Propensity Analysis on Consumption Expenditure of Rural Residents in Hebei Province, China

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Abstract   Consumption expenditure of rural residents can be divided into eight types of indices, such as food consumption expenditure, clothing consumption expenditure, household equipment and service consumption expenditure, health care consumption expenditure, transportation and communication consumption expenditure, cultural and educational entertainment and service consumption expenditure, housing consumption expenditure, and other goods and services consumption expenditure. Changes in structures of rural survivable consumption (food, clothing, housing, and cultural entertainment) and rural enjoyable consumption (transportation and communication, household equipment and services, health care and other goods and services) are analyzed in order to discuss the structural change of consumption expenditure of rural residents in Hebei Province, China. It is concluded that consumption expenditure of rural residents has increased year by year in Hebei Province with the enhancement of consumption level and the slight reduction of survivable consumption which is mainly caused by the decline of food consumption. Meanwhile, there is a slow growth of enjoyable consumption, mainly reflected in the transportation and communication expenditure and other goods and services expenditure. According to the investigation data of rural residents in Hebei Province from the year 2003 to 2007, qualitative analysis on the eight indices of consumption expenditure is conducted. Principal Component Analysis is used to analyze the change of consumption structure of rural residents in Hebei Province. It can be deduced that consumption structure of rural residents in Hebei Province has changed from survivable consumption to enjoyable consumption and the consumption level of rural residents has increased constantly.

Key words   Hebei Province, China; Rural residents; Living consumption; Propensity of expenditure

Consumption structure refers to the proportion of consumption expenditure in total expenditure, including the means of subsistence in daily life, the service types received and its proportion relation. Measurement index for optimization of consumption structure includes the proportions of clothing, housing and other kinds of consumption, proportions of survivable consumption, developmental consumption and enjoyable consumption, and the proportions of commodity consumption and self-sufficiency consumption[1]. Living standard is closely related to the consumption structure. In recent years, consumption level and life quality of rural residents have markedly improved and the consumption structure has undergone profound changes in Hebei Province [2]. In some areas, living standard of rural residents has changed from the state of having sufficient food and clothing in the past into a well-off level, and now is gradually turning into an opulent level.

In order to study on the consumption structure tendency of rural residents and to reflect the living standard of farmers, survey data of rural residents from 2003 to 2007 are used to analyze the living consumption of rural residents by using Principal Component Analysis. This helps to optimize the structure of rural consumption, improves the living standards of farmers, and promotes the development of rural economy.

1   Consumption of rural residents in Hebei Province

1.1   Changes in consumption expenditure of rural residents   According to the actual expenditures, consumption expenditure of rural residents can be divided into food consumption expenditure, clothing consumption expenditure, household equipment and services expenditure, health care consumption expenditure, transportation and communication consumption expenditure, cultural and educational entertainment expenditure, housing consumption expenditure, and other goods and services expenditure[3]. It is obtained from Table 1 that the order of consumption growth rate in rural family in the years 2003 –2007 is as follows: other goods and services expenditure (127.1%) > transportation and communication consumption expenditure (112.8%) > housing consumption expenditure (101.6%) > household equipment and services expenditure (96.0%) > health care consumption expenditure (85.0%) > clothing consumption expenditure (61.5%) > food consumption expenditure (60.5%) > cultural and educational entertainment expenditure (30.5%).

Consumption of rural residents grows rapidly. Living consumption of rural residents has an average growth rate of 14.7% from 2003 to 2007, an increase of 1 163.47 yuan and up by 72.7%. Table 1 indicates that other goods and services expenditure and communication consumption expenditure have increased rapidly, indicating that with the development of society, consumption structure of rural residents has undergone fun-

damental changes. Consumption structure of rural residents has changed from the food and clothing in the past into transportation, tourism, communication and cultural life. Farmers begin to buy computers, cars and even apartments in cities. And the general life quality of farmers has been improved significantly.

