	general managers of business services	1	6	1
3419	finance and sales associate professionals not elsewhere classified	1	1	17
3420	business services agents and trade brokers	4	0	0
3429	business services agents and trade brokers not elsewhere classified	3	10	8
3473	street, night-club and related musicians, singers and dancers	3	5	1
3474	clowns, magicians, acrobats and related associate professional	0	1	0
4133	transport clerks	7	5	17
4221	travel agency and related clerks	0	1	18
4222	receptionists and information clerks	17	27	12
5110	travel attendents and related workers	7	0	2
5111	travel attendents and travel stewards	0	4	0
5112	transport conductors	2	12	5
5113	travel, museum guides	3	1	2
5120	housekeeping and restaurant services workers	3	0	2
5121	housekeepers and related workers	0	12	36
5122	cooks	54	83	48
5123	waiters, waitresses and bartenders	55	63	59
5149	other personal services workers not elsewhere classified	0	13	6
5230	stall and market salespersons	517	372	566
7330	handicraft workers in wood,textile, leather and related materials	3	8	0
7331	handicraft workers in wood and related materials	5	2	5
7332	handicraft workers in textile, leather and related materials	4	4	0
8322	car, taxi and van drivers	26	153	82
8323	bus and tram drivers	36	18	12
9110	street vendors and related workers	1	1	6
9111	street food vendors	9	64	79
9112	street vendors, non-food products	11	39	17
Total		869	1051	1021

Source: according to 2010, 2013 and 2015 CGSS data.

Table 2
Variable description.

	Variable	Variable description
Explained variable	Logarithm of income	Natural logarithm of actual personal total income calculated according to survey year
Core explanatory variables	Types of tourism employment	The formal employed = 1 , the self-employed = 2 , the informal employed = 3
Control variable	Gender	Female = 0 , Male = 1
	Years of education	Actual years of education calculated according to the survey year
	Work experience	Actual work experience calculated according to survey year Work experience equals age minus years of education minus six
	Square of work experience	Square of actual work experience calculated according to survey year
	Marital status	Unmarried/Single = 0, Married = 1
	Health	No = 0 , Yes = 1
	Social security	No = 0 , Yes = 1
	Mandarin level	Low = 1 , Middle = 2 , High = 3

Source: according to 2010, 2013 and 2015 CGSS data.

informal employment. Specifically, Table 3 shows nine forms of tourism employment in CGSS questionnaire. The article takes No. 3 as the formal employed and recodes it as 1. According to the concept of self-employment, which includes the partners of employers, self-employed workers and informal producers, the number 1–2 is used as the self-employed recoded as 2. The informal employed includes informal employees, temporary workers, day workers and production In this paper, therefore the number 4–9 is used as the informal employed of tourism, which is recoded as 3. The control variables include gender, years of education, work experience, the square of work experience, marital status, health, social security and Mandarin level. Whether the economic status of men and women in the labor market is equal has always been an important field of labor economics research. Although the income difference caused by gender discrimination has been reduced, it still exists (Li & Liao,2014; Dai, 2005). Therefore, the gender variables are controlled in the model, where 0 represents female and 1 represents male. Education level is an important human capital for workers, and also a stepping stone to enter the labor market, which will have an impact on income (Yang&Wang, 2019). According to the actual educational level of the interviewees, the years of education is calculated, including 0 years for never going to school, 6 years for primary school, 9 years for junior high school, 12 years for senior high school and secondary school, 16 years for University, and 19 years for postgraduate and above. Work experience determines the productive capacity and position of an individual in the labor market. The CGSS data survey does not involve the inquiry of actual work experience, Therefore, work experience is defined as potential work experience, that is, age minus years of education minus 6, Considering that there may be a nonlinear relationship between work experience and income, we can learn from Zhao & Shi (2018) to put work experience and its square into the model. There are two opinions on the impact of marriage status on employment and income. One is that marriage is conducive to better employment opportunities and higher wages; the other is that marriage does not have "promotion", but brings "curse", that is, marriage reduces the employment participation rate and expands the wage difference. In view of this, this paper controls the marital status, among which unmarried/single is 0, married is 1. Health is the basis of high-quality human resources and is closely related to income inequality (Wang & Wang, 2010). Health is taken as a control variable, where 0 represents unhealthy and 1 represents health. Participation in social security helps to reduce the burden of living and effectively disperse the risks brought about by unemployment and poverty. The body has the ability to expand the input of human capital and material capital to obtain higher income. Based on the practice of He (2019), this paper takes whether to participate in social security as a control variable, in which 0 represents not participating and 1 represents participating. Language human capital plays an important role in improving individual wage level and narrowing the wage gap between urban and rural areas. Therefore, Mandarin level should be put into the model as a control variable. Mandarin level is divided into three types: low, medium and high, which are represented by 1, 2 and 3 respectively.

