International Journal of Database Theory and Application
Vol.9, No.3 (2016), pp. 1-10
http://dx.doi.org/10.14257/ijdta.2016.9.3.01

Contribution Analysis of Provincial Factor Inputs to the Forestry Economic Growth Based on Panel Data Model

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Abstract

The factor of input in forestry is a key reason for the economic growth of forestry. This paper divided the country's 31 provinces (autonomous regions) into three categories by system clustering method, and constructed Panel Data Models respectively, in order to analyze the contributions of fixed forestry assets investment and labor input to forestry economic growth. The results show that three types of regions in the provinces of forestry factor inputs are quite different in promoting the forestry economic growth: labor inputs is the main driver of the economic growth, the forestry investment as a leading role in forestry is relatively weak for the forestry economic growth, namely the forestry economic development in China is still a labor-intensive type.

Keywords*: Factor inputs; Forestry economic growth; System clustering; Panel Data Model*

1. Introduction

Forestry is the basic industry of the national economy in China. The economic growth of forestry has important practical significance in promoting the development of our national economy, protecting the ecological security of the country, increasing employment opportunities and building a beautiful China [1]. At present, the development of China's forestry has changed dramatically, according to the results of the eighth meeting of the National Forest Inventory, the acreage of national forest is 208 million hectares and the coverage rate of forest is 21.63% [2]. Forestry economic growth requires lots of production factors, including capital, technology and labor input. From the research to promote forestry economic growth of domestic factor inputs for forestry, the main focus is on the following research: Wei Zhu-yuan (2000) from the perspective of the labor factor inputs, reached forestry economic growth is closely related to the labor factor inputs, it is an important factor that affect the change of pattern of forestry economic growth [3]. Gao Lan (2012) start with the perspective of forestry ownership deregulation, combined with capital and others inputs, analyzed the interaction both forestry property control and forestry production elements to the output of forestry and the relationships between them [4]. Li Xue-ping (2014) by analyzing to count the pattern of statistical models and econometric models, study factor inputs of capital, land, labor and other factors for the effect of forestry economic growth [5], so as to explore a number of options and recommendations to promote the forestry economic growth.

2. Data Source

Data Source: 2001-2013, "China Forestry Statistical Yearbook", which includes Daxing'anling zone in Heilongjiang Province.

ISSN: 2005-4270 IJDTA

3. Development Status

In recent years, China's forestry economy has been rapidly developed, from 2001-2013 the growth of China's forestry output value (Figure 1). In 2001, China's forestry output value is 4090.4753 billion yuan, and in 2013, it grew to 47315.4396 billion yuan with an annual average growth rate of 22.03%. In addition，from the growth trend of China's forestry output value, its growth trend is clearly sustained growth, among them, the average annual growth rate of 13.29%-28.94% in the 2001-2013, which belongs to the rapid growth.

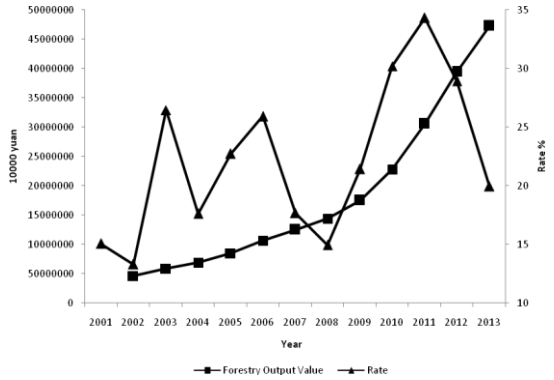

Figure 1. Forestry Output Value in China during 2001-2013

From 2001 to 2013, the changes can be seen in China's fixed asset investment and the total wages in the post in forestry (Figure 2), both of them are significant upward trends, in which the total amount of wages in the post persistent rise, the annual average growth rate of 17.11%, forestry investment in fixed assets in 2001-2010 years continued to rise, 2010-2011 there is a significant decline, after that still maintain a growth trend, and 2001-2013 average annual growth rate has reached 10.76%. So we can find, the interaction between invested capital and labor inputs has a combined effect on the economic growth forestry, it can be further analyzed by econometric models.