Table 1   Growth of living consumption of rural residents   yuan

Item	Other goods and services expenditure	Transportation and communication consumption expenditure	Housing consumption expenditure	Household equipment and services expenditure	Health care expenditure	Clothing consumption expenditure	Food consumption expenditure	Cultural and educational entertainment expenditure	Total living consumption expenditure
2003	25.28	149.52	311.46	71.65	101.63	114.97	639.10	186.48	1 600.10
2007	57.40	318.19	627.98	140.45	188.06	185.68	1 025.72	243.30	2 763.57
Growth amount	32.12	168.67	316.52	68.8	86.43	70.71	386.62	56.82	1 163.47

Note: Data are from the Hebei Investigation Brigade of the National Bureau of Statistics.

1.2 Structural changes in living consumption of rural residents in Hebei Province

Among the eight types of life expenses of rural residents, food, clothing, residence, cultural and educational entertainment are called survivable consumption; and transportation and communication, household equipment and services, health care and other goods and services are classified into enjoyable consumption (Table 2).

Table 2   Structural changes in living consumption of rural residents in Hebei Province   %

Year	Survivable consumption					Enjoyable consumption				
	Food	Clothing	Housing	Cultural and educational entertainment	Total	Transportation and communication	Household equipment and services	Health care	Other goods and services	Total
2003	39.94	7.19	19.47	11.65	78.25	9.34	4.48	6.35	1.58	21.75
2004	42.51	6.92	18.58	9.95	77.96	9.62	4.38	6.32	1.71	22.03
2005	41.02	7.18	18.42	10.43	77.05	10.25	4.69	6.22	1.80	22.96
2006	36.69	6.73	21.31	10.64	75.37	11.45	4.64	6.67	1.88	24.64
2007	36.81	6.66	22.53	8.73	74.73	11.42	5.04	6.75	2.06	25.27

Note: Data are from the Hebei Investigation Brigade of the National Bureau of Statistics.

1.2.1 Structural changes in survivable consumption of rural residents.

(1) Food consumption expenditure is reduced and the Engel's Coefficient decreases. According to the Engel's Coefficient put forward by the United Nations (proportion of food consumption in total living consumption), general standard of life stages is defined as absolutely poverty (above 59%), barely enough food and clothing (50% −59%), a " moderately well-off" standard of living (40% −50%), a "well-to-do" standard of living (40% −30%) and a "wealthy" life (below 30%)[4]. Table 2 indicates that in the past five years, proportion of food consumption of rural residents has decreased in Hebei Province. And Engel's Coefficient is gradually reduced from 39.94% in the year 2003 to 36.81% in the year 2007. Consumption level of rural residents is gradually stepping towards a "well-to-do" standard of living.

(2) Proportion of clothing consumption is relatively stable, while the housing consumption grows rapidly. Proportion of clothing consumption of rural residents fluctuates around the 6.95% from 2003 to 2007. Expenditure on housing grows rapidly. Housing consumption of rural residents increases by 3.06% from 2003 to 2007, manifested in construction materials, and electricity and fuels used in daily life. With the steady development of building a new socialist countryside, rural housing condition has experienced historic changes. Farmers move into new houses with methane in kitchen. Apparently, housing consumption of rural residents increases considerably.

(3) Expenditure on education declines, but education has attracted increasing attention. Proportion of cultural and educational entertainment expenditure in living consumption expenditure is decreasing year by year, but their total expenditure is increasing slowly. Per capita education consumption expenditure of rural residents has enhanced from 140.2 yuan in 2003 to 204.4 yuan in the year 2006. Tuition fee is a major part of education expenditure for rural children in the years 2003 −2006, because compulsory education is not implemented before the year 2007. Therefore, expenditure on education grows rapidly during this period. After the abolishment of tuition fee and the implementation of "two exemptions and one supplement", expenditure on children's education has reduced to 170.1 yuan in the year 2007 in rural areas. In the years 2003 −2006, average proportion of education expenditure in cultural and educational entertainment expenditure reaches 74.5%, showing that rural residents have put more and more emphasis on education. On the one hand, the overall educational level of rural residents is low. Fortunately, farmers have realized the importance of education, and spare no effort in giving the education opportunity to their children. On the other hand, farmers' basic needs of living have been met. They begin to attach great importance to their children's education, fully reflecting the improvement of farmers' awareness of education. Therefore, there is no doubt that farmers will pay more attention to education. And education consumption will become an indispensable part of the living consumption of rural residents just like food, clothing and housing consumption.

