

An Analysis of the Factors Affecting Rural Multidimensional Poverty

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Abstract. Based on the survey data of 2680 rural households in Hubei Province and the Family Life Cycle Model by Glick, this paper uses the Alkire –Foster multidimensional poverty method to measure the multidimensional poverty of households in different stages of family life cycle, and then analyzes the multi-dimensional poverty of rural households. Results found that the beginning stage has the least influence on the multi-dimensional poverty of farmers, followed by the declining stage, the mature stage and the expansive stage, while the growing stage the most influential effect. Therefore, education, training and non-agriculture activities have significant effect on multi-dimensional poverty. Therefore, the government should focus the anti-poverty policy on the families in the middle of the life cycle, reinforce vocational training among the farmers and provide more non-farming vocations to effectively reduce multi-dimensional poverty of farmers.

Introduction

Since the reform and opening up, remarkable achievements have been made in China's anti-poverty. The poverty has descended from 250 million at the beginning of the reform to 2.688 million by the end of 2010 and the incidence of poverty has dropped from 30.7% to 2.8%. However, according to the poverty line of the average net income per capita 2300 yuan per year (at 2010 constant prices), 30.46 million people in China's rural areas will stay poor by the end of 2017. To precisely identify who is poor and who is not is the starting point for targeted poverty alleviation. However, with the economic growth, the structure of poverty has undergone obvious changes. Only using the income or expenditure indicator to identifying the poor has great limitations, which fails to reflect the real poverty accurately. Therefore, more and more scholars begin to identify and analyze poverty from a multidimensional perspective.

Hagenaars (1987) first uses leisure time as an indicator as well as income to measure poverty. Sen (1992) argues that the poor people's capacity and subjective feelings of welfare are indispensable and non-income factors are important to measure poverty. Alkire and Foster (2008) propose a relatively comprehensive multidimensional poverty index and estimate the condition of multidimensional poverty in China. At the same time, domestic scholars have also deepened the study on multidimensional poverty. Yang Long and Wang Sangui (2015) use the dataset from Poverty Monitoring Report of Rural China to measure and decompose the multidimensional poverty in Impoverished Rural Areas of China. Wu Haitao and Hou Yu (2013) explore the multidimensional poverty of rural households from a gender perspective. Zhang Kejing et al. (2016) study the impact of rural women's educational level on multidimensional child poverty in China.

The family life cycle is an important perspective for understanding peasant households' behavior and analyzing poverty. Li Zhilan and Jiang Lin (2014) studied the influence of the family life cycle on residents' willingness to spend. Wang Xiangnan(2013) as well as Chen Ying and Wu Zhiwei(2014) explores the impact of family life cycle on household asset allocation. Tong Huijie and Huang Chengyi (2015) analyze the changing trends of marital relations in China from the perspective of family life cycle.

From the above review, we can see that the multidimensional perspective has become the mainstream of poverty research. It is of great theoretical and practical significance to study the



poverty of farmers from the perspective of family life cycle. However, few studies have been made to explore the multidimensional poverty in rural areas from the perspective of family life cycle. Which phase of family life cycle it is that is more vulnerable to multi-dimensional poverty? What characteristics does multidimensional poverty present in different stages of family life? In order to answer these questions clearly, this paper uses the rural household survey data in Hubei Province to quantitatively investigate the multi-dimensional poverty in rural Hubei from the perspective of family life cycle.

Data and Index

Data. This paper relies on five years of rural household survey data from 2006 to 2010 provided by Hubei Provincial Rural Investigation Team of National Bureau of Statistics. The data is quite authoritative and reliable and rural family information included is quite comprehensive. All cities / states in Hubei Province covered in the data, 2,680 samples are used at last when deleting those that are missing from the information.