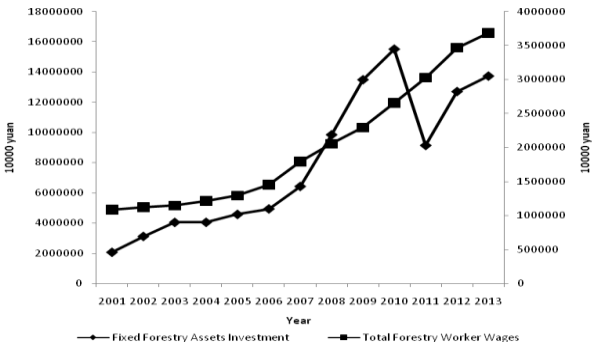

Figure 2. Changes of Fixed Forestry Asset Investment and Total Forestry Worker Wages in China during 2001-2013

4. Analysis Ideas

Due to the large gap in the forestry economic development in different provinces of China, we need to classify the actual situation of each province before the model analysis. It is generally believed that the main factors that promote forestry economic growth are capital and labor input. Due to the availability of data, we use the completed investment in fixed assets of forestry on behalf of capital investment and the total forestry worker wages

on behalf of labor input in the text, variable index using C-D function form, Panel Data model of forest growth in fixed asset investment and wages of workers of forestry output value was set up for clustering analysis of various regions, thus we can analyze the difference of the factor inputs contribution to forestry output growth based on system clustering results.

5. Provinces Cluster

The contribution of forestry factor input to the forestry economic growth which means input and output two aspects. In this paper, options for forestry investment in fixed assets, the total wages of workers in the post, and output value in forestry as the clustering index, uses SPSS19.0 to 2013 the country's 31 provinces (autonomous regions) in hierarchical clustering, via the Euclidean distance of the most distant as calculation method [6], obtained the results (Figure 3, Table 1).

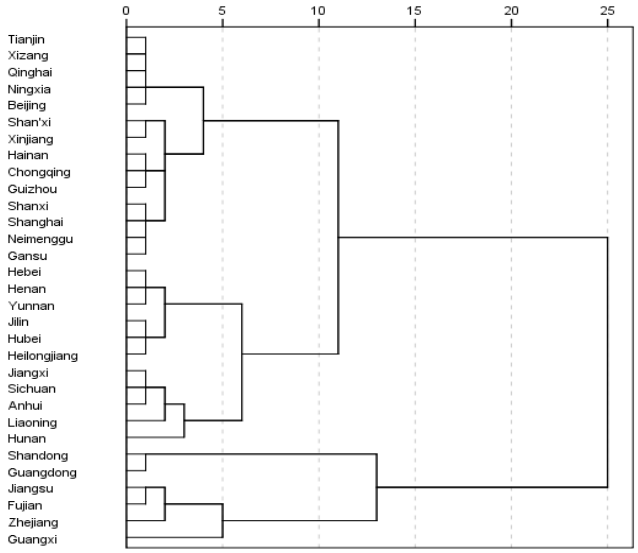

Figure 3. Result of System clustering

As shown in Figure 3, according to actual situation of the provincial forestry economic development and the needs of subsequent analysis, the system cluster can be divided into 2-4 categories. Clearly, the 31 provinces (autonomous regions) are divided into three categories which can be mostly realistic and can better meet the needs of subsequent analysis (Table 1).

