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# An Empirical Study on the Impact of Labor Transfer on Rural Household Electricity Consumption

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**To cite this article:**

Wang Ping, Liu Jiao, Yang Changhong, Zheng Yanan. An Empirical Study on the Impact of Labor Transfer on Rural Household Electricity Consumption. *Journal of Electrical and Electronic Engineering*. Vol. 5, No. 1, 2017, pp. 23-28. doi: 10.11648/j.jee.20170501.14

**Received:** January 16, 2017; **Accepted:** January 31, 2017; **Published:** March 15, 2017

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**Abstract:** The larger environment of China's rapid economic development and rising living standards of farmers, labor force is becoming more significant, significant changes in rural household electricity consumption occurred. Based in rural areas in Shaanxi Province "Labor Transfer and Rural Energy Survey" data combined with the actual situation in rural areas, a detailed analysis of Labor Migration on electricity consumption in rural households. The study found the number of rural labor transfer significantly improves the household electricity consumption; the number of the total number of labor force the proportion of household significantly reduces the power consumption of rural households. It concludes with recommendations to improve the efficiency of farmers' income and power as well as the development of new rural construction.

**Keywords:** Labor Transfer, Rural Household, Power Consumption

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## 1. Introduction

China is the world's most populous country, the first major agricultural country, in recent years, with the scientific and technological progress and the extensive application of agricultural production, farmers significantly increased the level of production efficiency, resulting in a large number of rural surplus labor. At the same time, the transportation facilities, the opening of the energy supply channels and other conditions gradually increased, the level of income of farmers, the traditional biomass energy can not meet the needs of rural people, the commercial energy in the energy supply to the family income, China's rural areas began to spread. China's rural households to commodity energy-based consumer structure will be the general trend of future development. China is the world's first agricultural population, the development of rural economy on China's economic impact is self-evident, with the outbreak of various environmental problems in China, long neglected rural energy issues are getting attention, and China is now entering the low-carbon. During the period of emission reduction, although the electricity is not entirely clean energy, but there is no bad gas emissions in use, and China is now vigorously develop water

power generation, wind power and solar power, these clean energy is electricity as a carrier into the farmers Of the daily life, so the study of Shaanxi rural power consumption is necessary and universal.

## 2. The Review of the Literature and Issues Raised

First of all, more research on labor transfer, mainly focus on the study of labor transfer indirectly improve the quality of rural people, consumption and consumption levels. Chen Gang and so that the transfer of rural labor to non-industry will significantly increase the level of household income of farmers, and thus promote the rural left-behind staff has a higher spending power. Qi Mingzhu that the transfer of rural labor force on economic growth contribution in two aspects, from a micro perspective, significantly improve the efficiency of the use of labor; from a macro perspective, to enhance the level of China's overall labor productivity. Jingye ZHANG, Zhifu GUO. Through analyzing the employment structure of rural labor force in Henan Province, it is found that the advantage of agricultural employment base of rural labor force is gradually weakened, while the competitive advantage of

industry, construction industry and retail food industry is strong. Tong Dajian, Jia Yu, who found that higher levels of education of farmers more inclined to shift to non-agricultural industries, which play a catalytic role in China's economic growth. Therefore, it is very important to analyze the transfer of labor force to rural and urban development.

Secondly, there are many studies on household electric power consumption, which mainly focus on the factors affecting the energy consumption of farmers and the negative impact on the environment. China's urban life energy consumption has spatial agglomeration and imbalance, its aggregation shows the positive spatial correlation of the rising trend in the fluctuation, and has the extended accumulation in the time dimension. The impact of the education level of the diverted population, the price of energy, the net income of household agriculture, the size of the household and the availability of biomass energy are introduced into the impact analysis, which further analyzes its causes. Jiang and Neill (2014) and others found that the higher the level of household education, the more inclined to the use of liquefied petroleum gas, solar energy and other new energy-based. Lou Bojie's research results show that household energy consumption increases with the level of the family economy, and Liu shuang and so on research has also proved this point. In many remote rural areas, the long-term development and utilization of traditional biomass energy has led to serious arbors in rural areas. The ecological problems such as water and soil erosion are continuing and the environmental problems in rural areas are still very serious. Xu Yongbing and Zhang Yun (2015) found that the annual consumption of coal in rural areas of Hebei Province has reached 40 million tons, and the scattered coal in the rural areas accounts for 11.9% of the total coal consumption. The contribution rate of these three pollutants has reached the dust 23.9%, 16.9% of sulfur dioxide and 4.9% of nitrogen oxides, of which only rural heating in winter to consume a total of 75% of the total amount of coal in rural areas, the equivalent of the province's emissions of all power plants pollutants. Therefore, in the extremely serious environmental pollution today, optimize the rural energy consumption structure is very important. Although there are a lot of researches on the influence factors of energy consumption in previous scholars, few scholars regard labor transfer as the influencing factor.