MPI Index. The dimensions and deprivation thresholds selected in this paper are determined on the basis of the MPI index as well as the "double line" approach of Alkire and Foster. Given that the MPI index lacks important monetary indicators that describe household incomes and consumption, per capita income and consumption are added. In addition, assets are added as a dimension by itself since the status of household assets is also important to measure poverty. After adjustment, this paper selects 6 dimensions of income, consumption, education, health, living standards and assets, 15 indices in total. MPI is calculated through the weighted sum of the scores of the deprivation of the dimensions and indicators of farmers. Therefore, the choice of poverty dimensions and weights of indices is the key issue of multidimensional poverty measurement. This article chooses the method of equally-weighted assignment which is easy to operate.

The Construction of Multidimensional Poverty Index. The multidimensional poverty index (M0) in this paper draws on the Multidimensional Poverty Index (MPI) developed jointly by the United Nations Development Program and Oxford University in 2010. The MPI includes three dimensions of education, health and living standards. Due to the lack of monetary and asset indicators, three other dimensions of income, consumption and assets are added in this article to make the coverage of multi-dimensional poverty more comprehensive and reasonable. In order to get the final MPI, the headcount (H) is adjusted as H_{ix} where k represents critical value of the dimensions. The individual is multi-dimensionally poor when he becomes deprived i in at least k dimensions. The average deprivation share across the poor (A), also known as poverty severity index, can be expressed as the ratio of the average dimensions of deprived individuals to the total

dimensions (m) or the average multidimensional deprivation degree $A_{(k)}$, The adjusted MPI can be decomposed as follow:

$$M_{(k)} = H_{(k)} \times A_{(k)} = \frac{\sum_{i=1}^{n} c_i(k)}{nm} = \frac{\sum_{i=1}^{n} \sum_{j=1}^{m} w_j g_{ij}}{nm} = \sum_{j=1}^{m} \frac{\sum_{i=1}^{m} w_j g_{ij}}{nm}$$

Family life Cycle Division and Distribution. With reference to the previous studies on the family life cycle and the current situation in China, this paper divides the family life cycle into 5 stages of beginning families, growing families, mature families, expansive families, and recession families.



Table 1	The standards of the family me cycle
The type the family life cycle	The standard of division
Beginning family	The couple with on kids
Growing families	The couple with kids all at the age of 1-18
Mature families	The couple with children over 18
Expansive families	Three generations under one roof
Declining families	The couple dividing with the children

 Table 1
 The standards of the family life cycle

Multidimensional Poverty Measure Results

The Poverty Incidence in All Dimensions at Different Stages of the Family Life Cycle. Table 2 shows the poverty incidence at different stages of the family life cycle in 2006 and 2010, where the dimension k = 3-7. The incidence of poverty in each dimension means if the dimension k = 5, there are only five aspects of poverty among 15 indicators. And we can see that from the perspective of the number of poverty dimensions, the poverty incidence reaches the highest when k = 6 while the lowest when k = 3. And from the point of view of different years, from 2006 to 2010, the poverty incidence in growing, mature and expansive families has increased when k = 3 -5 and decreased when k = 6-7. The poverty incidence of declining families in all dimensions is generally lower than that of the other four types of families while that of beginning families fluctuates up and down. Overall, the effect of poverty alleviation in Hubei Province was rather obvious from 2006 to 2010, and the poverty level in different stages of family life cycle has dropped.

Dimension	Year	Beginning	Growing	Mature	Expansive	Declining
k=3	2006	0.0483	0.0529	0.0469	0.0398	0
	2010	0.0915	0.1311	0.1292	0.1429	0.0941
k=4	2006	0.131	0.1078	0.1328	0.1284	0.0517
	2010	0.1242	0.177	0.2204	0.2	0.2
k=5	2006	0.1586	0.2042	0.1828	0.1669	0.0345
	2010	0.2418	0.2525	0.2304	0.2011	0.1706
k=6 2 2	2006	0.2276	0.2098	0.2391	0.2375	0.2069
	2010	0.2418	0.2098	0.2078	0.1968	0.2353
k=7	2006	0.2552	0.1947	0.175	0.2092	0.2241
	2010	0.1569	0.1148	0.1066	0.1026	0.1529