Table 3
Forms of tourism employment.

Number	Forms of employment participation	frequency			Total
		In 2010	In 2013	In 2015	
1	Boss (or partner)	84	19	78	181
2	Individual business	501	549	426	1476
3	Employed by others (with permanent employer)	213	336	383	932
4	Labor workers/dispatched workers	2	15	11	28
5	Part-time workers (employees without fixed employers)	28	48	51	127
6	Work/help in your own business/ business and get paid	7	24	24	55
7	Work/help in one's own business/ business without pay	9	33	14	56
8	A freelance	23	25	31	79
9	Other	1	1	0	2

Source: according to 2010, 2013 and 2015 CGSS data.

Table 4 reports the descriptive statistical results of the main variables from 2010、2013 and 2015, and also reflects some basic conditions of the tourism labor market. As for the explained variables, the logarithm minimum value of individual annual total income is 0, and the maximum value is 14.85, of which the overall average value is 9.86, indicating that the income level of most respondents is mainly concentrated in 90000-100000 RMB. As for the core explanatory variables, among the three types of tourism employment, 1657 respondents are engaged in tourism self-employment, and 347 respondents are employed, accounting for 56.4% and 11.8% of the total, respectively, indicating that only 31.8% of the respondents belong to tourism formal employment. Among all the respondents, 54.1% were male and 45.9% were female. The uniform gender distribution showed that the sample was representative. From the perspective of education years, the minimum value is 0, the maximum value is 19, the average value is 9.92, and the standard deviation is 3.38. It can be seen that the education level of the whole interviewee group is uneven, and many interviewees choose to work before they graduate from high school. The minimum value of work experience is 0, the maximum value is 73, and the average value is 24.35, indicating that the majority of respondents have rich work experience. In the marital status, the number of married people reached 2449, accounting for 83.3% of the total, indicating that less than 20% of the respondents were unmarried or single. The number of healthy respondents is 2230, accounting for 75.8% of the total, which shows that most of the respondents have good physical fitness, and only a few are in an unhealthy state. Of all the samples, 1632 said they had participated in basic social security, but about half did not. The average level of Mandarin Proficiency is 2.28, among which 512, 1047 and 1318 are low, medium and high respectively, accounting for 17.8%, 36.4% and 45.8% of the total, indicating that most of the interviewees have better language human capital.

4.2. Regression model

To study the income difference between formal and informal tourism employment, we should first prove that different types of tourism employment will affect the income level. Due to the different number of individuals observed in each period in 2010, 2013 and 2015, in order to avoid destroying the randomness of the samples and more truly reflect the actual situation of the questionnaire survey, this paper will use the

Table 4
Descriptive statistical results of the main variables from 2010、2013 and 2015.