Table 1. Category and Province Average Input-Output Unit: Million Yuan

Category	Provinces (autonomous regions)	Average Output	The average forestry assets investment	The average total wages	Output / investment	Output/ wages
1	Shandong,Jiangsu,Zhenjiang,Fujian, Guangdong,Guangxi	41311413.33	1481664.17	91208.36	27.88	452.93
2	HeiLongjiang,Jilin,Liaoning,Hebei,Henan,Hubei Hunan,Anhui,Jiangxi,Sichuan,Yunnan	16435321.91	233471.00	183693.12	70.40	89.47
3	Beijing,Tianjin,Shanxi,Neimenggu ,Shanxi, Gansu,Shanghai,Chongqing,Guizhou,Hainan, Ningxia,Qinghai,Tibet,Xinjiang	3178383.93	161348.57	79972.73	19.70	39.74

As can be seen from Table 1, the first category areas, including Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi, namely the southeast coast of the six provinces, the second category regions, including Heilongjiang, Jilin, Hebei and other provinces, namely the central Midlands, third category areas include the provinces of Chongqing,

Shanxi, Inner Mongolia, which include the western provinces. Although Beijing, Tianjin, Shanghai and other areas are classified as a third category, but considering the size of the forestry economic development of these areas is relatively small, the classification results are still reliable, which is consistent with the actual situation of the province's forestry economic development.

From a regional category, the average annual output value of the first class area in forestry is 413,114,133,300 yuan, followed by the second kind of area, forestry output value of the annual average of 164,353,219,100 yuan, while the third category is the lowest, only 31,783,839,300 yuan. Meanwhile, considering the ratio of forestry investment and labor wages to forestry output, which can be seen the "Output / wage" is greater than " Output / investment" all of the three types of areas; In addition, the first class area of " Output / wages" up to 452.93, the third type region, " Output / wage" is only 39.74, which shows that there is a big difference in labor output efficiency in the 3 class areas. For further analysis of the difference of the contribution of forestry investment and labor inputs to forestry economic growth, we need to further establish Panel Data models under various, from marginal contribution perspective to analysis whether the capital and labor to economic growth have a significant impact or not, as well as the impact of the specific effects.

6. Model Results

6.1. The Whole Nation

Taking all the variables index to the logarithm (when the index variable is zero, the logarithm result is 1), the output value of forestry as the dependent variable, set as LnY; The total fixed asset investment in forestry and the total wages of workers at post for the independent variables are set as LnK and LnL, Using Eviews6.0 for 2001-2013 National 31 provinces and autonomous regions to establish a fixed effects Panel Data model with constant coefficients (Table 2).

Table 2. Driving Effect of Total Output Value of Forestry in China

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.457164	0.433524	3.361210	0.0009
LNK?	0.039662	0.018024	2.200567	0.0284
LNL?	1.208218	0.038478	31.40042	0.0000
Fixed Effects (Cross)				
ANHUI--C	0.668517	LIAONING--C	0.805816	
BEIJING--C	-1.212140	NEIMENGGU--C	-2.346755	
FUJIAN--C	1.069413	NINGXIA--C	-0.800447	
GANSU--C	-1.553566	QINGHAI--C	-2.652744	
GUANGDONG--C	0.977959	SHANDONG--C	1.196125	
GUANGXI--C	0.104810	SHANXI--C	-0.665920	
GUIZHOU--C	-0.304303	SHANNXI--C	-0.697465	
HAINAN--C	1.609627	SHANGHAI--C	1.036054	
HEBEI--C	0.865989	SICHUAN--C	-0.236740	
HENAN--C	0.805317	TIANJIN--C	0.373579	
HEILONGJIANG--C	-2.065174	XIZANG--C	-0.236726	
HUBEI--C	0.627575	XINJIANG--C	-0.104365	
HUNAN--C	0.307406	YUNNAN--C	-0.565939	
JILIN--C	-1.283341	ZHEJIANG--C	1.623994	
JIANGSU--C	1.773349	CHONGQING--C	0.671812	
JIANGXI--C	0.208286			

Judging from Table 2, the P value of T test of the LnK is 0.0284<0.05, and the P value of LnL is 0.0000 <0.01, that is, forestry investment and labor input have a significant effect on the growth of the total output value of forestry. In addition, the model R^2 = 0.9232; the model can explain 92.32% of the total output value of forestry; The F value in the model is 138.9666, and its adjoining probability is 0.0000<0.01; AIC=1.5518, SC=1.879, HQ=1.6814. Obviously, the various statistical test results show that the model fit better, that can be used to analyze the economic significance.

