Participation in the New Rural Pension System (NRPS) in China: Determinants of Change over the 2011 to 2013 Period

Introduction

In current China, there are three public pension benefit programs: The Urban Employees' Pension System (UEPS); the Urban Residents' Pension System (URPS) and the New Rural Pension System (NRPS) [1] (Chen & Turner, 2015). The former two systems aim at the urban elderly while the latter one applies to the rural elderly.

According to the 2000 census, less than 5% of the rural elderly who are 60 and above had pension benefits (Wang, 2006). This number had a slight increase in 2008, but it only covered 7.8% of the rural population (Wu & Li, 2014). Because of the low participation rate, pension funds were not sufficient to meet the demands of promised benefits for the rural elderly, which weakened the old rural pension program further (Niu & Arends-Kuenning, 2016). Then, the Chinese central government put forward the NRPS program in 2009, and it covered all counties in 2012. However, not all rural residents participated in the NRPS after its universal coverage.

This study is to examine the indicators influencing the change in Chinese rural adults' participation in NRPS before and after its universal coverage in 2012, based on a nationally representative dataset over the 2011 to 2013 period in China. These determinants include changes in the coverage of NRPS, residents' geographic distribution, working status, family support, and health status, controlling for demographic indicators.

Data

Most of the data for this research comes from the *China Health and Retirement Longitudinal Study (CHARLS)*, a nationally representative sample of Chinese adults who are 45 and above. The baseline wave was fielded in 2011 and covered about 17,500 individuals. Follow-up interviews have been conducted every two years since baseline. The CHARLS is based on the Health and Retirement Study (HRS) in the U.S. and related aging surveys, providing the information in demographics, health status and functioning, health care and insurance, work, retirement and pension, income and consumption, etc. The CHARLS is sponsored by Peking University, the National Natural Science Foundation of China, the Behavioral and Social Research Division of the National Institute on Aging and the World Bank (CHARLS, 2016).

Our research uses the sample of the basic wave in 2011 (Wave 1) and the first follow-up wave in 2013(Wave 2). The sample (N=12,637) used for estimation includes all respondents and spouses who took part in both two waves with valid data related to rural pension participation, demographics, health status, and other social-economic measures[2].

Measurements

Dependent variable

We constructed one dependent variable to reflect the change in NRPS participation, which was computed according to respondents' situations of NRPS participation in both two waves. The dependent variable included four categories: (a) Respondents who did not participate in NRPS in both waves (NP); (b) Respondents who did not participate in NRPS in wave 1 and moved in NRPS in wave 2 (MI); (c) Respondents who participated in NRPS in wave 1 and moved out from NRPS in wave 2 (MO); (d) Respondents who participated in NRPS in both waves (BP).

Independent variables

The coverage of NRPS (Policy variable). Since the NRPS was established in 2009 and covered all counties in 2012, we only calculated the NRPS coverage in Wave 1(2011). The CHARLS does not include any variable related to the coverage of NRPS in Wave 1, so we found the number of NRPS pilots for all 31 provincial-level

[1] It is also translated to The New National Rural Pension Program (NRPP) or The New Rural Social Pension Insurance (NRSP)

[2] Approximate 30.7% of the sample was omitted in Wave 1 due to their exiting in Wave 2(13.8%) and missing data on these indicators (16.9%); approximate 34.2% of the sample was omitted in Wave 2 because they were new in Wave 2 without the data in Wave 1(18.2%) and missing data on these indicators (16.0%).

administrative divisions in 2011 from local government websites and reports. Thus, the policy variable in this study referred to the percent of NRPS pilots' coverage for each provincial-level division in wave 1.

Geographic distribution. The NRPS applies to rural residents with agriculture Hukou[3], so we would like to see if the variables of rural/urban status and Hukou change had impacts on change in NRPS participation. Also, the level of social-economic development has variations in regions across China. Thus, the local contribution and subsidy of NRPS are different among these regions. According to the data from CHARLS, the respondents' rural/urban status and regions did not change from Wave 1 to Wave 2, so we only used these two variables in Wave 1. Changes happened for Hukou situation, and we computed this variable based on two waves' variables.

Working status. Due to limited pension income for the rural elderly, labor income is the most crucial income source to maintain rural elders' normal lives (Cai et al., 2012). We focused on exploring the relationship between change in working status and NRPS participation in two perspectives: change in employment status and change in the type of jobs.

Family support. In developing countries like China, the traditional elderly support depends more on financial transfer from adult children in a family. It is because of insufficient pension plans for rural residents and limited individual savings resulting from their poor economic conditions (Pang et al.,2004; Cai et al., 2012). We used the variables of change in the number of children and change in family income to test if they are related to the change in NRPS participation.

