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Abstract

This paper investigates the well-being impact of the expansion of the New Rural Pension (NRP) program in rural China, exploiting the panel data "China Health and Retirement Longitudinal Study" (CHARLS) waves 2011 and 2013. We find that participating NRP significantly improves rural residents' subjective well-being with lower depression symptoms and higher life satisfaction. In addition, families with NRP participants not only increase total expenditure but also divert consumption towards categories of medical and fitness, communication and transportation.

Keywords: Pension; well-being; life satisfaction; consumption; rural China

Happiness is increasingly catching space in the spheres surrounding public policy discussions. Since the first world happiness report published in 2012 and subsequent reports have one very common association that financial capital is necessary but not a sufficient condition for people's well-being (Easterline 1974, 1994). For instance in US and Japan, real income has increased over time without changing the status of happiness in these two countries (Knight and Gunatilaka 2010). In 2016, OECD committed itself to bringing people's well-being at the forefront of government policies. In a recent speech by the head of United Nations Development Program (UNDP) called for inclusive growth where people's happiness should be an integral part of our efforts to achieve desired human and sustainable development. Happy people create society/nations that nurture well-being and in turn, such societies transform and create environments for development. These inclusive strategies in return promote social capital, build trust among themselves and in the state and contribute to inclusive growth and shared prosperity.

What defines well-being has been a central debate in the literature concerning happiness. Two aspects in the well-being have been studied and investigated widely. First is the objective well-being (OWB henceforth) theories which explain minimum requirements that need to be satisfied for good life. In other words, OWB is associated with factors that are external to individuals, for instance, income, residence, opportunity to education, health, safety and security and social and civil rights. On the other hand, subjective well-being (SWB hereinafter) theories provide well-being in a way that human beings are the best to judge their lives and this information can be collected by asking them about the quality of their life. In other words, SWB is associated with factors that internal to individuals, for instance, their self-reported responses about wellbeing.

China has experienced a remarkable growth in the last few decades. At the same time, China is facing severe problems and challenges including but not limited to inequality and rural-urban divide. The forced migration by the state's "send-down" movement during 1968-1978 caused long-term consequences of the lower level of happiness (Wang and Zhou 2016). Easterline (2012) in a recent study from 1990-2010 found a U-shaped pattern in life satisfaction in China. The declining trend, featured by increases in suicide rate as well as in incidence of mental issues, is through growing unemployment and inequality that started from 1990 (Helliwell and Huang 2008; Layard 2005). Social comparisons and the decline of social capital is also accounted for this decline in life satisfaction (Bartolini and Sarracino 2015). Afterwards, the unprecedented economic growth led to a "progress paradox" on citizens' psychological health in the short run (Graham, Zhou and Zhang 2017). This may be accounted for the increasing insecurity and inequality brought by the changes in the pace and nature of economic growth (Graham 2012; Graham and Lora 2010; Graham

and Pettinato 2002). Over the period 2005-2010, happiness scores recovered across all income groups and were determined by gender, residency and household income (Asadullah, Xiao and Yeoh 2015).

There is an extensive literature documented on determinants of life satisfaction (Frey and Stutzer 2002; Frey and Stutzer 2005; Dolan et al. 2008). These researchers make important contributions by exploring factors associated with life satisfaction. Of these factors, the most commonly explored are relative and absolute income, health, education, employment and other factors related to social, political and economic spheres. Apart from studies in developed countries, there is growing number of studies conducted in developing countries. For instance, Graham and Pettinato (2001) studying 17 Latin American countries investigated the life satisfaction by exploring changes in macroeconomic conditions and people attitude towards market and democracy on happiness and the results obtained were similar as in developed countries. Some studies undertaken in Asian countries explored the determinants of life satisfaction and their results suggest that although the factors influencing life satisfaction is almost similar as in the developed world, however, the effect of cultural factors such as marital status and role of a government play more importantly compared to income on the life satisfaction. Also, at low levels of economic development, the substantial gaps favoring urban over rural areas had consequently led to a large excess of urban life satisfaction (Easterlin, Angelescu and Zweig 2011).