Finally, the research on the impact of labor transfer on rural household electricity consumption is scarce, mainly focusing on the economic changes brought about by labor migration and changes in consumption consciousness, which affect farmer's energy consumption. The increase of income level, improvement of living conditions and change of consumption consciousness will directly or indirectly affect and change the energy consumption of rural households. Zhang Cuiping that the non-farm employment will reduce the labor effect of farmer's energy consumption, while the income effect will increase farmers' energy consumption. Xu Bin, Guo Haihua and others found that urbanization, industrial structure, energy consumption in the long term there is a balance between the two, the former two have a positive role in promoting energy

consumption. Guo cheng xin said that the transfer of labor power, coal and other commodities can have a significant impact on consumption. Up to now, no scholars have studied the relationship between labor transfer and household electricity consumption.

Based on the above analysis, this paper presents the status quo and development trend of China's rural areas: ①What are the influencing factors of farm household household electricity consumption in the context of rural labor transfer? ② Is there any effect of labor transfer on the change of electricity consumption? ③ How does the transfer of labor affect the household electricity consumption?

### 3. The Empirical Analysis

#### (I) Data sources

The data of this study were collected from the Energy and Economic Management Research Center of Xi'an University of Science and Technology in June, 2013 in Shaanxi, Shaanxi and Guanzhong. The object of the sample survey included some rural families in Xianyang, Yan'an, Hanzhong, Wuwei, Ji'an and Tongchuan of Shaanxi Province. The samples were sampled in a sample of 300 rural households by stratified multistage sampling method according to the system sampling method at county, township and village levels. A total of 295 questionnaires were obtained, with a response rate of 98.3%. 288 complete and effective questionnaires, the effective rate was 96%.

#### (II) Variable design

##### (1) The dependent variable

The dependent variable is the household electricity consumption, which is the ratio of total household electricity consumption to the average resident population.

##### (2) Independent variables

The independent variable is labor transfer. In this paper, the labor force transfer number, the per capita labor force transfer income and the number of the labor force transfer to the total number of the family are measured. The ratio of labor force transfer is the ratio of the number of migrant workers to the total number of the family, the ratio of the number of the labor force transfer to the total number of the family.

##### (3) Control variables

The education level of the head of household: It refers to the level of education of the head of household in each household. There are direct questions in the questionnaire, including 1 for illiterate, 2 for primary, 3 for junior, 4 for high school, 5 for Secondary school technical school, 6 on behalf of college and above, in order to statistical analysis, its reassignment, the illiterate assignment for 0 years, the primary school assignment for 6 years, junior high school assignment for 9 years, high school assignment for 12 years, 14 years, college and above assignment for 16 years, with the value after the data to represent the value of the variable; energy prices: This article refers to the impact of rural households living energy consumption price factors are coal prices and electricity prices, including coal prices Per capita agricultural net income: family income through agricultural labor; family size: family size refers to the resident

population of the family; students living in the household price per kilogram of electricity; Availability of material energy: In this paper, per capita arable land area to measure the availability of rural household biomass energy; consumer preferences: the farmers' consumption preferences will also affect the family's energy consumption choices. In this paper, the interviewees' consumption choices are sorted by their preferences. The question of consumer preference is: What is your favorite life energy? The results of a total of eight options, of which 1 on behalf of the straw, 2 on behalf of fuel wood, 3 on behalf of the power, 4 on behalf of the coal, 5 on behalf of biogas, 6 on behalf of liquefied gas, 7 on behalf of solar energy, 8 on behalf of others.