1.2.2 Structural changes in enjoyable consumption of rural

residents. Transportation and communication consumption expenditure and health care consumption expenditure have increased year by year. With the development of society, social material is significantly enriched. Based on the income increase of rural residents and the improvement of living standards of farmers, enjoyable consumption represented by health care and transportation and communication has developed. In the year 2007, expenditures on the transportation and communication and the health care have increased by 168. 7 and 86. 4 yuan, respectively, compared with those in 2003. Because more and more rural residents now use computers, cars, mobile phones and network, proportion of transportation and communication consumption will increase year by year. Data show that the usage of transportation and communication means has increased significantly from 2003 to 2007, causing the rise of maintenance cost for transportation and communication means. With the development of society, farmers pay more attention to their physical and mental health. Meanwhile, reform of medical insurance system is implemented. Therefore, expenditure on health care grows annually. Investigation shows that medical expense and medical and hygiene articles account for 98% of the medical care consumption. And the annual expenditure on them is on the rise.

The household equipment and services consumption and the other goods and services consumption together accounts for only a very small proportion in living consumption and the influence of the two is small. However, their growth rates should not be overlooked. At present, both commodity price and service level are very high. A slight change in consumption will result in great fluctuation of growth rate due to the small cardinal number of consumption expenditure.

In a word, consumption expenditure and consumption level of rural residents have increased year by year in Hebei Province. According to the growth situation, survivable consumption has reduced slightly, which is mainly caused by the decrease of food consumption. At the same time, enjoyable consumption has increased slowly, which is manifested mainly in transportation and communication expenditure and other goods and services expenditure. Thus, propensity of rural residents tends to

enjoyable consumption in Hebei Province.

2 Principal Component Analysis on living consumption of rural residents in Hebei Province

2.1 Creation of model According to the investigation data of rural residents in Hebei Province from 2003 to 2007, eight indices of consumption expenditure of rural residents in Hebei Province are studied by Principal Component Analysis, which are food consumption expenditure (X_1), clothing consumption expenditure (X_2), household equipment and services expenditure (X_3), health care expenditure (X_4), transportation and communication expenditure (X_5), cultural and educational entertainment expenditure (X_6), housing consumption expenditure (X_7), and other goods and services expenditure (X_8). Thus, we have principal component equation:

$$F_i = a_{1i}X_1 + a_{2i}X_2 + \cdots + a_{pi}X_p,$$

where F_i and X_p are n-dimensional vectors[3], $a_{1i}\cdots a_{pi}$ are constants, and $i = 1, 2, \cdots, n$.

2.2 Data source and processing Data are from survey resources in the past years by the rural social and economic investigation team of Hebei Province from 2003 to 2007. Standardized processing of data is conducted by SPSS13. 0 software, so as to eliminate the impact of dimension. Number of principal components is determined according to eigenvalue, variance contribution rate and cumulative variance contribution rate. Expression of principal components is obtained from the coefficient of principal components; and comprehensive analysis is carried out based on scores of principal components.

2.3 Result analysis

2.3.1 Determination of the number of principal components. Principal component is determined by eigenvalue, variance contribution rate and cumulative variance contribution rate. We choose the principal component with its eigenvalue bigger than 1 and cumulative variance contribution rate between 85% and 95%. Table 3 shows the output result after taking the data in SPSS13.0 software.

