Data Analysis on Consumer Pension Plans for Chinese Residents

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Abstract. Data plays an important role in various fields of today's society. Through data analysis, it is possible to discover the underlying operating mechanisms and laws behind the data. Analyzing relevant data can provide decision-making references for policymakers. According to the seventh national census data, the degree of China's population aging has further deepened, and the elderly pension problems have become even more severe. The basic pension security system can no longer meet the pension needs of all residents. This paper adopts the random sampling method, and uses the self-designed questionnaire to study the residents' consumption intention and influencing factors for the consumer pension plan. Although the residents as a whole do not know much about the new consumer pension mode, after they have a certain understanding of the content of consumer pension, more residents are willing to participate in the consumer pension plan. The results show that residents' different characteristics have different impacts on their willingness to participate in the consumer pension plan, and the factors influencing their choice of consumer pension plans are also different. Residents' willingness to participate in consumer pension plans will be affected by the advantages of the consumer pension plans, and the more obvious the advantages of consumer pension plans, the higher the degree of residents' willingness to participate in the consumer pension plans.

CCS CONCEPTS • Applied computing • Law, social and behavioral sciences • Economic

Keywords: Data mining, Data analysis, Consumer pension plans, Pension mode, Insurance system, Cross analysis

1   Introduction

At present, China's existing pension system is composed of three pillars: the first is the government-led basic pension system, including the basic pension system for urban workers and the basic pension system for urban and rural residents; the second is the occupational-led pension system; the third is the individual-led personal pension system including individual commercial insurance. After years of reform and construction, China's pension system is basically perfect at present, but the basic pension insurance system occupies a major position, shouldering the main responsibility of the pension, whether it is social security fund or medical insurance, its development is relatively perfect, but as the third pillar of the individual pension system, there are big shortcomings. Commercial insurance institutions only spontaneously launched some small endowment insurance products, the development scale of

commercial endowment insurance is still very small, and the individual endowment insurance market has not made substantial progress, not to mention the development of a new pension model of consumer pension. For a long time, the third pillar personal pension system, including consumer pension and commercial insurance, has not been paid attention to by relevant departments, without corresponding development goals and clear planning, the personal pension system is still in the initial and subordinate position, and the concept of consumer pension has not been popularized.

Domestic and foreign scholars have produced a large number of research results on the issue of pension, but most of them are limited to the field of basic pension security, and there is no innovative research on new pension models. Lim and Endo pointed out that for a country with low fertility rate and aging population, the government should actively take on the responsibility of building a pension insurance system for urban and rural residents [1]. Hafizhiantoro and Krisnanto pointed out that service quality, price and reputation have significant positive impacts on pension insurance purchase decisions [2]. Maciejasz and Chorkowy studied the pension system and population structure in Poland and found that the financial pressure of pension will continue to increase [3]. Yang et al. put forward reasonable suggestions and improvement directions for the construction of a new pension system based on the analysis of the background characteristics of the aging society and the problems existing in the traditional pension system [4]. Yu found that China's basic pension security is dominant, while the development of the second and third pillars is seriously lagging behind [5]. Ma analyzed the advantages and disadvantages of commercial insurance in the three-pillar pension system under the background of aging [6].

In order to better solve the problem of care for the elderly, some scholars begin to explore new pension modes, such as consumer pension modes. Song described consumer pension mode in detail [7]. Zhang analyzed the unique advantages of consumer pension modes [8]. Wu pointed out that security and inheritance concepts are the main factors affecting the choice of the way [9]. Yang Yifen discussed the significance and feasibility of the implementation of consumer pension modes in society [10]. Liu et al. studied the feasibility of implementing the consumer pension mode [11]. Dong et al. took two consumer pension platforms in different regions as examples to analyze operation process of the platforms [12].

It is not difficult to find from existing research that research on the consumer pension mode is mostly based on qualitative analysis, and lacks a quantitative perspective to study the consumer pension mode. Therefore, this paper analyzes the relevant issues of the consumer pension mode from a quantitative perspective.