Variable	Ratio	Number of observations	Min	Max	Mean	standard deviation
Logarithm of income		2693	0	14.85	9.86	1.81
Types of tourism employment		2936	1	3	1.80	0.63
(the self-employed：1657)	56.4%	2936	0	1	0.56	0.50
(the informal employed：347)	11.8%	2936	0	1	0.12	0.32
Gender(Male：1590)	54.1%	2941	0	1	0.54	0.50
Years of education		2940	0	19	9.92	3.38
Work experience		2940	0	73	24.35	12.72
Square of work experience		2940	0	5329	754.96	723.45
Marital status(Married：2449)	83.3%	2941	0	1	0.83	0.37
Health(Yes：2230)	75.8%	2941	0	1	0.76	0.43
Participation in social security(Yes：1632)	55.8%	2926	0	1	0.56	0.50
Mandarin level		2877	1	3	2.28	0.75
(Middle：1047)	36.4%	2941	0	1	0.36	0.48
(High：1318)	45.8%	2941	0	1	0.46	0.50

unbalanced panel data for quantitative analysis. As a two-dimensional data type combining section data and time series data, unbalanced panel data is widely used. Panel data is two-dimensional data, which includes not only the changes of the same individual at different times, but also the differences of different individuals at the same time. According to the main research content of this paper, the panel data model is constructed as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \ldots + \beta_k X_{kit} + \varepsilon_{it}$$
$$\varepsilon_{it} = \mu_i + \lambda_t + u_{it}$$

$$i = 1, 2, \ldots, N$$
$$t = 1, 2, \ldots, T$$

In the above formula, the explained variable Y_{it} refers to the natural logarithm of the total annual income of an individual; β_0 is a constant, β_k is a regression coefficient; X_{kit} is an explanatory variable, including the core explanatory variable and the control variable. The core explanatory variable refers to the type of tourism employment, which is divided into the formal employed, the self-employed and the informal employed. The control variables include gender, years of education, work experience, square of work experience, marital status, health, participation in social security and Mandarin level. ε_{it} is a random disturbance term. μ_i stands for individual effect. λ_t stands for time effect. u_{it} stands for error term. i(i = 1,2 …,N)is the number of samples in the section data, and t(t = 1,2 …, T)is the year of observation. k is the number of variables.

Panel data model is generally divided into fixed effect model and random effect model. In this paper, Hausman test is used to determine whether fixed effect model or random effect model is used.

In Hausman test, the original hypothesis is the preferred random effect model, while the opposite hypothesis is the preferred fixed effect model. According to the results of hausman test, Prob > chi2 = 0.1676 means accepting the original hypothesis, the random effect model is selected (Table 5).

Table 5
Results of Hausman test.

	Coefficients			
	(b)	(B)	(b-B)	Sqrt(diag (V b-V B))
	Fe	Re	Difference	S.E.
The self-employed	0.120	0.100	0.020	0.063
The informal employed	−0.293	−0.374	0.001	0.009
Gender (male：1590) rowhead	0.572	0.572	0.000	0.053
Years of educationrowhead	0.069	0.054	0.015	0.011
Work experiencerowhead	0.053	0.047	0.005	0.007
Square of work experiencerowhead	0.445	0.367	0.078	0.054
Marital status (Married：2449) rowhead	0.066	0.133	−0.067	0.070
Health (Yes：2230) rowhead	0.343	0.328	0.015	0.071
Participation in social security (Yes：1632) rowhead	−0.069	0.092	−0.161	0.000
Mandarin level (Middle：1047) rowhead	0.254	0.270	−0.016	0.065
Mandarin level (High：1318) rowhead	0.000	0.000	0.000	0.000
chi2 (11) = (b-B) T [(V_b-V_B) - (−1)] (b-B) = 15.34				
Prob > chi2 = 0.1676				

Note: Fe stands for fixed effect. Re stands for random effect. S.E. stands for standard error.

4.3. JMP decomposition

JMP decomposition is a decomposition method proposed by Juhn et al. (1991, pp. 107–143) in 1991. It introduces the distribution tool into mean decomposition.