### (III) Method

In this paper, descriptive analysis and stepwise multivariate linear regression model are used to study the effects of labor transfer on rural household electricity consumption. The variable of labor force transfer includes the proportion of labor force transfer, labor transfer income and labor force transfer to the total number of families.

## 4. The Results and Discussion

### (I) Descriptive results

Table 1 shows the basic information of farm households in

the three surveyed areas in southern Shaanxi, northern Shaanxi and Guanzhong, with the mean and standard deviation being used to measure the difference. As shown in Table 1, the electricity consumption in southern Shaanxi (381.045) is slightly higher than that in northern Shaanxi (370.705) and Guanzhong (342.867), and the alternative energy sources such as coal in southern Shaanxi are more inclined to use convenient power resources. The total household income (30102.89) in northern Shaanxi is about 43280.77 times that of Shaanxi (43280.77) and 1.3 (43280.77) times that of Guanzhong, but the ratio of labor income to total household income is less than that of Shaanxi (0.529) and Guanzhong (0.423) (0.923) is also slightly smaller than that in southern Shaanxi (1.200) and Guanzhong (1.009), indicating that due to the customs and government policy support of northern Shaanxi, the mineral resources in northern Shaanxi are more abundant, Easy access to income, northern Shaanxi people tend to stay in their hometowns, rather than tend to go out to work. The ratio of the number of shifts in the labor force to the total income is higher than that in the other two areas because the people in southern Shaanxi are accustomed to migrant workers to seek income. Guanzhong region due to geographical advantages, the labor force transfer situation is moderate.

**Table 1.** Basic information of farm households in the survey area (N=288).

Mean (standard deviation)	Southern Shaanxi	Northern Shaanxi	Guanzhong
Per capita electricity consumption (kg)	381.045(294.274)	370.705(256.373)	342.867(226.063)
Income from labor transfer (yuan)	13293.39(15484.22)	16076.92(20504.28)	12690.27(15171.03)
Total household income (yuan)	30102.89(26181.96)	43280.77(28956.11)	32970.23(39317.21)
Income from labor transfer/Total household income	0.529(0.941)	0.320(0.281)	0.423(0.350)
Net income per capita in agriculture (yuan)	9059.92(11459.10)	16305.77(11378.69)	12266.60(35652.34)
Number of Labor Transfer (person)	1.200(0.988)	0.923(0.763)	1.009(0.986)
Family size (person)	3.107(1.334)	2.827(0.985)	2.805(1.156)
Number of Labor Transfers / Family Size	0.289(0.224)	0.240(0.227)	0.238(0.237)
Educational level of head of household (year)	8.050(3.217)	8.731(2.971)	8.717(2.773)
Consumer Preference (Number of)	3	4	3

Source: "Labor Migration and Rural Living Energy Survey," sample survey, 2013

Table 2 for the basic statistics of each independent variable, the table are listed in the study of the variable mean, standard deviation or mode. It can be seen from Table 2 that, regardless of which region, an average of 1.073 individuals per household with labor transfer behavior, indicating that the transfer of labor practices in Shaanxi Province is very common. Labor transfer income accounted for the proportion of total family income of the average of 0.448, indicating that nearly half of the family income from labor transfer behavior, more prominent the importance of labor transfer. The average

level of education of the heads of household is 8.437 years, indicating that the level of education is higher, mostly secondary education. Electricity prices are relatively average in three regions, there is no obvious regional differences; and coal prices in northern Shaanxi (0.106) has obvious geographical advantages, the price is lower than the average price (0.219) half. The preferred energy consumption category is electricity (3), indicating that electricity is more convenient and the field of application is wider. Most people want to use electric energy and research power is very representative.