2 Questionnaire analysis and empirical results

This paper conducted a random sampling survey through the form of electronic questionnaire released on the Internet, in order to understand the residents' willingness to consume for the consumer pension plan and the influencing factors. The survey lasted for about 10 days, and a total of 590 valid questionnaires were collected. The survey involved the respondents' different gender, place of residence, age, health status, education level, monthly income level, marital status and number of children. Based on residents' choice of traditional modes of care for the elderly, this paper analyzes the reasons that affect residents' choice of the elderly care

mode. Further, this paper analyzes the advantages of consumer pension modes, and studies the influence of the two on Chinese residents' willingness to participate in consume pension plans.

2.1 Descriptive statistics of survey data

This paper analyzes the classification of different characteristics after assigning values, gender: male =1, female =2; Place of residence: north (north of Qinling Mountains)=1, south (south of Qinling Mountains)=2；Age: < 18 years old = 1,18 ~30 years old = 2,31 ~50 years old = 3,51 ~65 years old =4, > 65 years old =5; Health status: health =1, sub-health =2, long-term chronic disease =3, severe disease =4, physical disability =5; Education: below high school =1, high school (technical secondary school) =2, junior college =3, bachelor's degree =4, master's degree or above =5; Monthly income level: < 2000 yuan = 1,2000 ~5000 yuan = 2,5000 ~8000 yuan = 3,8000 ~10000 yuan = 4,10000 ~20000 yuan =5, ≥20000 yuan =6; Marital status: unmarried =1, married =2, divorced =3, widowed =4; Number of children: 0 = 1,1 = 2,2 = 3,3 or more =4; Living environment: township =1, county =2, city =3; Aged care mode selection: home aged care =1, community aged care =2, institutional aged care =3; Whether to make pension planning: no planning =1, planning =2; Whether you understand the consumption pension: very understand =1, relatively understand =2, heard of, but not clear =3, do not understand =4; Whether agree to participate in consumer pension plans: strongly agree =1, most agree =2, half agree =3, most disagree =4, strongly disagree =5. SPSS software is used to conduct descriptive statistical analysis of the basic characteristics of the survey objects in the questionnaire data, and the results are shown in Table 1 below.

Table 1. Descriptive statistical analysis of basic characteristics of survey respondents.

Items	Average	Median	S.D	Variance	Kurt	Max	Min
Gender	1.60	2	0.491	-0.398	1.159	2	1
Place of residence	1.54	2	0.499	-0.174	1.030	2	1
Age	2.76	3	0.834	0.641	2.597	5	1
Health status	1.35	1	0.659	2.488	11.151	5	1
Level of education	3.30	4	1.375	-0.411	1.864	5	1
Monthly income level	2.44	2	1.261	1.138	3.751	6	1
Marital status	1.62	2	0.602	0.780	4.525	4	1
Number of children	2.17	2	0.776	0.377	2.875	4	1
Living environment	2.41	3	0.774	-0.856	2.188	3	1
Choice of pension model	1.43	1	0.710	1.334	3.267	3	1
Whether pension plan	1.47	1	0.500	0.119	1.014	2	1
Whether to understand the consumption of old-age care	3.05	3	0.919	-0.673	2.573	4	1
Whether or not you agree to participate	2.24	2	1.025	0.553	2.823	5	1

2.2 Survey results of residents' willingness to participate in the consumer pension plan

In order to study residents' willingness to participate in consumer pension plans, this paper first investigates which traditional elderly care model residents prefer and the reasons for choosing it. The traditional elderly care model includes home-based elderly care, community elderly care, and institutional elderly care. According to the data, 70% of the respondents

preferred home-based elderly care, while 12.88% preferred institutional elderly care. And 17.12% of the respondents are willing to provide for the aged in the community. For different elderly care models, the reasons why respondents prefer a certain elderly care model are not the same, as shown in Table. Table 2 can be obtained by cross-analysis. As can be seen from Table 2, the home-based elderly care is chosen more because they can live with their children, family members or friends, while institutional care for the elderly is also chosen because the respondents are mainly considering the high service level of elderly care institutions, fully meeting the needs of elderly care (43, 51.19%), complete entertainment facilities, and high quality of life (83, 55.33%).