Studies on happiness are growing in China. There are a number of studies documented on happiness in China in the last few years. Appleton and Song (2008) findings based on their study on components and determinants of life satisfaction suggest that determinants of life satisfaction in China are similar as documented in the previous literature, including unemployment, income, marriage, sex, health, and age. The study on urban residents revealed similar determinants while the sense of relative deprivation suggested the challenge of a dramatic social change in terms of increasing competition and inequalities (Wang and VanderWeele 2010). Financial dissatisfaction became an increasing factor in depression happiness (Brockmann et al. 2008). Another study in China explored the determinants of life satisfaction in rural China suggest that despite rural-urban divide life satisfaction in rural China doesn't show a picture of dissatisfaction while they tend to take reference with each other in their own villages (Knight, Song and Gunatilaka 2009). The study on the determinants of happiness among the elderly population investigated traditional family norms and its effect on the elderly population (Chyi and Mao 2012). Their findings suggest that having grandchildren have a positive effect on the elder people happiness compared to their own children. However, many of the studies mainly focused on urban China. The survey of six Chinese cities indicated a moderate level of personal well-being with PWI score of 67.1 (Smyth, Nielsen and Zhai 2010). The individual well-being in

urban China is determined not only by absolute and relative income but also by income expectations (Liu and Shang 2012; Smyth and Qian 2008). Cheng et al. (2016) depicted the relationship between housing property right and subjective well-being in urban China.

Another important issue which has been the central focus of policy discussions is the rural-urban migration in China which has attracted a wider range of research interest particularly in the perspective of happiness and its determinants (Ding 2017). It is considered that inequality had been one of the most important factors for happiness in many recent studies. The unprecedented economic growth of China has resulted in widespread migration from rural to urban. On the other hand, the China's *hukou* system constraining migrant workers from enjoying benefits that are in place for the urban residents, for instance, welfare services, education and job opportunities (Zhu 2003; Chan and Zhang 1999). According to Knight and Gunatilaka (2010a, 2010b), one among the reasons of lower than average happiness level of rural migrants in urban areas is income, unstable employment opportunities and absence of family. The study focusing on citizen identity and its subsequent income inequality also proved to affect people's level of happiness but mainly through between-group comparisons (Jiang, Lu and Sato 2011). A similar study found that the well-being of migrants depends on references groups which are negatively related to within-group income gap and positively related to between-group difference (Akay, Bargain and Zimmermann 2012). There are some other studies who found that remittances have a positive and significant effect on the rural-urban migrants (Akay et al. 2014). Some other studies investigated the effect of social and environmental problems including inequality and pollution on Chinese subjective well-being (Smyth et al. 2008; Lu and Sato 2012; Wang et al. 2015).

The existing literature has well explained the income effect on individual subjective well-being especially in the case of urban China. Also, there are many works discussing the rural-urban gaps in economic development and happiness. However, it does not pay much attention to well-being changes induced by social policy changes and is less focused on rural residents.

This paper aims to make new contributions in evaluating the effect of a social welfare policy change on rural residents' well-being in China. We particularly focus on the China's new rural pension (short for NRP for this paper), which is officially named as new rural social pension insurance. NRP is designed for rural residents holding agricultural *hukou* and has caught great attention due to its large scale and unanticipatedly fast expansion. While keeping as a voluntary and contributory scheme, central government promised to provide basic pension benefit (55 RMB per month, equivalent to 9 US dollars) to NRP recipients for the first time ever.

Along with the NRP's gradual geographical expansion from 2009 to 2012, the China Health and Retirement Longitudinal Study (CHARLS) collected a high-quality observational data set in 2011 and 2013 which straddled NRP expansion in rural villages. Therefore, a two-period panel data made from CHARLS is used for the empirical analysis targeting rural residents who are in their mid-age and old-age (aged 40 and above). To address the potential endogeneity in the NRP participation because NRP is designed as a voluntary and contributory scheme, a combined estimation strategy using both instrumental variable method and fixed effect model is applied. The village level NRP participation rate serves as the instrument while first-differencing was used to control for individual fixed effect.

The results indicated that the individuals who participated in NRP had significant improvement in their subject well-being with decreased depression symptoms, less incidence of clinical depression, and higher general satisfaction with life. Female benefited more from pension participation in terms of the subjective well-being. On the other hand, there was no significant evidence that NRP expansion may harm rural households' living standards. Although households with pension participants fell in a shortage of financial mobility as they had lower saving rate and hold more cash at hand. This partially transformed into increased total household expenditure. Also, households with NRP participants tended to divert their consumption allocation from basic needs to health-related and work-related items.