Specifically, it is assumed that the income regression equation of the tourism formal employment group in "t" period is $Ln\overline{Y}_{ft} = \beta_t \overline{X}_{ft}$; if the income structure coefficient of the tourism formal employment is taken as the benchmark, for self-employment group, there is $Ln\overline{Y}_{st} = \beta_t \overline{X}_{st} + \mu_{st}$, μ_{st} is the difference between the income estimates of the tourism informal employment and self-employment; for the informal employed, there is $Ln\overline{Y}_{et} = \beta_t \overline{X}_{et} + \mu_{et}$, μ_{et} is the difference between the income estimates of the informal employed and the income structure of the formal employed. Therefore, the income difference between the formal employed and the self-employed in "t" period is $D_t = Ln\overline{Y}_{ft} - Ln\overline{Y}_{st} = \beta_t(\overline{X}_{ft} - \overline{X}_{st}) - \mu_{st}$; the income difference between the formal employed and the informal employed is $D_t = Ln\overline{Y}_{ft} - Ln\overline{Y}_{et} = \beta_t(\overline{X}_{ft} - \overline{X}_{et}) - \mu_{et}$. According to the practice of Juhn et al. (1991), it can be further decomposed into $D_t = \beta_t \Delta\overline{X}_t + \sigma_t \Delta\overline{\theta}_t$.

Based on the above description, from 2010、2013 and 2015 (based on 2010), the change of income difference between tourism formal employment and self-employment can be divided into:

$$D_1 - D_0 = \beta_0\left(\Delta\overline{X}_1 - \Delta\overline{X}_0\right) + \Delta\overline{X}_1(\beta_1 - \beta_0) + \sigma_0\left(\Delta\overline{\theta}_1 - \Delta\overline{\theta}_0\right) + \Delta\overline{\theta}_1(\sigma_1 - \sigma_0)$$

The first item that is named "quantity effect" on the right side of equation shows the contribution of changes in personal characteristics such as gender, years of education, work experience, etc. of tourism formal employed and self-employed persons to changes in income differences under a fixed coefficient; the second item named "price effect" shows the impact of changes in income structure of tourism formal employment on changes in income differences under the same individual characteristics; the third item named "difference in predicted gap" shows the difference distance effect refers to the change of the relative income distribution between the two groups, that is, whether the income distribution of the formal tourism employees moves up or down relative

to the informal employees, which is caused by the unpredictable characteristic differences; the fourth item named "difference in residual gap" refers to the change of the income inequality of the formal employees over time Influence. The first two items together reflect the change of income difference caused by the change of explainable part, while the second two items together reflect the change of income difference caused by the change of unexplainable part.

In the same way, the change of income difference between the two groups of the formal employed and the informal employed can also be decomposed in this way.

$$D_1 - D_0 = \beta_0\left(\Delta\overline{X}_1 - \Delta\overline{X}_0\right) + \Delta\overline{X}_1(\beta_1 - \beta_0) + \sigma_0\left(\Delta\overline{\theta}_1 - \Delta\overline{\theta}_0\right) + \Delta\overline{\theta}_1(\sigma_1 - \sigma_0)$$

The first item on the right side of equation reflects the influence of the changes of interpretable personal characteristics, such as gender, years of education, work experience and so on, on the change of income difference between 2010 and 2015; the second item represents the contribution of the change of interpretable regression coefficient to the change of income difference when the individual characteristics are the same; the third item represents the contribution of the change of interpretable regression coefficient to the change of income difference when the characteristic variables are controlled, the contribution of the formal employed and informal employed due to the change of income position; the fourth item represents the change of income difference caused by the change of unexplained coefficient.

5. Results

5.1. The result of regression

The first item in Table 6 reports the regression results of the random effect model. The specific analysis is as follows:

In the regression model, we mainly focus on the core explanatory variable–tourism employment type. Taking the formal employed as the benchmark group, choosing self-employment has no significant impact on income. The self-employed usually choose to start a business in order to realize their own values or ideals, taking into account the dual identities of "boss" and "labor". Under the strict system of the formal market, if they want to register an enterprise in China, they should first prepare enough registered capital, then pay various administrative fees (Xue & Wang, 2020; Fang et al., 2020). They would have to pay taxes every year, accounting for 25% of their income (Fan & Zhao, 2020). In addition to meeting their own employment needs, tourism self-employed groups are still the main force of entrepreneurship and the potential force of innovation. They can also obtain relatively good income depending on their talents and opportunities, which may be the reason why there is no difference between the two groups in terms of income compared with tourism regular employees.