Table 2The poverty incidence in all dimensions at different stages of the family life cycle

Results of Multidimensional Poverty Measure. Table 3 shows the results of multidimensional poverty measurement when k = 3-7 in 2006 and 2010. And from Table 5, we can see that the poverty incidence (H) in each year decreases with the increase of dimension k, and the average deprivation share (A) and the multi-dimensional poverty index (M) increase with the increase of k. In 2006, the incidence of poverty in all dimensions is high, and then declines successively in the following four years. From 2006 to 2010, the poverty incidence descends the deepest when k = 6, while the least when k = 3. The average deprivation share remains basically unchanged from 2006 to 2010 when k = 3 or 4, increases slowly when k = 5 or 6, and increases sharply when k = 7. The multi-dimensional poverty index shows a downward trend from 2006 to 2010, which shows that poverty has been alleviated in all dimensions in the five years.

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Table 5 Results of multidiffensional poverty measure					
K	Year	The number of multidimensional poor households	Н	А	М
k=3 2000 2010	2006	2645	0.9869	0.2939	0.2901
	2010	2536	0.9463	0.2497	0.2363
k=4 2006 2010	2521	0.9407	0.3163	0.2976	
	2010	2188	0.8164	0.308	0.2515
k=5 2006 2010	2200	0.8209	0.3829	0.3143	
	1648	0.6149	0.446	0.2743	
k=6 2006 2010	1712	0.6388	0.5309	0.3392	
	2010	1060	0.3955	0.7659	0.3029
k=7 2006 2010	2006	1107	0.4131	0.909	0.3755
	2010	503	0.1877	1.8431	0.3459

Empirical Analysis

Model. To measure the impact of the family life cycle stages on multi-dimensional poverty of farmers, this paper selects the poverty dimensions of farmers to measure of multi-dimensional poverty of farmers. The poverty dimensions of farmers are ordered class variables, which can be analyzed through the Ologit (ordinal logit) model. Since the Ologit regression model is based on the cumulative Logit model, assume that the dependent variable is the order value from 1 to J, and the cumulative Logit with dependent variables less than or equal to j and bigger than j can be expressed as follow :

$$L_{j}(x_{j}) = log[\frac{Pr(y_{j} \le j/x_{j})}{Pr(y_{j} > j/x_{j})}] = a_{j} + X\beta$$

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where X denotes the explanatory variables that affect the multi-dimensional poverty of farmers, β denotes a set of regression coefficients corresponding to X, j denotes the multi-dimensional poverty categories of farmers, and a_j is the estimated cut-off point. The regression coefficient of the explanatory variable can be converted to the occurrence ratio to explain the influence on dependent variables. In addition to the family life cycle stage, the personal characteristic, family endowments and location are also introduced as the control variables of the model.

Descriptive Statistics of Variables. The dependent variable in this paper is multidimensional poverty and the poverty dimensions of farmer households are selected to measure the multidimensional poverty. To test the robustness of the model, multiple K-value thresholds are used to classify the poverty level. It can be seen that with the increase of the critical value of K, the mean value of poverty decreases, which indicates that the poverty dimensions of rural households are mainly concentrated in the relatively lower dimensions. The key explanatory variable in this paper is the family life cycle, the mean value of which indicates that the main family types of peasant households in Hubei are mature families. The average age of heads of households shows that most of the heads of households in Hubei are 50 years old. Besides, households without spouses account for 4.51%. The average years of schooling of laborers are 8.3. The families involved in the labor training account for 21.38%. The average working days of non-agriculture of the households are 17. The average distance of the farmers to the towns is 0.48 kilometers. And the mean of geographical location shows that farmers are mainly located in Hilly Areas.