The rest of the paper is organized as follows. Section 1 describes the background of NRP reform and provides some keynotes of the revised pension scheme. Section 2 explains the data and summary statistics. Section 3 presents the empirical strategy. Section 4 presents the main results and some robustness checks. Section 5 concludes.

1. Background of NRP

With the announcement of Doc.32 "Guiding Principle on the Development of the New Rural Pension Pilot" (State Council of China, 2009), the reform on rural pension was initiated as new Rural Pension Pilot Program (NRPP) for rural residents in 2009 which was transformed into new Rural Pension Scheme (NRP henceforth, full name being *New Rural Social Pension Insurance*) later. The guiding principle of the pilot is basic insurance and wide coverage with flexibility and sustainability[1]. The main target of NRP includes "accelerating the construction of a social security system covering both urban and rural residents", "expanding domestic consumer demand", "gradually narrowing the rural-urban gap, transforming dualistic structure and promoting

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[1] The corresponding expression of these basic principle is documented as "保基本、全覆盖、多层次、可持续" in Chinese.

equalization of basic public service" and "achieving old-age support for vast of rural residents, promoting family harmony and increasing farms income".

ORP verses NRP

Unlike the old pension scheme, the source of contribution was made more dynamic in NRP. The source of contribution includes subsidies from central and local governments, collective subsidy and individual contribution. From individual accounts only in the old pension system, the NRPS was comprised of both individual account as well as basic pension account. The basic pension benefits to be paid by the central government while premium subsidy to be provided by the local government. Central government subsidy of 55RMB is guaranteed to be provided in the form of pension benefits which is to be adjusted according to the inflation rate in the country.

There are two main differences between old and new rural pension. First, the source of contribution is different. Old rural pension mainly relies on the individual contribution by rural residents themselves, which is in fact self-saving. The new rural pension will have multiple sources, including central and local government subsidy, collective subsidy and individual contribution. Second, the structure of payment is different. Old rural pension uses only individual pension accounts while the payment of new rural pension combines a basic pension account with individual accounts. And payment from basic pension account is guaranteed by state financing.

Besides these major differences, NRP keeps the setting of voluntary participation of individuals which is distinct from the mainstream mandatory public pension system. Individuals not only choose whether to participate NRP but also choose their preferred premium level if participating.

Institutional Arrangement for NRPSS

The source of NRP is divided into two main parts, (i) individual premium and (ii) government subsidy. The individual premium is comprised of five categories including 100RMB, 200RMB, 300RMB, 400RMB, and 500RMB per year. Government subsidy consists of two main sources, local government, and central government. Local government is required to provide no less than 30RMB per year to individual fund while central government subsidy is guaranteed to provide 55RMB as basic pension benefits per month. Individual premium and local government subsidy are accumulated into individual account according to one-year deposit rate. Central government subsidy of 55RMB will be provided as basic pension benefits to individuals. Therefore one of the good features in the new pension scheme will be that an individual can be benefitted local government subsidy and individual premium which will be accumulated to individual account as well as basic pension benefits.

Some main contents of NRP are reported below.

- *Eligibility: Any rural residents, who are aged 16 or above and not participate in the Basic Pension of the Firms, can voluntarily participate. Students are excluded.*
- *Fund constitutes of individual contributions, collective benefits, and government subsidies.*
  - *Individual premium is comprised of five categories including 100RMB, 200RMB, 300RMB, 400RMB, and 500RMB per year. Participants can freely choose the premium category. And the premium level can be modified as with economic growth.*
  - *Collective benefits are encouraged if the local collective group is affordable.*
  - *Government subsidy: The full amount of basic pension benefit should be insured by the central government. Local government should set subsidize no less than 30 RMB per person per year.*
- *Pension benefit: The basic pension benefit from central government is 55 RMB per month. Local government can increase the basic benefit using the local fiscal budget. The individual account will refund 1/139 of the accumulation at age 60.*
- *Pension benefit eligibility: Elders who are aged more than 60 and do not participate the Basic Pension of the Firms can receive the pension benefits on a monthly basis.*

