

Status Quo Analysis of Defined Contribution Pension Scheme Based on Behavioral Finance

Lixuan Jian, Yihui Liu

*Xiamen University (Xmu), Xiamen, Fujian, 361005, China
liuyihui0214@163.com*

Keywords: Defined contribution pension, Annuity puzzle, Behavioral finance, Status quo of china

Abstract: Under Defined Contribution's pension scheme, there is the phenomenon of retirees taking a general lump-sum receipt instead of having their pension in annuity form, which is known as the “Annuity Puzzle”. Based on a questionnaire, this paper empirically investigates the main factors that influence the choice of pension receipt and whether the annuity puzzle will continue to exist in China.

1. Introduction

The aging of population has become a serious problem in Chinese society, and according to the prediction of “China Human Development Report”, the population of those that are above 65 will take up 18.2% of the total Chinese population by 2030.

The purpose of having pension funds is to provide the old with economic guarantees, and the realization of this target is closely related with the way people choose to receive their pension. Though it has been proved that receiving pension in annuity form is the best choice according to the life cycle theory, some scholars found that a fairly low proportion of people would choose to the annuity form in practice in DC pension plan, which is also called “the annuity puzzle” (Hu & Scott, 2007; Brown J & Mitchell O, 2007).

This paper analyzes empirically the reasons affecting the preference of pension receipt methods based on the questionnaire data conducted at Xiamen University, tries to find out whether the annuity puzzle will still continue to exist in China, and also proposes some policy recommendations.

2. Literature Review

According to the two-stage life cycle model with life uncertainty proposed by Yaari (1965), the best strategy for an individual is to annualize all his/her retirement wealth. Based on the theory of demand, Davidoff et al. (2003) considered annuitization to be the sufficient condition to the optimal choice, and found that positive annuitization remains optimal widely, but complete annuitization does not.

In terms of empirical researches, Beshears et al. (2014) summarized the research results of Mottola and Utkus (2007), Benartzi et al. (2011), Previtro (2012), Banerjee (2013) and Johnson et

al. (2004), and found that in the DB pension schemes of the United States, only about 25%-50% of the retirees would choose to receive their pension in annuity form, and the figure for DC pension scheme was 10%.

The situation was quite the same in China. Although China has been promoting the development of commercial annuities at the policy level in recent years, but the demand for commercial annuities is still very low, and the phenomenon of “annuity puzzle” exists. In an investment conducted by Chen (2018), it was found that only 17.7% of the retirees would prefer to annuitize their pension, 54.3% preferred not to annuitize.

Many scholars have tried to explore the factors that might contribute to the annuity puzzle, and the several significant factors can be concluded as below.

(1) Adverse choice

The adverse selection of the group with long life expectancy may cause the annuity pricing to be too high and the annuity participation rate to be low. Mitchell et al. (1999) verified the adverse selection phenomenon in the annuity market by using the joint survivor annuity data and a pricing model considering factors such as interest rate structure, tax arrangement and inflation. Finkelstein and Poterba (2004) studied the relationship between the posteriori mortality of individuals who chose the annuity mode and their selected annuity characteristics, such as selection time and payment arrangement, using the annuity data in the UK. It was also found that there was an obvious phenomenon of adverse selection.

(2) Liquidity concerns

Concerns about liquidity needs reduce the preference for installment pickup. An important advantage of pension lump sums over annuitization is the ability to meet liquidity needs after retirement. The participants in the survey that Beshears conducted in 2014 cited the desire for “flexibility in the timing of my spending” as one of the most important factors in their annuitization decision. When pensions were allowed to be partially annuitized and the remainder used to maintain liquidity, the percentage opting for a lump sum dropped from 49.8% to 20%. The greater the concern about emergency liquidity needs, the more employees prefer to receive pension at once (Beshears, 2014).

(3) Inflation

Inflation affects the level of purchasing power of pensions. Beshears (2014) argued that the concerns of inflation have a significantly positive effect on annuitization rates. He found that 50% of respondents would prefer to receive an increasing amount (e.g., 2% per year) due to inflation concerns.

(4) Risk preference

The behavioral element to be considered in retirement saving is loss aversion. (Pande, 2013) Thus people incline to be more cautious about their pension investment strategies. Many empirical studies have shown that investors’ choices are often contrary to expected utility maximization theory when it comes to risky decisions. Hu and Scott (2007) demonstrated by constructing a mental account that the price of an individual's acceptable pension annuity is significantly lower while making a risk decision. The presence of a mental account makes annuitizing possessed assets trigger strong risk-averse behavior, which discourages individuals from purchasing commercial annuities.