Variable	Variable definitions	Mean	Std. Dev.	Min	Max
,	Degree of poverty.		20012011		
Poverty1	m=1(k<4):	3.2778	1.3651	1	5
	m=k-2(3 < k < 7); m=5(k > 6)				
	Degree of poverty,				
Poverty2	m=1(k<5);	2.5294	1.3576	1	5
	m=k-2(4 <k<8);m=5(k>7)</k<8);m=5(k>				
	Degree of poverty,				
Poverty3	m=1(k<6);	1.8818	1.1590	1	5
	m=k-2(5 <k<9);m=5(k>8)</k<9);m=5(k>				
	Family life cycle (beginning				
Flc	type = 1; growing type = 2;	2 9904	0.9910	1	5
110	mature type $= 3$; expansive	2.7701		1	5
	type = 4; declining type = 5)				
Hzage	Householder age	49.5049	8.9438	14	83
Hzage2	The square of householder	2530.7160	903.9795	196	6889
Warriage W	age				
	with or without spouse $(0 =$	0.0451	0.2076	0	1
C	yes; $1 = no$				
Education	Average years of schooling	8.2788	1.9066	0	15
T _w	Trained or not $(0 - no; 1 -$				
Train	1100000000000000000000000000000000000	0.2138	0.5620	0	1
Days	Non-agricultural working				
	days of the households	17.1576	21.2763	0	80
	Distance to the nearest				
Distance	township	0.4040	a	0	
	(under $5 \text{ km} = 0$; over 5 km	0.4813	0.4997	0	1
	= 1)				
Terrain	Geographical location (plain	1.0004	0.7026	1	2
	= 1; $hilly = 2$; Mountain = 3)	1.9094	0.7836	1	3

Table 4 Descriptive statistics of variables

Regression Results

Table 5 shows the estimation results of the model. The column (1), (3) and (5) are the regression results when there are only variables of the family life cycle and the head of household's age, and the column (2), (4) and (6) are the regression results with other control variables added. When all the control variables are added to the model, the regression coefficient of the model is not too different from the previous, which indicates that the model has strong robustness. With the increase of the critical value of k, the coefficient of the model shows a clear upward trend, because the increase of k will deepen the multi-dimensional poverty of farmers at the data layer. This paper mainly reports the regression results of column (6).

From the perspective of the variables of the family life cycle, taking the beginning stage as the baseline, the growing, mature and expansive stage have a significant positive impact on the multi-dimensional poverty of farmers, while the declining stage has no significant impact. The multi-dimensional poverty in the beginning stage is the smallest, followed by the declining, mature and expansive stage and the most influential stage is the growing stage.

From the individual characteristics' angle, the rural householders' age has a significant negative impact on the multi-dimensional poverty of farmers, and the square of that has a significant positive impact. It indicates that with the age of household head increasing, the livelihood ability of farmers is increasing. And when the age increases to a certain degree, the farmer's livelihood ability tends to



decline as a result of aging. Therefore, the impact of peasant households' age on multi-dimensional poverty shows a downward trend first and then rises up. The existence of spouses has a significant negative impact on rural multi-dimensional poverty, indicating that multi-dimensional poverty of farmers without spouses is higher than that of farmers having spouses. This may be due to the fact those without spouses lack sufficient household labor and thus are more likely to fall into multi-dimensional poverty.

From the perspective of family characteristics, the average years of education of family laborers have a dramatic negative impact on multi-dimensional poverty of farmers, indicating that the improvement of human capital can effectively reduce the multi-dimensional poverty of farmers. The training of family labor force has a remarkable positive impact on multi-dimensional poverty of farmers, which means trained farmers suffer less multi-dimensional poverty than those without training and that workforce training is an effective way to alleviate poverty. The working days of non-agriculture in the household has a significant negative impact on the multi-dimensional poverty of farmers, indicating that engagement in non-agricultural production activities can alleviate the multi-dimensional poverty of farmers.