When the beneficiary turns age 60, he/she can avail the benefits of the pension. He/she can get 1/139 of the total accumulation from the individual accounts up to 139 months as well as basic pension benefits of 55 RMB per month. Furthermore, the benefits are inheritable only from the accumulated individual funds and the government subsidy. The new pension system has incorporated many good aspects that could actually contribute to mitigating the risk of the aging population in China. With higher responsibility for the government, individual benefits are maximized from sources that include local and central government subsidy and of course individual premium. The financing means seems more durable than the old pension system where the source of operating expenses was the pension benefits. In the new pension system, it is allocated to the local fiscal budget which shows government will and commitment to supporting old age population in China.

Apart from the many positive aspects that have been incorporated into the new pension system, there are, however, some critics in the literature about this new pension system (Feng 2010; Feng & Dong 2010; Zhang 2010; Zhang J 2010; Lei et.al 2011; Song et.al 2015; Chen & Turner 2015). One major concern of the NRP is that the low premium and benefit level may not be generous enough to potentially change behaviors of the NRP participants. Some argue that the current pension system does not provide incentives for people particularly peasants and younger that actually questions the effectiveness of the new pension system (Feng & Dong 2010; Zhang 2010). In their findings, they suggested that those who participate usually select the lowest payment standard and some others have a wait and see attitude because they may jump in if they actually see materializing the benefits of the pension on grounds. Furthermore, there are constraints for enrollment into the pension system for people

who are approaching age 60. Some researchers observe challenges in implementation of the current pension system in the view of demographic transition, rural to urban migration and fast wage growth (Song et.al 2011; Song et.al 2015). By constructing overlapping generation model, Song et.al (2015) suggested that delaying the implementation of the current pension system can bring larger gains for the current generation and reduce the burden on the future generation. They concluded in their findings that although public pension has largely been used as an instrument for welfare enhancement in the past, but keeping in view the demographic transition in China, this could challenge and harm the fiscal sustainability. Targeting gender is also one of the most fundamental issues surrounding aging population and dependency on the younger people. As we discussed above, women mostly depend on support from the family which could create even more pressure for the younger. Therefore keeping women at the forefront of the new pension system could significantly contribute to the government efforts in establishing pathways for a dividend. Chen and Turner (2015) suggest that gender equality in the new pension system would actually increase their contribution and help them independent of the family support.

Phase-in design in NRP

Unlike the general policy change process in China which is implemented in a nationwide scope all at one time, New Rural Social Pension Insurance (NRP henforce) is implemented in a pilot scope.

After the announcement of the NRP scheme in 2009, it started in 10 percent of counties nationwide in late 2009, with 24 percent of counties to be included by the end of 2010, which followed by over 60 percent of counties covered by early 2012. And by the end of 2013, full coverage by all counties are achieved which is far earlier than expected (originally finalized as 2020).

Therefore, taking advantage of the phase-in implementation scheme of NRP, it can be viewed as a quasi-experiment and evaluate the effect of the NRP scheme on elders well-being in rural China.

It is necessary to highlight here once again that the NRPS is designated for residents who hold the Agricultural *Hukou*[2] (referred as "rural residents"), not only for those who currently live in rural areas. Considering the existence of large amount of migrant workers in urban cities who are with Agricultural Hukou, the NRP expansion would gradually cover both rural and urban areas instead of only being limited to rural counties. And this is what we mean by achieving full geographical coverage of NRP.

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[2] A *hukou* is a record in a government system of household registration required by law in China, and determines where citizens are allowed to live. There are mainly 2 type of *hukou*, Agricultural Hukou and Non-agricultural Hukou, which is mainly assigned to rural and urban residents respectively. Therefore, the term rural residents and urban residents here are according to the *hukou* status instead of currently living place.

2. Data

In this paper, we analyze the impact of pension coverage using a panel data, the China Health and Retirement Longitudinal Study (CHARLS) waves 2011 and 2013. CHARLS collects a nationally representative sample of Chinese residents ages 40 and older[3]. We focus on those reside in rural villages and hold agricultural household register (*hukou*). To balance the data, only individuals who exist in both waves are selected for analysis. In total, the restricted sample contains 17,818 observations in 2 waves of survey which are formed by 8,909 individuals from 5382 households, 236 villages, and 115 counties.