From the economic point of view of model parameters, among other factors remain unchanged, forestry investment in fixed assets increased by 1% will promote China's forestry output increased by an average of 0.0397%; Forestry every 1% increase in total wages, will promote China's forestry output increased by an average of 1.2082%; Model variables and to 0.0397%+1.2082%=1.2479%>1%, indicating that the current stage of Chinese forestry output value increased by increasing returns to scale in recent years.

In addition, from the drive effect of each component of model to the output growth in forestry, spontaneous element (constant), the contribution of investment and labor factors of national economic development in 2013 to forestry output growth factors were 7.7485: 2.9919: 89.2596, the total increase in wages of workers on the post leading role in forestry output growth was stronger than the leading role of forestry in fixed assets investment growth, that is, at present, the development of forestry economy in China is still labor-intensive. In addition, the fixed effects model also for provinces and autonomous regions spontaneous forestry output growth factors to calculate the degree of deviation relative to the country as a whole, through redundant fixed effects test can determine whether provinces and autonomous regions of spontaneous factor significantly different (Table 3).

Table 3. Redundant Fixed Effects Test

Region	Effects Test	Statistic	d.f.	Prob.
Nationwide	Cross-section F	63.2625	(30,370)	0.0000
	Cross-section Chi-sq	730.6778	30	0.0000
The first region	Cross-section F	4.4566	(5,60)	0.0016
	Cross-section Chi-sq	24.6342	5	0.0002
The second region	Cross-section F	11.6779	(10,110)	0.0000
	Cross-section Chi-sq	103.4601	10	0.0000
The third region	Cross-section F	2.7574	(13,140)	0.0016
	Cross-section Chi-sq	41.4905	13	0.0001

As can be seen from Table 3, the country fixed effects with constant coefficients F statistic redundant fixed effects model test and chi-square value of the LR test probability are accompanied by less than 0.01, mixed refused sectional model is relatively fixed effects model is more is more valid assumption, that indicates that there are significant differences between the country's 31 provinces forestry spontaneous growth factor. Therefore, the model can better reflect the country's provinces and autonomous regions forestry spontaneous growth level of output growth in the contribution of forestry differences.

Through calculating the average value of the constant relative to the national level in the fixed effect model of the provinces, we can know that there is a big difference among 31 provinces and autonomous regions in nationwide forestry spontaneous growth factors, the largest province in which the spontaneous contribution of Jiangsu(1.472+1.7733), the smallest for Qinghai(1.472-2.6527). At the same time, an average deviation of 3 class regions is 1.1243,0.0125 and -0.4917 respectively, that showed investment in the forestry and labor inputs to the same marginal contribution of forestry economic growth situation, there are significant differences in forestry spontaneous economic growth in the third class regions.

6.2. The First Region

In order to compare three types of regions in various provinces of fixed asset investment and the contribution of forestry in total wages in forestry output growth, variable coefficient model of Panel Data model can be used for analysis. In this part, we establish the fixed effect Data Panel model with variable coefficients in the first class region [7]. Using 2001-2013 first class area of logarithmic data model to obtain results as shown in Table 4:

Table 4. Fixed-Effects Variable-Coefficient Model of the First Class Region

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.148630	1.589716	-4.496797	0.0000
FUJIAN--LNKFUJIAN	0.785829	0.314661	2.497382	0.0153
GUANGDONG--LNKGUANGDONG	0.004090	0.031841	0.128463	0.8982
GUANGXI--LNKGUANGXI	0.168562	0.160041	1.053243	0.2965
JIANGSU--LNKJIANGSU	0.349147	0.085656	4.076173	0.0001
SHANDONG--LNKSHANDONG	-0.100548	0.156682	-0.641733	0.5235
ZHEJIANG--LNKZHEJIANG	-0.153765	0.184317	-0.834242	0.4075
FUJIAN--LNLFUJIAN	1.910325	0.371858	5.137249	0.0000
GUANGDONG--LNLGUANGDONG	2.659985	0.287455	9.253580	0.0000
GUANGXI--LNLGUANGXI	1.817511	0.787628	2.307576	0.0245
JIANGSU--LNLJIANGSU	1.211236	0.340751	3.554609	0.0007
SHANDONG--LNLSHANDONG	2.500740	0.342633	7.298585	0.0000
ZHEJIANG--LNLZHEJIANG	1.588263	0.277656	5.720253	0.0000
Fixed Effects (Cross)				
FUJIAN--C	-6.075135	JIANGSU--C	6.551252	
GUANGDONG--C	-6.313357	SHANDONG--C	-2.453283	
GUANGXI--C	0.181725	ZHEJIANG--C	8.108798	

From Table 4, the P value for each province LnK T test, only Fujian and Jiangsu have past the test, and all LnL of P values are 0.05 or less, and variable through the T test. In addition, the model R^2 = 0.9098, F = 35.5997, P = 0.0000 <0.01; AIC = 0.7036, SC = 1.2474, HQ = 0.9213. Therefore the model is better in the fitting effects, and can be analyzed for the economic significance.

From 2001 to 2013, the fixed assets investment to contribution margin of the output value growth in forestry, the order of the marginal contribution of the six provinces in the first area is: Fujian, Jiangsu, Guangxi, Guangdong, Shandong, Zhejiang; However, the total increase in wages in the post output growth of forestry marginal contribution of size order is Fujian, Guangdong, Guangxi, Jiangsu, Shandong, Zhejiang. Furthermore, the first class of fixed asset investment and the post total increase in wages are 0.1756 and 1.9480 in the average for the marginal contribution of forestry output growth, in other words, that other factors remain unchanged, forestry total fixed asset investment growth of 1% will averaged promote first class regional forestry output increased by 0.1756 percent, the total wages of workers in the post increased 1% will averaged promote the total output of first class regional forestry increased by 1.9480 percent. The same trend is showed that factor inputs returns to scale increasingly, and labor input have significantly affect than investment in fixed assets.

Similarly, the model also needed to tested by redundant fixed effects to judge whether there are differences among every province's forestry output value of the spontaneous growth factor or not (Table 2), which can find along with probability F test and LR test are 0.01 or less, while spontaneous factors on increased contribution of total output in forestry of order: Zhejiang, Jiangsu, Guangxi, Shandong, Fujian, Guangdong.

6.3. The Second Region

Establish variable coefficient Panel Data model (Table 5) for the second category region.

Table 5. Fixed-Effects Variable-Coefficient Model of the Second Class Region

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.615041	0.602973	-9.312257	0.0000
ANHUI--LNKANHUI	0.046405	0.217837	0.213026	0.8317
HEBEI--LNKHEBEI	-0.032632	0.068990	-0.472996	0.6372
HENAN--LNKHENAN	0.002656	0.039644	0.066997	0.9467
HEILONGJIANG--LNKHEILONGJIANG	-0.086877	0.254573	-0.341267	0.7336
HUBEI--LNKHUBEI	0.061938	0.076299	0.811782	0.4187
HUNAN--LNKHUNAN	0.069121	0.113055	0.611393	0.5422
JILIN--LNKJILIN	0.223487	0.181958	1.228238	0.2220
JIANGXI--LNKJIANGXI	0.237901	0.073924	3.218188	0.0017
LIAONING--LNKLIAONING	-0.039828	0.068734	-0.579454	0.5635
SICHUAN--LNKSICHUAN	0.169149	0.055398	3.053336	0.0028
YUNNAN--LNKYUNNAN	0.273923	0.242528	1.129450	0.2612
ANHUI--LNLANHUI	2.326784	0.379570	6.130060	0.0000
HEBEI--LNLHEBEI	0.703613	0.112886	6.232956	0.0000
HENAN--LNLHENAN	1.549599	0.153153	10.11800	0.0000
HEILONGJIANG--LNLHEILONGJIANG	1.496673	0.302558	4.946724	0.0000
HUBEI--LNLHUBEI	1.770977	0.166778	10.61876	0.0000
HUNAN--LNLHUNAN	1.558038	0.271329	5.742254	0.0000
JILIN--LNLJILIN	2.112000	0.170581	12.38119	0.0000
JIANGXI--LNLJIANGXI	1.799863	0.150442	11.96383	0.0000
LIAONING--LNLLIAONING	1.851001	0.136836	13.52714	0.0000
SICHUAN--LNLSICHUAN	2.482669	0.191732	12.94866	0.0000
YUNNAN--LNLYUNNAN	2.085640	0.358563	5.816667	0.0000
Fixed Effects (Cross)				
ANHUI--C	-3.988908	JILIN--C		-7.315134
HEBEI--C	14.09069	JIANGXI--C		-1.488650
HENAN--C	4.719704	LIAONING--C		2.081761
HEILONGJIANG--C	3.005550	SICHUAN--C		-9.426616
HUBEI--C	1.504071	YUNNAN--C		-6.295687
HUNAN--C	3.113219			