From the perspective of the natural environment, the farmers who live within 5 kilometers away from the nearest township suffer less multi-dimensional poverty than those who live further. Probably because the smaller the distance is, the more opportunities farmers have to obtain outside information or engage in non-agricultural employment, and subsequently the multi-dimensional poverty can be reduced. Compared with the farmers in the plain areas, the multi-dimensional poverty of farmers in the hilly and mountainous areas will be greater, possibly due to the worse natural resources in the hills and mountains.

Variable	poverty1	poverty 1	poverty 2	poverty 2	poverty 3	poverty 3
variable	(1)	(2)	(3)	(4)	(5)	(6)
flc=2	0.549***	0.718***	0.604***	0.775***	0.641***	0.854***
	(0.1530)	(0.1520)	(0.1600)	(0.1730)	(0.1770)	(0.1900)
flc=3	0.038	0.247*	0.0996	0.305*	0.0819	0.356*
	(0.1470)	(0.1440)	(0.1520)	(0.1650)	(0.1680)	(0.1820)
flc=4	0.308**	0.414***	0.423***	0.511***	0.464***	0.587***
	(0.1570)	(0.1490)	(0.1610)	(0.1700)	(0.1760)	(0.1830)
flc=5	0.0449	0.0006	0.106	0.103	0.201	0.234
	(0.1470)	(0.1580)	(0.1440)	(0.1720)	(0.1490)	(0.1750)
hzage	-0.430***	-0.141***	-0.429***	-0.135***	-0.399***	-0.102**
	(0.0609)	(0.0427)	(0.0603)	(0.0471)	(0.0613)	(0.0489)
hzage2	0.0037***	0.0012***	0.0037***	0.0011**	0.0035***	0.0008*
	(0.0006)	(0.0004)	(0.0006)	(0.0005)	(0.0006)	(0.0005)
marriage		-0.532***		-0.492**		-0.573***
		(0.1730)		(0.2030)		(0.2110)
education		-0.271***		-0.290***		-0.319***
		(0.0193)		(0.0219)		(0.0231)
train		0.190***		0.184***		0.106**
		(0.0440)		(0.0471)		(0.0520)
days		-0.0252***		-0.0238***		-0.0210***
		(0.0023)		(0.0024)		(0.0026)
distance		0.294***		0.308***		0.320***
		(0.0908)		(0.0954)		(0.0990)
terrain=2		0.433***		0.477***		0.492***
		(0.1080)		(0.1060)		(0.1120)
terrain=3		3.058***		3.093***		3.106***
		(0.1270)		(0.1280)		(0.1300)
Observations	13,400	13,400	13,400	13,400	13,400	13,400

 Table 5
 The estimation results of ordered logit regression on panel data

Note: Figures in parentheses are robust standard errors, *, **, *** represent the significance of 10%, 5%, 1% respectively.



Conclusions and Recommendations

Based on the survey data of the rural households in Hubei Province from 2006 to 2010, this paper constructs the panel data and then measures the MPI index including income, consumption, education, health, living standards and assets. Moreover, on the basis of Glick, we divide the family life cycle into five stages to study the multidimensional poverty in rural Hubei and its influencing factors and focus on the impact of the life cycle on multidimensional poverty. Results found that in the survey years, multidimensional poverty has declined in different stages of family life cycle. This paper further verifies the impact of different stages of the family life cycle on multidimensional poverty in rural households through the regression model. The beginning stage has the least impact on rural multi-dimensional poverty, followed by the declining stage, the mature stage and the expansive stage, while the growing stage has the greatest impact. It shows that, at present the main groups of multi-dimensional poverty of China's rural households are concentrated in growing, mature and expansive stages. Under the background of China's targeted poverty alleviation strategy, the government should pay attention to the multi-dimensional poverty of the three types of families. In order to further alleviate poverty, the government can increase rural human capital by adopting a variety of educational forms or training methods, provide more employment opportunities for rural migrant, and strengthen their efforts to alleviate poverty in remote areas.

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