Table 2. Cross-analysis of residents' willingness and reasons for choosing consumer pension mode.

Projects	home-based elderly care	community elderly care	Institutional elderly care
Wish to live with children, family or friends	263(82.70%)	36(11.32%)	19(5.97%)
Institutional charges too much or has poor stability	89(76.07%)	21(17.95%)	7(5.98%)
The service level is high and fully meets the needs	23(27.38%)	18(21.43%)	43(51.19%)
Be familiar with the surroundings	208(75.91%)	56(20.44%)	10(3.65%)
Living alone or without children	34(27.64%)	13(21.67%)	13(21.67%)
The institution has abundant medical resources	34(27.64%)	56(45.53%)	33(26.83%)
Complete recreational facilities and high quality of life	63(44.68%)	37(26.24%)	83(55.33%)
Eat healthy and private dietary habits can be taken care of	39(27.27%)	35(24.48%)	41(29.08%)
Easy to communicate and avoid quarrels	57(41.91%)	45(33.09%)	34(25.00%)
Other reasons	6(75.00%)	0(0.00%)	2(25.00%)

Secondly, the survey data shows that under a certain mode of care for the elderly, the top three elderly care services that residents are willing to buy are domestic cleaning services, entertainment and leisure services, and chronic disease diagnosis and treatment services, accounting for 57.12%, 52.20% and 51.19% respectively. Tables and catering services for the elderly, cultural and educational services and special food and health products followed, accounting for 42.88%, 29.49% and 23.56%, respectively. If the consumer pension mode can meet the needs of residents in all aspects of elderly care services, then the number of residents choosing to participate in consumer pension plans will increase. According to the survey data, only 46.95% of the respondents have made a financial plan for their pension, and more than half of the respondents are not clear about their current plans for the elderly care. In addition, only 24.92% of respondents are familiar with the consumer pension mode, 37.97% of respondents have only heard of it, and 37.12% of respondents have no understanding at all. Cross analysis of pension planning and consumer pension mode can be obtained in the following Table 3.

Table 3. Cross-analysis Cross analysis of pension planning and consumer pension mode.

Items	Very knowledgeable	Relatively well understood	I've heard of it, but I'm not really sure	Don't understand
No planning	18(5.75%)	41(13.10%)	114(36.42%)	140(44.73%)
Have a plan	26(9.39%)	62(22.38%)	110(39.71%)	79(28.52%)

Based on Table 3, there are many residents who know about the consumer pension mode, but they have little understanding of the operating mechanism of the consumer pension mode. No more than half of them understand or are familiar with the operating mechanism of the consumer pension mode, and most residents do not know or even have never heard of this. Even for the survey respondents who have made pension planning, the cognition of consumer pension mode is still very low, and most of the respondents have a vague understanding of the consumer pension mode. Furthermore, this paper investigates whether residents hold an optimistic attitude towards the development prospects of consumer elderly care models and are willing to participate in consumer pension plans. The corresponding results are presented in Table 4. According to Table 4, 89.67% of the respondents believe that consumer pension mode has a good development prospect and are willing to participate in the consumer pension plans, among which 27.29% of the respondents "strongly agree" and 34.07% of the respondents "mostly agree". And 28.31% of the respondents hold the attitude of "half agree" that consumer pension has a bright development prospect. Based on this, it can be believed that most of the residents in China have a positive attitude toward the implementation of consumer pension plans.

Table 4. A survey on residents' willingness to participate in the consumer pension mode.