From Table 5, the P value for every province LnK T test, only Jiangxi and Sichuan through the inspection, and all LnL of P values are less than 0.01, the variable through the T test. In addition, the model R^2=0.9405, F=54.2910, P=0.0000<0.01；AIC=0.0104, SC=0.6941, HQ=0.2882. Therefore the model is better in the fitting effects, and can be analyzed for the economic significance.

From the contribution margin of the fixed assets investment to the output value growth in forestry in 2001-2013, the size order of the marginal contribution of the eleven provinces in the second class area is: Yunnan, Jiangxi, Jilin, Sichuan, Hunan, Hubei, Anhui, Henan, Hebei, Liaoning, Heilongjiang; However, the total increase in wages in the post output growth of forestry marginal contribution of size order is Anhui, Hebei, Henan, Heilongjiang, Hubei, Hunan, Jilin, Jiangxi, Liaoning, Sichuan and Yunnan. Furthermore, the second class of fixed asset investment and the post total increase in wages are 0.0841and 1.7943 in the average for the marginal contribution of forestry output growth, in other words, that other factors remain unchanged, forestry total fixed asset investment growth of 1% will averaged promote first class regional forestry output increased by 0.0841 percent, the total wages of workers in the post increased 1% will averaged promote the total output of first class regional forestry increased by 1.7943 percent. The same trend is showed that factor inputs returns to scale increasingly, and labor input also have significant effect than investment in fixed assets.

In addition, redundant fixed effects test also shows that the spontaneous factor of every province have significant differences to output increased in forestry, while spontaneous factors on increased contribution of total output in forestry of order: Hebei, Henan, Hunan, Heilongjiang, Liaoning, Hubei, Jiangxi, Anhui, Yunnan, Jilin, Sichuan.

6.4 .The Third Region

Establish variable coefficient Panel Data model (Table 5) for the third category region.