Table 6
Regression results.

Natural logarithm of income	Random effects	Time effects
The self-employed	0.100 (0.077)	0.132* (0.077)
The informal employed	−0.374*** (0.114)	−0.398*** (0.114)
Gender (male : 1590)	0.572*** (0.067)	0.579*** (0.067)
Years of education	0.054*** (0.013)	0.053*** (0.013)
Work experience	0.048*** (0.010)	0.048*** (0.010)
Square of work experience	−0.001*** (0.000	−0.001*** (0.000)
Marital status (Married : 2449)	0.092 (0.101	0.099 (0.101)
Health (Yes : 2230)	0.270*** (0.079)	0.236*** (0.079)
Participation in social security (Yes : 1632)	0.367*** (0.071)	0.298*** (0.071)
Mandarin level (Middle : 1047)	0.134 (0.099)	0.108 (0.099)
Mandarin level (High : 1318)	0.328*** (0.102)	0.290*** (0.101)
Constant	7.831*** (0.220)	7.619*** (0.222)
Time(In 2013)		0.401*** (0.083)
Time(In 2015)		0.415*** (0.083)

Note: ** *, * *, and * * are statistically significant at the level of 10%, 5%, and 1%. Numbers in brackets indicate standard errors.

The coefficient of the informal employed is −0.374, which is statistically significant at the level of 1%. It shows that compared with the regular tourism employees, the income of the informal employed will be reduced by 37.4%, that is to say, the impact of tourism informal employment on income is significantly negative. The low value of human capital and the segmented market form lead to the low income of tourism informal employees. On the one hand, the informal employed group is mainly composed of married people with low education level, who are forced to engage in jobs with poor stability in order to solve the problem of family food and clothing. Its income is easy to fluctuate due to some external factors, such as the different preferences of employers, the alternation of the weak and peak seasons of tourism, etc. On the other hand, due to the obstacles of non-competitive factors such as system and structure, it is difficult for them to enter the formal sector, let alone obtain the same high income as the formal employees. In the long run, even if the work experience accumulated by tourism informal employees is richer than that of formal employees, they can not cross the gap created by market segmentation and can not obtain formal employment opportunities.

In the control variables, taking female as the benchmark group, the coefficient of gender is 0.572 and is statistically significant at the level of 1%, which shows that gender affects income, in other words, the income of male is significantly higher than that of female. This conclusion reflects the existence of serious gender discrimination in the tourism labor market from the side. In China, the traditional concept of gender role centered on "male outside and female stay" has a direct inhibitory effect on female's wage income, but has no significant effect on male's income. The coefficient of years of education is 0.054, which is statistically significant at the level of 1%, indicating that with the increase of years of education, the income is also increasing, which is consistent with a large number of research results based on workers, that is, there is a positive and significant relationship between years of Education and income. Generally speaking, the higher the level of education, the stronger the learning ability, and the rapid mastery of work skills can create the higher income. The coefficient of work experience is positive, while the coefficient of work experience square is negative. Both of them are statistically significant at the level of 1%, which shows that there is an obvious inverted U-shaped relationship between work experience and income level. That is to say, when the working experience reaches a certain number of years, the income of workers will decline, which is in line with the logic of reality, because the increase of working years also means the increase of age, at this time, more workers working in the first-line positions will choose to retire to the second line, and get a lower income in the relatively idle positions. The influence of marriage status on income is not significant, that is to say, there is no phenomenon of marriage "rising water" or "marriage curse" in the tourism labor market. The probability value of health is 0.001 less than 0.01, which indicates that health status has a significant impact on income, that is, the income of healthy workers is higher than that of unhealthy workers. Health is the most important human capital. Only by keeping healthy can we get long-term stable income. Taking the absence of social security as the benchmark group, the coefficient of social security is 0.367 and is statistically significant at the level of 1%, which shows that compared with the absence of social security, the income of workers who choose to participate in social security increases by 36.7%. The social security system has surpassed the welfare system of the employment unit, greatly eliminated the worries of the urban residents, and directly increased the welfare income of the employees. Taking the low level of Mandarin Proficiency as the benchmark group, the level of Mandarin Proficiency generally has no impact on income, but the coefficient of high level of Mandarin Proficiency is 0.328, probability value

is 0.001 less than 0.01, which indicates that mastering high level of Mandarin Proficiency will significantly affect income.