Classification	Quantity	Frequency (%)
Couldn't agree more	161	27.29
Most agree	201	34.07
Half agree	167	28.31
Most disagree	43	7.29
Strongly disagree	18	3.05

2.3 Regression analysis of factors influencing the willingness to participate in the consumer pension plans

This section focuses on the research on factors influencing the willingness to participate in the consumer pension plans. This study helps to provide decision-making references for the development of consumer elderly care models. This study is conducted from two aspects. Considering that different groups with different characteristics have varying demands for consumer pension modes, this section first investigates the impact of residents' basic characteristics on their willingness to participate in consumer pension plans. In addition, the advantages of the consumer pension mode will undoubtedly have a significant impact on the choices of residents towards this mode. Therefore, starting from the characteristics of the consumer pension mode, this section studies the impact of the advantages of the consumer pension mode on the willingness of residents to choose the consumer pension model. In sum, the dependent variable studied in this section is the residents' willingness to participate in

consume pension plans, that is, the degree of consent of residents to participate in the consumer pension plans. While the independent variables are the factors influencing residents' choice to participate in consumer pension plans. They are the basic characteristics of residents and the advantages of the consumer pension mode.

Firstly, the impact of residents' basic characteristics on their willingness to choose consumer pension modes is researched. Using the willingness of residents to participate in the consumer pension plans as the dependent variable, and the basic characteristics of residents in Table 5 as the independent variable, SPSS software is used to conduct multiple linear regression analysis. The results are shown in Table 5 below.

As shown in Table 5, the DW test value is 1.968, close to 2, indicating that the model does not have autocorrelation. The VIF value of each independent variable is less than 5, indicating that there is no multicollinearity between the data. R^2 equals to 0.149, indicating that the basic characteristics of residents have insufficient explanatory power on the willingness of respondents to participating in consumer pension plans, and there are other factors that affect residents' willingness to participating in consumer pension plans. In the independent variables, place of residence, education level, and number of children have a negative impact on the willingness of respondents to choose the consumer pension mode, while gender, age, income status, marital status, and living environment have a positive impact on the willingness of respondents to choose the consumer pension mode. Among them, the regression coefficients of the health status and marital status of the respondents are both significant at the 10% level, indicating that currently, the main factors determining whether Chinese residents choose to consumer pension mode are not income, education, etc., but rather their health status and marital status.

Table 5. Multiple linear regression.

Models	Beta	t	Significance	VIF
Gender	0.047	1.098	0.273	1.127
Place of residence	-0.018	-0.433	0.665	1.050
Age	0.074	1.172	0.242	2.452
Health status	0.082	1.972	0.049*	1.059
Educational attainment	-0.028	-0.466	0.641	2.152
Monthly income situation	0.026	0.575	0.566	1.245
Marital status	0.122	2.085	0.038*	2.100
Number of children	-0.032	-0.736	0.462	1.173
Living environment	0.013	0.294	0.769	1.128
DW	1.968			
R^2	0.058			
F	3.976			
P	<0.001			

Secondly, this section analyzes the impact of the advantages of consumer pension modes on residents' willingness to choose consumer pension modes. The relevant research results are listed in Table 6 to Table 9. According to relevant research, the consumer pension mode can better improve the life of the elderly, realize zero-cost pension accumulation, complement the existing pension security, meet the interest needs, achieve win-win results for platforms, merchants and consumers. In addition, the participation of consumer pension model is

flexible, and is not limited by time and payment amount. Moreover, the gains of the consumer pension mode for the participant are universal and not limited by occupation, region, or identity. Further, this paper investigates the degree of residents' agreement on the above advantages of the consumer pension model. The degree is divided into five levels: "strongly disagree", "most disagree", "half agree", "most agree" and "strongly agree". (Assign values to the 5 levels: Strongly disagree =1, mostly disagree =2, half agree =3, mostly agree =4, strongly agree =5.)