Table 6. Fixed-Effects Variable-Coefficient Model of the Third Class Region

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.387270	0.890427	0.434927	0.6643
BEIJING--LNKBEIJING	0.415059	0.246295	1.685211	0.0942
GANSU--LNKGANSU	0.014935	0.163821	0.091167	0.9275
GUIZHOU--LNKGUIZHOU	-0.086778	0.068597	-1.265047	0.2080
HAINAN--LNKHAINAN	0.040360	0.274765	0.146889	0.8834
NEIMENGGU--LNKNEIMENGGU	0.355138	0.326052	1.089208	0.2779
NINGXIA--LNKNINGXIA	-0.000850	0.093995	-0.009048	0.9928
QINGHAI--LNKQINGHAI	-0.462836	0.170559	-2.713643	0.0075
SHANXI--LNKSHANXI	-0.099848	0.104126	-0.958920	0.3393
SHANNXI--LNKSHANNXI	-0.044646	0.208204	-0.214433	0.8305
SHANGHAI--LNKSHANGHAI	0.799443	0.332746	2.402561	0.0176
TIANJIN--LNKTIANJIN	0.030098	0.038578	0.780185	0.4366
XIZANG--LNKXIZANG	0.256302	0.041886	6.118992	0.0000
XINJIANG--LNKXINJIANG	-0.315328	0.297549	-1.059752	0.2911
CHONGQING--LNKCHONGQI...	0.147691	0.101461	1.455641	0.1477
BEIJING--LNLBEIJING	0.085737	0.203673	0.420951	0.6744
GANSU--LNLGANSU	1.292294	0.251189	5.144713	0.0000
GUIZHOU--LNLGUIZHOU	2.337632	0.334668	6.984919	0.0000
HAINAN--LNLHAINAN	0.942048	0.231344	4.072068	0.0001
NEIMENGGU--LNLNEIMENGGU	1.041073	0.274340	3.794825	0.0002
NINGXIA--LNLNINGXIA	1.558281	0.237186	6.569860	0.0000
QINGHAI--LNLQINGHAI	1.145277	0.215743	5.308519	0.0000
SHANXI--LNLSHANXI	1.117344	0.236294	4.728622	0.0000
SHANNXI--LNLSHANNXI	1.090717	0.216664	5.034150	0.0000
SHANGHAI--LNLSHANGHAI	1.324593	0.146020	9.071297	0.0000
TIANJIN--LNLTIANJIN	1.736631	0.308032	5.637828	0.0000
XIZANG--LNLXIZANG	0.945297	0.055256	17.10759	0.0000
XINJIANG--LNLXINJIANG	1.146125	0.235547	4.865812	0.0000
CHONGQING--LNLCHONGQING	1.560871	0.245155	6.366879	0.0000
Fixed Effects (Cross)				
BEIJING--C	7.182318	SHANXI--C	3.022138	
GANSU--C	-1.109647	SHANNXI--C	2.663531	
GUIZHOU--C	-9.525013	SHANGHAI--C	-7.281911	
HAINAN--C	5.095989	TIANJIN--C	-2.568649	
NEIMENGGU--C	-3.326520	XIZANG--C	1.093682	
NINGXIA--C	-2.692884	XINJIANG--C	5.822812	
QINGHAI--C	4.521175	CHONGQING--C	-2.897021	

From the P value for every province LnK T test, only Beijing, Qinghai, Shanghai and Tibet through the inspection, and all LnL of P values are less than 0.01, the variable through the T test. In addition, the model R^2 =0.9465, F=60.3538, P=0.0000<0.01; AIC=1.4194, SC=2.1588, HQ=1.7191. Therefore the model is better in the fitting effects, and can be analyzed for the economic significance.

From 2001 to 2013, the fixed assets investment to contribution margin of the output value growth in forestry, the third class area fourteen provinces marginal contribution of size order: Shanghai, Beijing, Inner Mongolia, Tibet, Chongqing, Hainan, Tianjin, Gansu, Ningxia, Shaanxi, Guizhou, Shanxi, Xinjiang, Qinghai; However, the total increase in wages in the post output growth of forestry marginal contribution of size order is Tibet, Xinjiang, Tianjin, Shanxi, Shaanxi, Shanghai, Qinghai, Ningxia, Inner Mongolia, Hainan, Guizhou, Gansu, Chongqing and Beijing. Furthermore, the third class of fixed asset investment and the post total increase in wages are 0.0749and 1.2374 in the average for the marginal contribution of forestry output growth, in other words, that other factors remain unchanged, forestry total fixed asset investment growth of 1% average will averaged promote first class regional forestry output increased by 0.0749 percent, the total wages of workers in the post increased 1% will averaged promote the total output of first class regional forestry increased by 1.2374 percent. The same trend is showed that factor inputs returns to scale increasingly, and labor input also have significant effect than investment in fixed assets.