The second item in Table 6 reports the regression results of the time effect in random effect model. Taking 2010 as the benchmark group, the coefficients in 2013 and 2015 are both positive and highly significant at the 1% statistical level, indicating that the overall income level of tourism employment is also increasing with the change of time. After adding the year variable, it is observed that the p-value of self-employment changes to 0.087, and its impact on income changes from not significant to significant at the statistical level of 10%, and its coefficient is 0.132, which shows that compared with tourism formal employment, the income of self-employment increases by 13.2%. Although the self-employed groups can not enjoy the security, welfare and services in the formal system in the informal business environment, but with the passage of time, self-employed people have sufficient space to play the advantages of high flexibility, strong organizational flexibility, and get rid of or reduce many system costs. It is logical that their economic income is higher than that of formal employment. The impact of tourism informal employment on income is always highly significant at the statistical level of 1%, and its coefficient changes to - 0.398, which indicates that the income of the employees is 39.8% lower than that of the regular employees, reflecting the large income gap between the tourism informal employees and the formal employees from 2010、2013 and 2015.

In all the control variables, except that marital status has no effect on income, gender, years of education, work experience, square of work experience, healthy, participate in social security, and the level of Mandarin Proficiency always have a significant effect on income at the 1% statistical level. It also shows that the control variables selected by the model are reasonable and scientific.

5.2. The result of JMP decomposition

According to the above principles, this paper uses JMP decomposition method to decompose the changes of income difference between the formal employed and the self-employed in tourism, and between the formal and informal employed in tourism from 2010、2013 and 2015. See Table 7 for specific results.

The decomposition results of the income difference between the formal employed and self-employed groups in tourism from 2010、2013 and 2015 show that the income difference has increased by 17.3% as compared with 2010. As for the increase of income difference, it is mainly attributed to the difference in predicted gap. The change of the difference in predicted gap makes the total income difference increase by 40.2%, which shows that the income distribution of regular tourism employees has increased by 0.402 compared with the self-employed in 2010、2013 and 2015, which may be other variables not included in the article model, such as market system. However, quantity effect, price effect and difference in residual gap reduced the income differences by 6.1%, 16.0% and 0.8%, respectively. In the quantity effect, gender, years of education, health status, social security and Mandarin level all reduce the income gap in varying degrees, only work experience plays an expanding role in the income gap; in the price effect, gender, years of education and work experience return rate narrow the income gap, others expand the gap. As the rising proportion is larger than the falling proportion, the income difference between the formal employed and self-employed becomes larger.

Table 7
Results of decomposition: from 2010、2013 and 2015.

	Tourism formal and informal employment	Tourism formal and informal self-employment
Difference of differential	0.173	−0.164
Quantity effect (%)	−0.061	−0.062
Gender	−0.020	−0.050
Years of education	−0.011	0.003
Work experience	0.004	−0.090
Health	−0.004	−0.005
Participation in social security	−0.020	−0.022
Mandarin level	−0.010	0.002
Price effect (%)	−0.160	−0.141
Gender	−0.008	−0.004
Years of education	−0.224	−0.212
Work experience	−0.065	−0.055
Health	0.047	0.071
Participation in social security	0.032	−0.005
Mandarin level	0.058	0.064
Difference in predicted gap (%)	0.402	0.094
Difference in residual gap (%)	−0.008	−0.055