**Table 2.** Descriptive statistical analysis of variables (N = 288).

Variables	Southern Shaanxi	Northern Shaanxi	Guanzhong	Total
	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)
The dependent variable: rural household per capita annual electricity consumption	381.045(294.274)	370.705(256.373)	342.867(226.063)	364.081(261.946)
Independent variables:				
1. Labor force transfer (person)	1.198(0.988)	0.923(0.763)	1.009(0.986)	1.073(0.954)
2. The proportion of the labor force transferred to the total number of families	0.289(0.224)	0.240(0.227)	0.238(0.237)	0.260(0.230)

Variables	Southern Shaanxi	Northern Shaanxi	Guanzhong	Total
	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)	Mean (standard deviation)
3. Income from labor transfer (yuan)	13293.39(15484.22)	16076.92(20504.28)	12690.27(15171.03)	13561.19(16374.40)
4. Proportion of income from labor transfer to total household income	0.529(0.941)	0.320(0.281)	0.423(0.350)	0.448(0.661)
Control variables:				
1. Educational level of household head (years)	8.050(3.217)	8.731(2.971)	8.717(2.773)	8.437(3.011)
2. Energy prices				
① Electricity price (yuan / degree)	0.514(0.033)	0.5462(0.068)	0.5265(0.053)	0.5248(0.050)
② coal prices(yuan/ jin)	0.202(0.348)	0.106(0.243)	0.289(0.342)	0.219(0.335)
3. Per capita net agricultural income (yuan)	9059.92(11459.10)	16305.77(11378.69)	12266.60(35652.34)	11644.32(24185.28)
4. Family size (person)	3.107(1.334)	2.827(0.985)	2.805(1.156)	2.937(1.212)
5. Consumption preference (number)	3	4	3	3

Source: "Labor Migration and Rural Living Energy Survey," sample survey, 2013

Note: The consumer preference: the results of a total of eight options, namely: straw, fuelwood, electricity, coal, biogas, liquefied petroleum gas, solar and other, so the number of analysis to determine.

#### (II) regression results

Table 3 shows the stepwise multiple linear regression analysis of the effect of labor transfer and other factors on rural household electricity consumption. Model 1 shows the effect of the independent variables, such as the number of labor force transfer, the proportion of labor force transfer to the total number of households and the income of labor transfer, on the household electricity consumption. The regression results show that labor force transfer has a significant positive effect on rural household electricity consumption (322.019 \*\*). The proportion of the labor force transfer to the total number of households has a significant negative impact on rural household electricity consumption (-1558.454 \*\*\*).

Model 2 is based on the model 1 on the basis of the control variables of household basic economic characteristics of the impact of household electricity consumption, the results show that the number of labor force transfer on rural household electricity consumption is more intense (344.026 \*\*\*), the total family Revenue is positively related to per capita

electricity consumption (.014 \*\*\*). Per capita agricultural net income and per capita electricity consumption was significantly inverse relationship (-0.015 \*\*\*). The education level of head of household is positively related to per capita electricity consumption (98.757 \*). Model 3 is based on the model 2 and then add the control variable energy availability factors. The regression result has a change, except that the educational level has weakened the rural household electricity consumption (79.580+), and the influence and influence degree of the other factors to the household electricity consumption are basically the same as the model 2. Per capita arable land area and per capita electricity consumption showed a significant negative relationship (-43.640 \*\*). Model 4 is based on the model 3 to join the price factor. The significant degree of influence factors in the regression results are basically the same as in model 3, and the coal price has a significant negative correlation with the per capita electricity consumption (-366.126 \*\*). Electricity price has no significant effect on per capita electricity consumption. Model 5 and Model 6 are the cross factors that gradually increase the consumption preference factor and the household education level and consumption preference on the basis of model 4 respectively, and the significant degree of factor effect in the regression result is basically the same as model 3.

**Table 3.** Analysis of regression results of rural household electricity consumption by labor force transfer (N = 288).

Variable (model)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant term	988.032***	523.872**	675.097***	922.212*	986.044*	750.816
Labor transfer						
Number of Labor Transfer (person)	322.019**	344.026***	346.239***	358.638***	353.624***	355.739***
Number of Labor Transfer/Total Number of Households	-1558.454***	-1406.455***	-1388.986***	-1486.839***	-1479.300***	-1494.559***
Income from labor transfer (yuan)	.005	-.009*	-.009*	-.009*	-.009*	-.008*
Basic Economic Characteristics of Households						
Total household income (yuan)		.014***	.014***	.014***	.014***	.014***
Net income per capita in agriculture		-.015***	-.014***	-.015***	-.015***	-.014***
Education level of household head (years)		98.757*	79.580+	81.618+	83.381+	168.333+
Energy availability						
Per capita arable land			-43.640**	-41.265**	-39.473**	-39.299**
Price factor						
Coal prices				-366.126**	-354.149**	-356.014**
Electricity prices				-31.735	-35.070	-35.122
Consumer preferences					-16.011	36.482
Household education level× consumption preference						-6.400
Pseudo R <sup>2</sup>	.053	.179	.203	.231	.232	.236