Based on the survey data, the degree of agreement among residents regarding the advantages of consumer pension plans is shown in Table 6 below. The reliability and validity test are carried out, and the test results are shown in Table 7 and Table 8 below. The test results show that the Klonbach Alpha value is 0.954, indicating that the sample data of the scale is basically reliable and can be used for regression analysis. The test results show that the KMO score is 0.921, greater than 0.6, and the significance is less than 0.05, indicating that the data of the scale is suitable for exploratory factor analysis to investigate the validity of the data, and the sample data is valid.

Table 6. The degree of agreement on the advantages of the consumer pension mode.

Topic \ Options	Strongly disagree	Largely disagree	Generally agree	Mostly agree	Couldn't agree more
Able to improve elderly life	46(7.80%)	47(7.97%)	153(25.93%)	218(36.95%)	126(21.36%)
Be able to accumulate pensions at zero cost	58(9.83%)	67(11.36%)	198(33.56%)	157(26.61%)	110(18.64%)
Complementary to existing pension modes	42(7.12%)	38(6.44%)	159(26.95%)	218(36.95%)	133(22.54%)
Meet the needs of interests	45(7.63%)	48(8.14%)	173(29.32%)	211(35.76%)	113(19.15%)
Participation is flexible	45(7.63%)	44(7.46%)	154(26.10%)	220(37.29%)	127(21.53%)
Gains are universal	44(7.91%)	55(9.32%)	159(26.95%)	204(34.58%)	128(21.69%)

Table 7. Reliability statistics.

Klonbach Alpha	Number of terms
0.954	6

Table 8. KMO and Bartlett tests.

KMO sample appropriateness measure		0.921
Bartlett's sphericity test	ApproximateChi-square	3681.128
	Degrees of Freedom	15
	Salience	0.000

Table 9. Linear regression analysis of independent variables and dependent variables.

Models	Beta	t	Significance	VIF
Able to improve elderly life	-0.199	-2.647	0.008**	3.992
Be able to accumulate pensions at zero cost	-0.076	-1.245	0.214	2.602
Complementary to existing pension modes	-0.004	-0.055	0.956	4.402
Meet the needs of interests	-0.175	-2.158	0.031*	4.659
Participation is flexible	0.013	0.139	0.889	5.798

Gains are universal	-0.011	-0.135	0.893	4.675
DW	1.94			
R²	0.174			
F	20.490			
P	＜0.001			

The regression analysis results are shown in Table 9. As shown in Table 9, the value of the DW statistic is 1.94, which is close to 2, indicating that the model does not have autocorrelation. Table 9 means that at least one advantage of consumer elderly care can significantly enhance residents' willingness to choose the consumer pension mode. Specifically, the advantages of "being able to improve elderly life" and "meeting the needs of interests and achieving a win-win situation for the platform, merchants, and consumers" can significantly influence the willingness of respondents to choose the consumer pension mode.

3   Conclusions

This paper conducts research on the relevant issues of consumer pension mode through a questionnaire survey. Research has found that Chinese residents have limited understanding of the consumer pension mode. But after having a certain understanding of the consumer pension mode, most residents are willing to choose the consumer pension mode. This indicates that there is great potential for the promotion of the consumer pension mode in China. This paper further investigates the impact of basic characteristics of Chinese residents on their willingness to choose the consumer pension mode. Research has found that the basic characteristics of some residents have a significant impact on their willingness to choose the consumer pension mode. Specifically, the regression coefficients of the health status and marital status of the respondents are both significant at the 10% level, indicating that currently, the main factors determining whether Chinese residents choose to consumer pension mode are not income, education, etc., but rather their health status and marital status. Finally, this paper investigates the impact of the advantages of the consumer pension mode on the residents' willingness to choose the consumer pension mode. Research has found that some advantages of the consumer pension mode significantly positively affect residents' willingness to choose the consumer pension mode.

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