Table 3 Explanation of total variance

Serial number of variable	Description of initial variable			Variable description after extracting principal components		
	Eigenvalue	Variance contribution rate∥%	Cumulative variance contribution rate∥%	Eigenvalue	Variance contribution rate∥%	Cumulative variance contribution rate∥%
1	7.673	95.913	95.913	7.673	95.913	95.913
2	0.242	3.027	98.940			
3	0.078	0.978	99.918			
4	0.007	0.082	100.000			
5	0.000	0.000	100.000			
6	0.000	0.000	100.000			
7	0.000	0.000	100.000			
8	0.000	0.000	100.000			

Note: Data are from the Hebei Investigation Brigade of the National Bureau of Statistics.

Table 3 shows that there is only one eigenvalue bigger than 1 and the average values of variance contribution rate and cumulative variance contribution rate are both 95.913%. Since one principal component can fully reflect all the information of

eight indices, we conclude that one principal component is enough.

2.3.2 Determination and analysis of the expression of principal components. Loading coefficient matrix of principal compo-

nents is obtained by SPSS13. 0 software (Table 4). In the loading matrix of principal component, load coefficient of principal component is listed, and the load value represents the correlation coefficient between variables and principal components.

Table 4 reports that transportation and communication expenditure has the maximum correlation coefficient, followed by health care expenditure, other goods and services expenditure, household equipment and services consumption, clothing consumption expenditure, housing consumption expenditure, food consumption expenditure and cultural and educational entertainment expenditure. Among them, health care expenditure has a large proportion in all variables. Except the cultural and educational entertainment expenditure, loads of principal components in the rest variables are all large.

Table 4 Loading matrix of principal component

Serial number	Eight indices of living consumption expenditure	First principal component
1	Transportation and communication expenditure	0.998
2	Health care expenditure	0.996
3	Other goods and services expenditure	0.994
4	Household equipment and services expenditure	0.993
5	Clothing consumption expenditure	0.993
6	Housing consumption expenditure	0.984
7	Food consumption expenditure	0.979
8	Cultural and educational entertainment expenditure	0.894

Note: Data are from the Hebei Investigation Brigade of the National Bureau of Statistics.

Table 4 indicates that propensity of living consumption of rural residents in the years 2003 – 2007 can be expressed by a principal component. Thus, we have the equation:

$$F_1 = 0.979X_1 + 0.993X_2 + 0.993X_3 + 0.996X_4 + 0.998X_5 + 0.894X_6 + 0.984X_7 + 0.994X_8.$$

Correlation coefficient of each variable in the equation of Principal Component Analysis shows that living consumption of rural residents is gradually changing from survivable consumption (food, clothing, housing, and cultural entertainment) into enjoyable consumption (transportation and communication, household equipment and services, health care and other goods and services). Meanwhile, investigation on rural residents from 2003 to 2007 shows that there is substantial increase in transportation and communication consumption expenditure, health care expenditure, other goods and services expenditure, and household equipment and services consumption. But increases of clothing consumption expenditure, housing consumption expenditure, food consumption expenditure, and cultural and educational entertainment expenditure are slow. In general, living consumption expenditure in Hebei Province has changed gradually from the survivable type to enjoyable type.

2.3.3 Analysis of the score of principal component. There are positive and negative scores of principal components. Negative score means lower than the mean value; and the greater the absolute value is, the smaller the negative score becomes. Positive score stands for greater than the mean value; and the greater the absolute value is, the larger the positive score becomes.

Table 5 shows the scores of principal components after standardization. It can be concluded that from the year 2003 to

2007, scores of principal components increase from negative value to positive value. Score is negative before the year 2005, indicating that the standard of living is below the average level. The score turns to positive after the year 2006, indicating that the consumption level of rural residents has improved. Scores of principal components show that the living and consumption level of rural residents has improved constantly in Hebei Province.