Health status. In this study, we chose the change in self-assessed health status and change in the number of chronic diseases to measure the health status.

Demographic indicators. We used demographic indicators, including gender, age, change in highest education and change in marital status as control variables in this study.

Research Method

Because our dependent variable had four categories, we used the multinomial logit model (MNL) to explore the association between each determinant and the change in NRPS participation among Chinese residents who are 45 and above between 2011 and 2013. It belongs to a longitudinal study because both independent variables and dependent variable reflect changes. Odds ratios denote the magnitude of the association with the p-value, which shows the comparison of the current outcome and the base outcome for each predictor. We are also interested in whether each determinant as a whole, is statistically significant in the entire models with four outcomes, so we use the Wald test to fulfill this task. To provide more holistic and intuitive results, we present and interpret the predicted probabilities of change in NRPS participation for various values of independent variables. In this model, we used average marginal effects (AMEs) to represent the predicted probabilities.

Results

Based on the description analysis in this study[4], the percentage of NRPS participation between two waves increased from 20.1% to 50.2%, which was consistent with the expansion of NRPS policy. Even though the NRPS policy covered all counties in China in 2012, there was still a gap from universal coverage to universal participation. We used the chi-squared tests to explore the association between each independent variable and NRPS participation for each wave. Most of the independent variables were statistically significant and we could not say that they did not have relationship with NRPS participation in both waves, except marital status (not significant in both waves), self-assessed health status (not significant in Wave 1), age (not significant in Wave 2) and family income (not significant in Wave 1).

The empirical results for the multinomial logit model were initially shown in odds ratios[5]. Apart from that, we tested the significance of each independent variable for the entire model. The results are shown in Table 1.

[3] Hukou is a record of the governmental household registration system in China.

[4] Detailed description analysis will be shown in the full paper.

[5] Original odds ratios will be shown in the full paper.

The policy variable and all geographic variables are statistically significant at the 0.01 level. Most of the variables related to working status and two variables related to the number of children are statistically significant at the 0.05 level. Most of the demographic variables, family income variables, and health status variables are not statistically significant at the 0.05 level. As noted, we used the AMEs to present the results of a multinomial logit model more effectively and efficiently. Table 2 shows the differences in predicted probabilities of the change in NRPS participation.

Table 1. Test each independent variable for the entire model (table with weighed estimates)

	F	P>F
Policy Variable		
NRPS pilots coverage in wave 1(sd=0.163)	9.822	0
Geographic Variable		
rural	30.341	0
non-agriculture hukou in both waves	124.034	0
other hukou change status	13.008	0
middle region	13.534	0
western region	15.957	0
northeastern region	6.1	0
Demographic variables		
male	0.923	0.428
from less than high school to high school and above	0.396	0.756
high school and above in both waves	2.852	0.036
married before in both waves	0.015	0.997
never married in both waves	0.539	0.655
marital status change in both waves	1.043	0.372
age(sd=9.711)	6.462	0
Job variables		
retired and still work in two waves	1.831	0.139
Not retired in two waves	23.153	0
from not retired to new retired and not work	2.921	0.033
Other change in employment status	3.375	0.018
from employed to farming	5.592	0.001
from employed to other type of jobs	2.708	0.044
from farming to employed	3.698	0.011
farming in both waves	16.743	0
from farming to other type of jobs	6.127	0
from other type of jobs to employed	1.996	0.112
from other type of jobs to farminng	4.269	0.005
other type of jobs in both waves	10.824	0
Family support variables		
number of children in wave 1(sd=1.395)	3.875	0.009
change in number of children in wave 2(sd=0.829)	3.221	0.022
family income in wave 1(sd=4.6e+06)	0.367	0.777
change in family income in wave 2(sd=8.4e+04)	1.122	0.338
Health status		
from not healthy to healthy	1.224	0.299
from healthy to not healthy	2.779	0.04
healthy in both waves	0.523	0.666
number of chronic disease in wave 1(sd=1.391)	1.369	0.25
change in number of chronic disease in wave 2(sd=0.610)	0.935	0.423

Table 2. Differences on Predicted Probabilities of change in NRPS participation (table with weighted estimates)