There are two set of well-being measures. One is individuals' subjective well-being measures, including general satisfaction with life and CES-D (known in full as the Center for Epidemiological Studies – Depression). The other is households' financial measures, including expenditure allocations, savings and financial wealth.

2.1 Subjective well-being measures

The first measure for subjective well-being is general satisfaction with life. In this paper we specifically focus on the general life satisfaction in the context of China. This issue has attracted renewed interest in the literature based on the arguments that China despite of its remarkable progress in income per capita, life satisfaction didn't improve mainly because of dissolution of social safety nets and growing inequality (Easterline 2012).

In this paper, general satisfaction with life is derived from following survey question: "Please think about your life-as-a-whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, not satisfied, or not at all satisfied? (CHARLS questionnaires, 2011 and 2013)" Contrary to the descending values assigned in the survey, we convert the values to ascending assignment which follows: 1=not at all satisfied, 2=not satisfied, 3=somewhat satisfied, 4=very satisfied, and 5=completely satisfied.

Figure 1 presented the distribution of general satisfaction with life according to responses in each wave of survey. In wave1, 83 percent of respondents were generally satisfied with life. The largest proportion lied in the middle rank who are somewhat satisfied with life generally, while the share of very satisfied respondents was merely one-third of it. However, there was very few reports (around 1.7 percent) of completely satisfaction. On the other end of the distribution, 2.85 percent of

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[3] In CHARLS, the respondent-level sampling is randomized in the households which have members older than 40 and meet the residence criterion. "If the chosen person is 45 or older, then he/she becomes the main respondent and spouse is also interviewed. If the chosen person is between ages 40 and 44, he/she is reserved as a refresher sample for future rounds of survey. (Zhao et al., 2013)" In order to collect as large samples as possible, this paper uses samples who are aged no less than 40 if meeting other sample restrictions.

respondents were not satisfied with life at all, which is almost two times of the complete satisfaction. In wave2, the distribution of general life satisfaction is very similar to the previous wave. Nonetheless, some structural change could still be observed. On both ends of the satisfaction distribution, there was an increased share of respondents while the positive end increased relatively more. Both complete dissatisfaction and complete satisfaction accounted for 3 percent. Besides, respondents who were not very satisfied decreased by 2.5 percentage points and those who were very satisfied increased by 0.5 percentage points. In general, the level of general life satisfaction raised between the two waves. These findings are aligned with the recent world happiness report (2017) that showed a decline from 1990 to 2005 and substantial recovery that has been attributed to changes in social safety nets particularly a rise in pension and health care coverage.

It is found that life satisfaction could vary by country and age. Deaton (2008) observed that lift satisfaction declines with age in a cross-country study. However, he also acclaimed that very highest-income countries, namely the U.S., the U.K., Canada etc., are the exceptions where life satisfaction is U-shaped with age throughout lifetime. In the case of urban China, the similar U-shape between satisfaction and age was also observed with age of early 40s serving as turning point using a purposely designed module on subjective well-being which had been incorporated into the 2002 Chinese Household Income Project (CHIP,2002) (Appleton and Song 2008). When focusing on the elderly population alone, Zhang and Liu (2007) noted that elderly who aged 65 and above are happier with their lives as they are getting even older in the case of China using 2002 wave of the Chinese Longitudinal Healthy Longevity Survey (CLHLS).

Table 1 illustrated the distribution of general satisfaction with life among age groups across NRP participation status. In general, the average of general life satisfaction increased as the rural respondents are getting older. It started with a mean of 2.91 in the early 40s and reached an average of 3.20 when above 80s. When diving the sample into groups according the respondents pension participation status, the positive relationship between general life satisfaction and age still held within each group. However, there was a clear gap in general life satisfaction throughout all age groups between the pension participants and non-participants with an average difference of 0.07 as a whole. Figure 2 depicted this gap in a much clear way. Despite the youngest age group (40-45 years old), the average life satisfaction is all the way along higher among pension participants than those of non-participants.

The second measure adopted is an index for depressive symptoms, known in full as the "Center for Epidemiological Studies - Depression" (CES-D). It is originally developed by Radloff (1977) with a 20-item based rating on how often the respondents experienced symptoms associated with depression over the past week.