Source: "Labor Migration and Rural Living Energy Survey," sample survey, 2013

Note: \*\*\* p<0.001; \*\* p<0.01; \* p<0.05; +p<0.1

### (III) discussion

This paper uses questionnaire survey data to study the impact of rural household electricity consumption from the aspects of the number of labor force transfer, the number of labor force transfer, the proportion of total household population and the income of labor transfer. Overall, the number of labor transfer and household consumption of electricity was significantly positive relationship, while the proportion was significantly negative correlation.

Table 3 shows that the number of labor force transfers has a significant positive effect on the per capita electricity consumption of rural households, and gradually adding control variables shows that the effect is more significant; the ratio of labor force transfer to total household number has a significant effect on rural household per capita electricity consumption. Negative impact, the greater the proportion of households in the transfer of the number of people to stay less, while the people left behind but also for agricultural cultivation, the use of electric energy will be reduced. The income of labor transfer has a positive effect on the per capita electricity consumption of rural households, which is negatively affected by the total household income of the controlled variable. The more household income is transferred, the more negative the household income. Labor transfer is to promote household electricity consumption, people have more wealth and insight, the more inclined to high-quality goods, energy, and electricity is undoubtedly the most convenient, but because we are facing the rural groups, do not rule out Left-behind people are not willing to save money consumption situation.

In addition, total household income has a significant positive impact on rural household electricity consumption per capita, people are willing to use the money for basic living, the tendency to use convenient energy, the more power needed, the greater the power consumption. The per capita agricultural net income has a significant negative impact on the per capita electricity consumption of rural households. The higher the per capita agricultural income, the more conservative the farmers' thinking, saving money becomes their final choice rather than consumption. The education level of household heads is positive to the per capita electricity consumption of rural households, and the households with higher educational level are more inclined to use electric energy, that is, the higher the educational level of family members, the more inclined to use electric energy. The basic life of people, people are willing to spend less time on the basis of life, and spend more time for other things. The per capita arable land area is negatively correlated with the power consumption, that is, the greater the per capita arable land area, the greater the possibility of obtaining biomass energy, so the use of electricity will be reduced accordingly. The price of coal is negatively correlated to the per capita consumption of electricity in rural households. The higher the price of coal is, the more people tend to consume electricity. The impact of electricity price is not significant because electricity has been used in rural areas in recent years. Popularity, and the country

has been in the implementation of some preferential policies on electricity, electricity prices in rural areas is not very high, so the impact of electricity prices is not obvious.

## 5. Conclusion and Policy Recommendations

Based on the questionnaire, this paper mainly analyzes the impact of rural labor force transfer on rural household electricity consumption in Shaanxi Province, and draws the following conclusions: (1) The number of labor force transfer has a significant positive effect on rural household electricity consumption; (2) The agricultural net income per capita, energy availability, education level and coal price have a certain impact on farm household electricity consumption. (3) The agricultural power consumption of rural households is higher than that of rural households.

Therefore, this paper suggests to guide farmer household energy consumption by guiding the labor transfer, so as to better guide farmers' energy consumption. People's consumer awareness and consumer attitudes change, will promote the gradual upgrading of household energy consumption structure. Advocate farmers to reduce biomass and coal combustion options using higher commodity energy to promote the use of renewable energy sources.

## Acknowledgements:

Fund project: Shaanxi Provincial Department of Education key scientific research program "labor transfer on the impact of energy consumption of farmers" (15JZ037); National Natural Science Fund Project "under the conditions of uncertainty in China's important energy resources supply safety management theory and policy research" (71273206); Study on the Transfer of Agricultural Population and the Development of Rural Energy Consumption in Shaanxi Province under New Urbanization (12017Z018).