	Not participate in NRPS in both waves (NP)	Move in NRPS in wave 2 (MI)	Move out from NRPS in wave 2 (MO)	Both participate in both waves (BP)
All	0.465	0.334	0.042	0.159
Policy Variable				
NRPS pilots coverage in wave 1(sd=0.163)				
Every one percent increase	-0.062	-0.148**	0.084*	0.126*
Every one standard deviation increase	-0.007	-0.023**	0.009**	0.02**
Geographic Variable				
rural				
rural vs urban	-0.052**	0.102**	-0.02**	-0.029**
Hukou change				
both non-agriculture hukou versus both agriculture hukou in two waves	0.49**	-0.267**	-0.036**	-0.186**
other hukou change status versus both agriculture hukou in two waves	0.172**	-0.14**	0.015	-0.047*
other hukou change status versus both non-agriculture hukou in two waves	-0.318**	0.127**	0.051*	0.14**
Region				
middle versus eastern	-0.084**	0.029*	-0.019**	0.075**
western versus eastern	-0.034*	0.082**	-0.009	-0.039**
northeastern versus eastern	-0.04*	0.072**	-0.017*	-0.015
western versus middle	0.05**	0.053**	0.01*	-0.113**
northeastern versus middle	0.045*	0.042*	0.002	-0.09**
northeastern versus western	-0.005	-0.01	-0.008	0.024
Demographic variables				
gender				
male versus female	-0.003	0.012	-0.005	-0.004
Highest education change				
from less than high school to high school and above versus both less than high school in two waves	-0.011	-0.009	-0.002	0.021
from both high school and above versus both less than high school in two waves	0.034	-0.041**	-0.004	0.01
from both high school and above in two waves versus from less than high school to high school and above	0.045	-0.032	-0.002	-0.011
Marital status change				
both married before versus both married now in two waves	0	0.003	0	-0.004
both never married versus both married now in two waves	0.047	-0.002	0.006	-0.051
marital status change versus both married now in two waves	-0.007	-0.032	0.018	0.021
both never married versus both married before in two waves	0.047	-0.005	0.006	-0.048
marital status chagne versus both married before in two waves	-0.007	-0.035	0.018	0.024
marital status change versus both never married in two waves	-0.054	-0.03	0.012	0.072
age(sd=9.711)				
Every one percent increase	-0.002	0.001	0.001**	0
Every one standard deviation increase	-0.016	0.011	0.01**	-0.005
Job variables				
employment status change				
both retired and still work versus both retired and not work in two waves	-0.07	0.01	0.02	0.04
both not retired versus both retired and not work in two waves	-0.356**	0.171**	0.03**	0.155**
from not retired to retired and not work versus both retired and not work in two waves	-0.127	0.047	0.025	0.056*
other change in employment status versus both retired and not work in two waves	-0.106*	0.018	0.016	0.072**
both not retired versus both retired and still work in two waves	-0.286**	0.161**	0.009	0.115**
from not retired to retired and not work versus both retired and still work in two waves	-0.057	0.037	0.005	0.015
other change in employment status versus both retired and still work in two waves	-0.036	0.008	-0.004	0.032
from not retired to retired and not work versus both not retired in both waves	0.229**	-0.124*	-0.005	-0.099**
other change in employment status versus both retired and not work in two waves	0.25**	-0.153**	-0.013	-0.083**
other change in employment status versus from not retired to retired and not work	0.021	-0.029	-0.009	0.017
Type of job change (Only show the significant results)				
from employed to farming versus both employed in two waves	-0.078*	0.103**	0.033	-0.058
from employed to other type of jobs versus both employed in two waves	0.044	0.003	0.063	-0.111*
from farming to employed versus both employed in two waves	-0.087*	0.072*	0.027*	-0.013
farming in both waves versus both employed in two waves	-0.119**	0.127**	0.022**	-0.028
from farming to other type of jobs versus both employed in two waves	-0.119**	0.076**	0.058**	-0.015
from other type of jobs to employed versus both employed in two waves	0.007	0.11	0.005	-0.121**
from other type of jobs to farminng versus both employed in two waves	-0.092*	0.162**	0.002	-0.072
other type of jobs in both waves versus both employed in two waves	-0.06	0.103**	0.044**	-0.086**
from farming to employed versus from employed to other type of jobs	-0.131	0.069	-0.036	0.098*
farming in both waves versus from employed to other type of jobs	-0.164*	0.124*	-0.043	0.083*
from farming to other type of jobs versus from employed to other type of jobs	-0.163*	0.072	-0.005	0.096*
from other type of jobs to farminng versus from employed to other type of jobs	-0.137	0.158*	-0.061	0.039
from other type of jobs to employed versusfrom farming to employed	0.094	0.037	-0.023	-0.108**
other type of jobs in both waves versus from farming to employed	0.026	0.03	0.017	-0.073**
from other type of jobs to employed versus farming in both waves	0.126*	-0.018	-0.015	-0.093**
other type of jobs in both waves versus farming in both waves	0.059**	-0.025	0.024	-0.059**
from other type of jobs to employed versus from farming to other type of jobs	0.126	0.034	-0.053	-0.106*
from other type of jobs to farminng versus from farming to other type of jobs	0.026	0.086	-0.055*	-0.057
other type of jobs in both waves versusfrom farming to other type of jobs	0.058	0.027	-0.014	-0.071*
other type of jobs in both waves versus from other type of jobs to farminng	0.032	-0.059	0.041*	-0.015
Family support variables				
number of children				
number of children in wave 1(sd=1.395)				
Every one percent increase	0.011	-0.006	-0.006**	0.001
Every one standard deviation increase	0.015	-0.008	-0.008**	0.001
change in number of children in wave 2(sd=0.829)				
Every one percent increase	0.018*	0.006	-0.004	-0.02*
	0.015*	0.005	-0.003	-0.016*
family income				
family income in wave 1(sd=4.6e+06)				
Every one percent increase	0	0	0	0
Every one standard deviation increase	0.005	0.006	0.002	-0.012
change in family income in wave 2(sd=8.4e+04))				
Every one percent increase	0	0	0	0
Every one standard deviation increase	0.003	-0.005	0.007	-0.005
Health status				
self-assessed health status				
from not healthy to healthy versus both not healthy in two waves	-0.01	-0.009	0.011	0.009
from healthy to not healthy versus both not healthy in two waves	0.019	-0.016	-0.013**	0.01
both healthy versus both not healthy in two waves	0.006	-0.012	0.007	-0.001
from healthy to not healthy versus from not healthy to healthy	0.029	-0.007	-0.023**	0.001
both healthy versus from not healthy to healthy	0.016	-0.002	-0.004	-0.01
both healthy versus from healthy to not healthy	-0.013	0.004	0.019**	-0.011
number of chronic diseases				
number of chronic disease in wave 1(sd=1.391)				
Every one percent increase	-0.003	-0.000	-0.002	0.005
Every one standard deviation increase	-0.004	-0.001	-0.003	0.007
change in number of chronic disease in wave 2(sd=0.610)				
Every one percent increase	-0.004	0.009	0.002	-0.007
Every one standard deviation increase	-0.002	0.006	0.001	-0.004