Table 5 Score coefficient of principal component

Serial number	Year	Score of principal component	Serial number	Year	Score of principal component
1	2003	-1.141 90	4	2006	0.692 38
2	2004	-0.786 96	5	2007	1.263 58
3	2005	-0.027 10			

Note: Data are from the Hebei Investigation Brigade of the National Bureau of Statistics.

3 Conclusion and discussion

3.1 Conclusion According to the analysis, we can conclude that the living consumption level of rural residents in Hebei Province is increasing and the basic material life has met the needs of farmers. With the increase of peasants' income, farmers turn to pursue higher material and spirit comforts. Nowadays, material culture and spiritual culture are greatly enriched. The development of tourism, entertainment, transportation, communication and computer networks has met the needs of the people in all aspects. Reform of health care system and the improvement of rural cooperative medical service have greatly enhanced health awareness of rural residents. Therefore, due to the change of farmers' consumer concepts, government should strengthen the infrastructure construction in rural areas including running water, power system and cable television, actively support the cultural life of rural residents, enhance the cultural awareness of farmers, advance the construction of " Rural Library" , and do well in presenting culture to the countryside. Meanwhile, government should also improve rural medical insurance and social security system, reduce the burden of farmers, promote the consumption confidence of farmers, and guide the farmers live a modern and diversified life.

3.2 Discussion Principal Component Analysis is used to analyze the investigation on rural residents in Hebei Province from 2003 to 2007. Conclusions obtained are basically in accord with the actual situation in real life and have certain similarities with the research result of Kou Mingting[1]. Moreover, Principal Component Analysis in this study has also achieved ideal results, which verifies the reliability of Principal Component Analysis in studying on this kind of problems.

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countryside and the development of agricultural industrialization. Thus, deepening of agricultural industrialization management and steady progress in new countryside construction can be achieved only by strengthening the decision-making, management and service level of government.

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社会主义新农村建设背景下的农业产业化发展

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摘要　分析了社会主义新农村建设与农业产业化发展之间的关系。一方面,社会主义新农村建设是农业产业化发展的时代背景,为农业产业化的发展提供了有力的支撑;另一方面,农业产业化经营是新农村建设的重要内容,为新农村建设提供了经济基础保证。提出新时期应按照科学发展观的要求,统筹推进社会主义新农村建设和农业产业化的发展。在此基础上,从农业产业结构调整、农民收入增加、劳动力转移、新农民的培养、农村基础设施建设、环境保护等方面探讨了在社会主义新农村建设背景下推动农业产业化发展的6点措施。

关键词　新农村建设;科学发展观;农业产业化

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河北省农村居民生活消费支出倾向分析

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摘要　按照人们实际支出去向将农村居民消费支出分为食品消费支出、衣着消费支出、家庭设备及服务消费支出、医疗保健消费支出、交通通讯消费支出、文教娱乐及服务消费支出、居住消费支出、其他商品及服务消费支出共8项内容,从农村居民生存型消费结构(食品、衣着、居住、文教娱乐)与农村居民享受型消费结构(交通通讯、家庭设备及服务、医疗保健、其他商品及服务)2方面的变化情况探讨了河北省农民居民生活消费支出结构变化状况,得出河北省农村居民生活消费支出逐年增长,生活消费水平逐渐提高,生存型消费有所下降,下降幅度不是很大,主要是食品消费下降所到导致的结果,享受型正在消费缓慢增长,主要表现在交通通讯支出和其他商品及服务支出上。根据河北省2003～2007年农村居民调查资料,对河北省农村居民生活消费支出的8项指标进行定性分析,采用具有消除相关性影响的主成分分析方法分析了河北省农村居民生活消费结构的变化情况,得出河北省生活消费支出从生存性消费向享受型消费转变,农村居民生活消费水平在不断提高。

关键词　河北省;农村居民;生活消费;支出倾向