## References

- [1] Xiu-ping LIU, Ming-yu LIU, Zhong-yuan XIE. The Strategy of Revival of the Chinese National Minority: An Understanding of Xi Jinping's Series of Speeches [J] Decisions and Information, 2014, Z1: 8-157+2.
- [2] Huanguang Chou, Jianbiao Yan, Dengwang Li, Wei Han. An Analysis of Current Situation, Development Trend and Determinants of Rural Life Energy Consumption in China - An Empirical Study Based on Two-period Survey of Four Provinces [J]. China Soft Science, 2015, 11: 28-38.
- [3] Xi Zhang, Shuwen Niu, Cchongsheng Zhao, Lili Hu. A Study on Energy Consumption and Carbon Emissions of Households in the Process of Urbanization in China [J]. Software of China, 2011, 09: 65-75.
- [4] Gang Chen, Hui Zhang. The Influence of Labor Transfer on Rural Consumption Market [J]. Socialism New Countryside and Advertising Industry Development, 2010, 03: 4-11.

- [5] Mingzhu Qi. A Quantitative Study on the Contribution of Rural Labor Transfer to Economic Growth in China [J]. *Population, Resources and Environment*, 2014, 04: 127-135.
- [6] Jingjing ZHANG, Zhifu GUO. On the Employment Structure and Transfer Characteristics of Rural Laborers in He nan Province. [J] *Agricultural Economy and Management*, 2016, 17 (1): 209-216.
- [7] Dajian Tong, He Jia. A Study on the Relationship between Human Capital, Labor Transfer and Agricultural Economic Growth - Based on the Empirical Study of China [J]. *Business Economics Research*, 2015, 15: 123-125.
- [8] Xianxian Liu, Manzhi Liu, Qianru Feng. The Spatial and Temporal Patterns and Evolution of Urban Life Energy Consumption in China [J]. *Consumer Economics*, 2016, 01: 41-45+67.
- [9] Jiang L, O'Neill B C. Impacts of Demographic Trends on US Household Size and Structure [J]. *Population Development Review*, 2007, 33 (3): 567-591.
- [10] Bojie Lou, Min Song, Qingwen Zhang, Peng Li. Analysis on the Influencing Factors of Farmers' Highly Toxic Pesticide Application Behavior - A Case Study of Six Provinces in Eastern China [J].
- [11] Shuang Liu, Chongjie Qi, Yu Zhao. Analysis of Farmers' Consumption Behaviors - Based on the Survey of Farmers in Hubei Province [J]. *Technology in Agriculture and Technology*, 2015, 02: 23-32.
- [12] Yongbing Xu, Yun Zhang, Jiayu Zhai. The Path and Countermeasures of Rural Energy Consumption Structure Optimization under the Background of Low Carbon [J]. *Economy and Management*, 2015, 01: 82-85.
- [13] Cuiping Zhang. The Impact of Non-agricultural Employment on Energy Consumption of Farmers - A Case Study of Taihu Lake in Jiangsu Province [D]. Nanjing Agricultural University, 2009.
- [14] Bin Xu, Haihua Guo. An Empirical Study on the Relationship between Urbanization, Industrial Structure and Energy Consumption in China [J]. *Journal of Business Economics*, 2015, 16: 122-123.
- [15] Chengxin Guo. The influence of labor transfer on rural household energy consumption [D]. Xi'an University of Science and Technology, 2014.
- [16] Feixiao Yin. Human Capital and Rural Poverty: Theoretical and Empirical Research [D]. Jiangxi University of Finance and Economics, 2013.
- [17] Haipeng Zhang, Junlin Mou, Hang Yin. An Empirical Analysis of Rural Household Energy Consumption in Forest Area-A Linear Expenditure System Model Based on Double Expansion [J]. *China Rural Economy*, 2010, 07: 64-74.
- [18] Foley, G. Photovoltaic Applications in the rural Areas of the Developing World [J]. *World Bank Technical Paper Number 304, Energy Series*, Washington, DC. 1995, 03: 32-35.
- [19] Ting Yuan. Study on the Influencing Factors and Guidance Policies of Urban Residents' Energy-saving [D] China University of Mining and Technology, 2014.