(5) Health concern

The attention paid to health risks and the concerns about medical expense sufficiency can significantly reduce the preference for staged receipt methods. Pang and Warshawsky (2010) theoretically derived the optimal asset mix for retirees to cope with longevity risk and earnings risk, claiming that the need for long-term care, as one of the main retiree health risk concerns, leads to a greater focus on risk-free assets such as bonds. The demand for annuity insurance also increases

with age. Nevertheless, the risk of disability and the expense of long-term care are the most important and costly medical risks for elderly people. The uncertainty of future health expenses is one of the major reasons why retirees want to receive a lump sum pension, as long-term care insurance provided by the government and companies is not yet adequate and the percentage of individual long-term care insurance is low (Murtaugh, 1997).

(6) Default choice

Bütlerand Teppa (2006) found that the default choice has a significant effect on the way of pension receiving, using data on receipt of employer-provided pension plans in Switzerland. Madrian and Shea (2000) showed that the proportion of annuitized receipts can be increased by 25% when using annuities as the default benefit option for DC plans.

(7) Gender

Women prefer to receive their pension in installments compared to men. Charness and Gneezy (2012) found that women are more conservative in their investments than men. They tend to invest less in risky assets such as stocks than men and have a higher probability of choosing "mostly bonds."(Sunden & Surette, 1998) Combined with the survey data, women are more risk averse and even less likely to choose a DC pension plan.

3. Resarch Methods

This research is based on quantitative and descriptive analysis. The data in this paper are collected through questionnaires conducted in Xiamen University, and we used SPSS as the data processing software for further statistical analysis.

4. Questionnaire Design, Data Collection and Analysis

The purpose of having this questionnaire is to find out whether the “annuity puzzle” will exist, and what factors might affect its existence. Through having students in Xiamen University answering questionnaire, we got 70 samples in total.

(1) Variable description

In the first part of the questionnaire, the respondents were asked to rate the two kinds of pension payment: annuity form and non-annuity form, according to their preference, and these are the dependent variables in this paper. The distribution is in the table below.

Payment	Score				
	1	2	3	4	5
Annuity	12.86%	10%	20%	37.14%	20%
Non-annuity	7.14%	1.43%	35.71%	42.86%	12.86%

SPSS made the following prediction merely according to the dependent variables’ distribution:

		Prediction		Correct percentage
		Non-annuity	Annuity	
Observed	Non-annuity	0	23	0%
	Annuity	0	47	100%
Percentage		-	-	67.1%

This means that SPSS tends to predict that people will have their pension in annuity form, because according to the observed samples (23 people gave non-annuity form higher score, and 47 gave annuity form higher score), a higher average correct percentage can be reached by predicting all people would choose annuity form (compared with predicting all of them would choose non-annuity form). This prediction done by SPSS indicates that the annuity puzzle might not exist, which contradicts the conclusion of previous Chinese scholars (Chen. & Chen, 2018).

Categories	Independent variable	Score					
		0	1	2	3	4	5
Liquidity	Liquidity need	-	4.29%	2.86%	11.43%	42.86%	38.75%
	Emergent withdrawal proportion	-	5.71%	18.57%	25.71%	14.29%	35.71%
Investment	Financial management	-	24.29%	27.14%	18.57%	17.14%	12.86%
	Time preference	21.43%	17.14%	8.57%	7.14%	21.4%	24.29%
	Risk preference	-	52.86%	25.71%	2.78%	7.14%	11.43%
Medical risk	Health concern	-	8.57%	17.14%	31.43%	34.29%	8.57%
	Long term care needs	-	7.14%	5.71%	30%	42.86%	14.29%
	Medical expense sufficiency	-	2.86%	12.86%	48.57%	14.29%	21.43%
others	Bequest motive	-	8.57%	15.71%	34.29%	28.57%	12.86%
	Economics related knowledge	31.43%	40%	10%	7.14%	7.14%	4.29%

The second part of the questionnaire was mainly designed based on the findings of previous studies. We took the factors previous scholars considered to be significant to explain the annuity puzzle into account, and these factors are the independent variables in this research.

In the category of liquidity, most of our respondents have high liquidity need, and when it comes to choosing the emergent withdrawal proportion, the most popular choice is “more than 50%” (35.71%), the second is “30%” (25.71%).

In terms of investment attitude, our respondents are fairly conservative. About a quarter of them would just install their spare money in the banks (24.29%), and more than a quarter would purchase some breakeven financial products on a platform named “Ant Financial”. This might relate with the background of the respondents: more than 70% of them have never/a little knowledge on economics.

When it comes to medical risk, large proportion of the respondents showed relatively high concerns, and nearly half of them were neither concern nor confident in terms of the medical expense sufficiency.

(2) Regression result

The regression model this paper chose was binary logistic regression model, and we used backward LR elimination to eliminate the irrelevant variables and identify the significant ones. The independent variables that passed the LR test is shown in the table below.