However, instead of the original CES-D form, CHARLS fielded a 10-item based CES-D scale with a response card to measure the depression in elderly (Zhao et al. 2013).[4] The properties of the 10-item CES-D was proved to be excellent for use as a screening instrument for identifying major depression in the older adults (Irwin et al. 1999). The list of the 10-item version CES-D in CHARLS is given in Appendix 3.1. According to the guidance of standard CES-D[5], response options of each item is valued by a scale of 0-3 which follows: 0=rarely or none of the time (<1 day), 1=some or a little of the time (1-2 days), 2=Occasionally or a moderate amount of the time (3-4 days), and 3=Most or all of the time (5-7 days). In return, the scores would range from 0 to 30, with high scores indicating greater depressive symptoms. As there is no recommended cutoff scores for 10-item CES-D, it will be standardized for analysis purposed.

Table 2 and Figure 3 presented the distribution of CES-D (before standardization) among age groups and across NRP participation status. Overall, the average score of CES-D is 8.76 (out of a total of 30) in all samples, while it is reported as 8.94 and 8.57 respectively for NRP participants and non-participants. Again, a clear gap of depression level between NRP participants and non-participants was observed among all age groups. It also showed that depression symptoms generally increased with the age and peaked at age 65-70 with an average of 9.45.

Considering CES-D score is not a commonly used indicator, it would be difficult to understand the meaning of its scale. According to Andersen et al. (2013) the possible range of 10-item scale is 0 to 30 and a cut off score of 10 or higher indicates the presence of significant depressive symptoms. Although there are several suggested cutoff scores, mainly following Andresen et al. (1994, 2013), we consider cutoff score for clinical depression as CES-D≥10[6]. Thus the generated binary indicator could clearly identify the incidence of being at risk of clinical depression. Compared with cutoff score 10, almost 40 percent of the rural residents in the analysis sample were actually at the risk of clinical depression.

Apart from theses major subjective measures, we further consider the three subjective feeling of depression symptoms, which are "I felt depressed", "I felt fearful", and "I was happy". Both feeling of depression and fear are in scale of 0 to 3 with higher

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[4] Irwin et al. (1999) pointed out that the original CES-D could be problematic for the older adults who may be not familiar with a multiple item, forced choice scale because the questions are emotionally stressful and the time to complete it is burdensome. Kohout (1993) also found that the CES-D response format is confusing for the elderly respondents.

[5] Center for Epidemiological Studies-Depression. American Psychology Association. retrieved from: http://www.apa.org/pi/about/publications/caregivers/practice-settings/assessment/tools/depression-scale.aspx.

[6] There is no commonly recognized cutoff for CES-D 10-item questionnaires. Commonly suggested cutoff values include 8 and 10 by Andresen et al. (1994), or 15 by Björgvinsson et al. (2013). It has been proved that previously suggested cutoff scores could resulted in good sensitivity (Andresen et al., 1994; Andresen et al., 2013; Björgvinsson et al., 2013).

values indicating more presence of this feeling. Feeling of happy is in scale of 0 to 3 with higher values indicating less presence of this feeling.

The full set of summary statistics for all subjective well-beings can be found in the top section of Table 3.

2.2 Objective well-being measures

Unlike subject well-beings which are measured on individual level, measures for objective well-being will be created on household level. The intuition behind is that household should be considered as the relevant decision-making unit on issues such as consumption and savings rather than individuals (Davis 1970, 1971; Spiro 1983). Major expenses such as food, housing and transportation are often jointly "consumed" while individual consumptions (e.g. tobacco) should only accounts for a very small portion (Davis 1976).

Thus a household's objective well-being is measured in the following three dimensions: expenditure allocations, savings and financial wealth. All of them are derived from the income and expenditure module in CHARLS. In general, information of income and expenditure is provided by the "financial respondent" who is considered as the most knowledgeable family member (including the main respondent and spouse) about these matters (Zhao 2013).