Brief Conclusions

We found that the policy coverage, which reflected the policy effect, had a significant influence on changes in residents' NRPS participation from 2011 to 2013. As the universal coverage of NRPS was achieved in wave 2, the residents' participation also rose a lot. Especially for the residents who had not been covered by NRPS in wave 1, they had a higher probability to move in the NRPS in wave 2. However, significant variations still existed in different locations. Because the NRPS applied to the rural residents with agriculture hukou, people with these two characteristics had higher probabilities to move in the NRPS. With regards to job variables, both the change in employment status and the change in the type of jobs were associated with the change in NRPS participation. Concerning family support variables, the number of children in a family had a significant influence on the change in NRPS participation. However, the family income was not significant in this study. It

is not hard to understand because the major contributions for NRPS come from the governments: the central government pays the basic pension benefits, and the local government provides the premium subsidy (Lei, Zhang & Zhao, 2011).

Strengths and Limitations

This study made the comparison before and after the universal coverage of NRPS in 2012, which allowed us to isolate the policy effect. Even though the national survey did not provide any measurement directly related to the coverage of NRPS, we innovatively collected and calculated the number of NRPS pilots for all 31 provincial-level administrative divisions from official government websites and reports. An additional strength of this research is using measures that represented both the longitudinal and cross-sectional characteristics. We reclassified the original variables to the change variables to reflect the changes of both dependent and independent variables from 2011 to 2013. This modeling strategy is also advantageous because the multinomial logit model (MNL) is fit for analyzing the relationship between the categorical dependent variable and independent variables. Also, the average marginal effect (AME) helps present the results of a multinomial logit model effectively and efficiently. The taxonomy of this study is complicated and takes a lot of work. It is also the first study to examine the policy effect and other related indicators influencing residents' participation in the NRPS in China.

However, several limitations cannot be omitted. The study has missing data due to several reasons. The one reason is that we focus on the respondents who take part in both waves, which means that the respondents who move out or move in in the wave two cannot be included in this study. The other reason is related to the quality of the survey that some missing data exists on variables. Moreover, since there is no direct observation of policy variable, we have to compile this variable separately which may not be as consistent as other variables in CHARLS. Besides, the respondents of the CHARLS are 45 and above, which means that we do not have the information of the people aged from 16 to 45 years old, who are also eligible to participate in the NRPS. Finally, it is hard to be sure that the associations we find are capturing the causal effects. It is in part due to the internal relationship between the independent variables.

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