In addition, redundant fixed effects test also shows that the spontaneous factor of every province have significant differences to output increased in forestry, while spontaneous factors on increased contribution of total output in forestry of order: Beijing, Xinjiang, Hainan, Qinghai, Shanxi, Shaanxi, Tibet, Gansu, Tianjin, Ningxia, Chongqing, Inner Mongolia, Shanghai, Guizhou.

7. Conclusions and Recommendations

7.1. Conclusions

Hierarchical clustering divides 31 provinces and autonomous regions into three categories, the classification results broadly consistent with the economic development of Eastern, Central, Western Region of China; Labor input has a relatively weak compared with fixed assets investment in forestry to the contribution of growth on forestry output in short-term. The contribution of labor input growth on forestry output growth in the three categories of regions are significant, factors, including spontaneous factor, investment and labor factor, which contribute 2013 national forestry are 7.7485%, 2.9919% and 89.2596%, hence, forestry of China is still a labor-intensive economic development as a whole.

In addition, the average of contribution margin rate of total wages forestry in these regions to the growth of output is 1.9480%, 1.7943% and 1.2374% respectively, similarly, the average of contribution margin rate of total fixed assets investment of forestry in these regions to the growth of output is 1.9480%, 1.7943% and 1.2374% respectively. That shows the contributions of labor input and fixed assets investment to economic growth in forestry are significantly different, which is going to increase, with the development of the forestry economy.

7.2. Recommendations

7.2.1. Improve Forestry Workers Compensation Levels

There is a big difference in the level of China's economic development among eastern, central and western, so the pay of the forestry enterprise employees in the three regions is quite different. The results show that the impact of labor factor on the development of forestry is most significant, therefore, in order to stimulate the enthusiasm of the labor, increasing the level of remuneration forestry is the most direct and effective way. Including the following three aspects: first to directly improve wages of forestry enterprise workers, especially in the second, third region (despite Beijing, Shanghai and Tianjin), by higher wages stimulate the enthusiasm of forestry enterprise employees and improve the efficiency of operations; Second is to perfect the incentive mechanism, rewarding the outstanding employees in the work of forestry companies, creating a virtuous circle; third fully protect the fundamental interests of the forestry enterprise employees, try to improve the production environment for enterprise employees, provide safe operation of advanced production tools, and ensure production safety of workers.

7.2.2. Accelerating Forestry Accumulated Labor

Labor forestry stocks including the quantity and quality of the workforce, with the acceleration of urbanization construction process and the lifestyle of youth trend to urbanization, the number of labor across the country engaged in forestry showed a decreasing trend, in the view of the current educated degree of staff in forestry, the level of education of foresters is lower generally, the existing situation needed to be improved urgently. Including the following three aspects: First, to further increase the development of forestry education, ensure the stability of the quality of the labor force to promote the development of forestry transformed from intensive to intensive; Second is to establish a long-term labor capital investment mechanism, the use of national and local government support and construction for forestry, construction of multi-channel train forestry personnel, to attract more manpower engaged in forestry production, ensure the stability of forestry labor force; Third is to increase talents and elites recruitment in the second, third regions, attracting more elites to serve the two regions of forestry economic development.

7.2.3. Expanding Investment of Forestry

Forestry investment is a powerful backing for the sustainable of forestry, although it is not obvious in the short term to the contribution of forestry economic growth, but in the long run, which is crucial to the healthy development of forestry. Forestry investment work should do the following three aspects: first, remaining stable of forestry investment of the first region, ensuring the growth of forestry economy steady; Second is to strengthen efforts in building the infrastructure of the second category of forestry, through the acquisition and introduction of advanced equipment and technology of forestry, improving the productivity of labors; third is to strengthen the third area of forest plantation investment, increasing the area and forest coverage of forest, to get ready in building a beautiful China.

Acknowledgments

The authors wish to acknowledge the funding support from the Scientific Research Project of Institutions of Higher Education in Inner Mongolia No. NJSY379; The philosophy and social science project of Heilongjiang province No.15GLE02.

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