Looking at the JMP decomposition results of income difference between tourism formal and informal employment groups in 2010、2013 and 2015. Compared with 2010, the income difference between the formal employed and informal employed decreased by 16.4% in 2015. For the decline of income difference, it is mainly attributed to the quantity effect, price effect and difference in residual gap. Among them, the quantity effect makes the total difference decrease by 6.2%, the price effect makes the total difference decrease by 14.1%, and the difference in residual gap makes the total difference decrease by 5.5%. Specifically, in the quantity effect, gender contributes 5.0% to the decrease of income difference, work experience (including the square of work experience) contributes 9.0% to the decrease of income difference, health status contributes 0.5% to the decrease of total difference, and social security contributes 2.2% to the decrease of income difference. It can be seen that in the quantity effect, work experience contributes the most to the decrease of income difference. The years of education and the level of Mandarin increased the income difference by 0.3% and 0.2% respectively, but from the perspective of the whole quantity effect, the result of the income difference still decreased. Among the price effect that can be explained, the contribution rate of the coefficient changes of gender, years of education, work experience and social security to the decline of the total income difference is 0.4%, 21.2%, 5.5% and 0.5%, respectively. It can be observed that the coefficient of years of education has the strongest explanatory power to the decline of the total difference; the health status and the level of Mandarin have increased the income difference by 7.1% and 6.4% respectively, even so, from In the whole price effect, the result is still decreasing. It can be found that although the difference in predicted gap makes the total income difference increase by 9.4%, the income difference between formal and informal employment of tourism still decreases with time.

6. Conclusion

In this paper, tourism informal employment is subdivided into self-employment and employment. Using the data of China's Comprehensive Social Survey (CGSS) from 2010、2013 and 2015, the random effect model is used for regression. The results show that taking tourism formal employment as the benchmark group, choosing self-employment has no significant impact on income, while tourism informal employment coefficient is −0.374 and 1% water The average statistics shows that compared with the regular tourism employees, the income of the informal tourism employees will be reduced by 37.4%, that is to say, the impact of the informal tourism employees on the income is significantly negative. After adding the time variable, the impact of t self-employment on income has changed from not significant to 10% statistically significant, while the impact of informal employment on income has always been highly significant at the 1% statistical level. This shows that there is a gap between formal and informal employment in tourism.

Finally, the paper uses JMP dynamic decomposition method to decompose the changes of income difference between formal and self-

employment, formal and informal employment in tourism between 2010 and 2015. Finally, it is found that the income gap between formal and self-employment in tourism has increased by 17.4% as of 2015 compared with 2010. The Income difference decreased by 16.4% between tourism the formal and informal employed. As for the income difference, the former is attributed to the difference in predicted gap, while the latter is attributed to the quantity effect, price effect and difference in residual gap. These results also reflect that although there is segmentation in Chinese tourism market, the segmentation is gradually becoming smaller, and human capital is the leading factor in the labor market.

No matter in the income difference between formal and self-employment, or between formal and informal employment, years of education, health status, Mandarin level and so on are all important factors. The education, health status and Mandarin level of the tourism informal employment group are significantly lower than that of the formal group, so it is of great significance to improve the education level, health status and language human capital accumulation of the tourism informal employment group to narrow the income gap. From the national level, the government should increase the education expenditure, guarantee the quantity and quality of education services, and improve the education level of tourism informal groups; take people's health as a top priority, establish health files, publicize and lead healthy life, and pay attention to the physical and mental health of tourism employees; vigorously promote Chinese language and culture, and advocate tourism workers He should speak Mandarin Proficiency well and be a propagandist of Chinese culture. From the enterprise level, we should provide more and better learning opportunities for tourism employees, such as going abroad for further study, study and investigation, strengthen post training, and improve the working skills and learning ability of tourism informal employees; secondly, we should provide healthy and nutritious staff meals for tourism employees, provide at least two free physical examination opportunities every year, and the logistics support department should also be concerned Safety and health of employees, help employees to relieve bad emotions in time, guide and establish a positive and optimistic outlook on life and work; often organize team activities, learn Mandarin Proficiency together, and improve language skills. From the personal level, the tourism informal self-employed personnel should strive to learn professional knowledge in the field of tourism, cultivate innovation awareness, and constantly learn and improve in the process of entrepreneurship; the tourism informal employees should consciously learn scientific and cultural knowledge, improve their education level, master working skills, and pay attention to the training of Mandarin Proficiency ability in normal work.

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