Independent variables	B
Female	-1.329** (0.672)
Emergent withdrawal proportion	-6.543** (2.784)
Health concern	1.397*** (0.538)
Long-term care needs	-1.512*** (0.550)
Medical expense sufficiency	0.697 (0.363)

Significance level *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The variables that have negative correlation with choosing annuity form are female, emergent withdraw proportion, and long-term care needs, the ones that have positive correlation are health concern and medical expense sufficiency.

According to the research done by Sunden and Surette (1998) and Charness and Gneezy (2012), women tend to be more conservative in terms of making financial decisions, and this might contribute to the negative correlation of the variable of female.

A higher emergent withdrawal proportion indicates a higher liquidity need, making the

respondent choosing non-annuity form (Beshears, 2014). The positive correlation between medical expense sufficiency can be explained in the same way.

In terms of the three variables about medical concern, the outcome that higher long-term needs could make people prefer non-annuity form of having their pension fits the prediction proposed by Ameriks et al. (2011), and that people who concern more about their health would have higher needs on annuity-form return also fits the theoretical deduction done by Pang and Warshawsky (2010).

5. Discussion

5.1 Limitation

In the study by Lockwood (2012) and other scholars, they identified the bequest motive as the most significant factor limiting the demand for annuities. Irrational behavioral factors such as subjective probability, mental accounts, information perception, and financial literacy can also have an impact on individuals' commercial annuity consumption decisions. In empirical tests, we have found the effects of mobility ratios, health importance, and long-term care needs etc. on the choice of pension receipt method, but continue to argue that the annuity puzzle is likely not to exist in younger generations. To this conclusion we give the following explanation:

(1)The sample size was too small and the type of questionnaire respondents was limited, making some of the results insignificant or insufficiently representative. The sample audience could be expanded in further research and include influential variables such as education level and regional differences. For instance, households with average level wages and savings are less likely to be influenced by bequest motives in their pension choices.

(2)The answers given by the respondents may be influenced by hypothetical bias. When individuals do not need to back up their choices with actual commitments, their behavior may not be consistent with their real thoughts (Hensher, 2010). Simultaneously, some design flaws of our questionnaire such as not providing respondents with the exact answers they wanted can cause bias in the assumptions of the results as well.

(3)Respondents' responses may vary with age due to the lack of practical experience and necessity of considering the issues involved. Young people like college students are generally more concerned about the available consumer cash flow and therefore prefer annuity options. Moreover, less investment experience tends to cause underestimation of the volatility of wealth due to annuitization and the risk of loss that it brings.

5.2 Suggestions

Based on the results of theoretical and empirical studies, this paper proposes the following recommendations for the development of annuity programs in enterprises and institutions from the perspectives of promoting employees' utility and annuitized receipt:

(1) Making receipt in the form of annuity as the default benefit option of DC pension plan can increase the proportion of annuitization receipt to a certain extent and help cope with aging.

(2) Designing emergency early withdrawal provisions, similar to the loan option of commercial policies, to meet liquidity needs.

(3) The scheme can use part of the employer's contribution to provide employees' medical coverage benefits to reduce employees' concerns about health risks and medical expenses.

References

- [1] Benartzi S, Previtro A, “Thaler R H. Annuity Puzzles”. *The journal of economic perspectives* 25.4(2011): 143-164.
- [2] Beshears J, Choi J J, D Laibson, et al. “What Makes Annuity More Appealing?” *Journal of Public Economics* 116(2014): 2-16.
- [3] Brown J R, Casey M D, Mitchell O S. “Who Values the Social Security Annuity? New Evidence on the Annuity Puzzle.” *Journal of Social Science Electronic Publishing* (2007).
- [4] Charness G, Gneezy U. “Strong Evidence for Gender Differences in Risk Taking.” *Journal of Economic Behavior & Organization* 83.1(2012):50-58.
- [5] Ze Chen, Bingzheng Chen. *Research on the Annuity Puzzle and Pension Receiving Behavior in China--Based on the Investigation of Enterprise Annuity Receiving Preference [J]. Chinese Journal of Economics*, 2018, 5(2):23.
- [6] Hu W Y, Scott J S. “Behavioral Obstacles to the Annuity Market.” *Financial Analysts Journal*, 63.6(2007): 71-82.
- [7] Pande, Alok. “Behavior of participants in a defined contribution pension scheme.” *Journal of Asia Business Studies* 7.1(2013): 84-95.
- [8] Pang G, Warshawsky M. “Optimizing the Equity-Bond-Annuity Portfolio in Retirement: The Impact of Uncertain Health Expenses.” *Insurance Mathematics & Economics* 46.1(2010): 198-209.
- [9] Yaari M E. “Uncertain Lifetime, Life Insurance, and the Theory of the Consumer [J].” *Review of Economic Studies* 32.2(1965): 137-150.
- [10] Sunden, Annika E & Surette, Brian J. “Gender Differences in the Allocation of Assets in Retirement Savings Plans.” *American Economic Review, American Economic Association* 88.2(1998): 207-211.