In CHARLS survey, expenditures were recalled into weekly, monthly and annual expenditure to ensure the accuracy of measurement and analysis. These levels of measurements can be well utilized to represent different needs with various frequency occurrence. In order to capture the induced impact of joining NRP due to expansion of pension coverage, the total household expenditure was categorized into eleven categories i.e. (1) food, (2) smoking and drinking, (3) daily goods, (4) leisure, (5) communication and transportation, (6) utilities, (7) clothes, (8) education, (9) medical and fitness, (10) durable goods, and (11) other. The definition of each categories, with mean and share in total expenditure, were listed in Table 4[7]. On average, a typical rural household would spend a total of 1762 RMB on the whole package of commodities. The top three items were ranked as food, communication and transportation, and medical and fitness, with each of them accounting for 36.25 percent, 13.35 percent and 10.66 percent respectively.

In latter columns of Table 4, the expenditure was furtherly reported for households with different NRP participation status. In general, households with at least some member joined NRP would spend approximately 20 percent (found by (1927.7-1596.5)/1596.5) more than households who did not join NRP. It also showed briefly

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[7] To fully capture how a rural household allocate expenditure on different sub categories, only households who answered all of the expenditure questions were counted in this table. On the other hand, all available samples will be used in regression analysis to maximize the sample size of each dependent variable.

that households covered by pension tended to spend more on all categories compared to their counterparts, but their allocation of spending on each type of expenditures were different.

The "extra" expenditures made by households joined NRP may come from two possibilities. On one hand, joining NRP will induce a fixed amount of yearly contribution because NRP is still a contributory pension scheme. Recalling that the premium one NRP participants would contribute may vary from 100 to 500 RMB per year in initial several years. As NRP is available for all rural residents who has aged 16 and over and not yet been covered by any other public pension scheme, if households would have more than only one participants, joining NRP will impose a large of amount of expenses on the household. On the other hand, joining NRP would change people's expectation on current and future income and thus change the structure of household consumption. More discussion on how households may change their expenditure allocations will be followed in later section.

Given the information of yearly household income and monthly expenditure, savings were first calculated as the household total income minus total expenditure adapted to yearly basis. However, the calculated savings should be used with great cautions. Among all available household samples, more than 60 percent of household has negative savings in a single survey year while there is huge dispersion in the savings data. This is mainly because of the low income level of households. As a result, one cannot perform logarithm transformation in regression analysis. As is confirmed in Appendix 2 figure a, the original saving data seems to follow a normal distribution shape but with very long tails at both ends. The histogram of savings after removing the bottom and top 2 percent of samples can be found in Appendix 3.2 figure b and figure c, which would approximately lead to 400 and 1000 observations dropped respectively. It showed that dropping small portion of outliers in savings can effectively reduce the dispersion while keeping a normally distributed shape. This property also inspired us to have further robustness check using various outlier filtering strategies.

Considering the large variations in household income as well as savings. We did not use the typical definition as mentioned above. Instead, this paper used an alternative measure of household saving rate which defined local saving rate as the difference between log of household income and log of household expenditures (Wei and Zhang 2011; Chamon and Prasad 2010). It is suggested that this definition is less susceptible to extreme values and can make the error term more likely to satisfy the normality assumption (Wei and Zhang 2011).

Since a large proportion of negative savings was observed in rural households, it is necessary to have a look on how household would respond in order to "compensate" declined savings. The potential response household could have may include reduce

expenditure, increase cash flow, decrease deposit, or increase loans and borrowings. For this purpose, two components will be discussed as well. One is expenditure and its allocation. Another is financial wealth, including the amount of cash and loan in a rural household.

The full set of summary statistics for household financial behaviors can be found in the top section of Table 5.

2.3 Independent variables

To analyze the difference in individuals' subjective well-being measures as well as households' objective well-being measures among those who participated NRP and or not, the independent variable of interest here is the NRP participation status. Given subjective well-being are measured on individual level and objective well-being are measured on household level, the NRP participation status will be defined accordingly, as well as control variables.

For subjective well-being, individual NRP participation is defined by a dummy variable: whether the respondents participated in NRP or not.

$$NRPpr_{ij} = \begin{cases} 1 & ,if\ i\ joined\ NRP \\ 0 & ,if\ i\ did\ not\ join\ NRP \end{cases}$$

where both contributing pension premium and receiving pension benefit are considered as participation for any individual i from household j.

Control variables for subjective well-being include individual demographics (gender, age and squared, education, marital status), individual health status (any disability, any chronic, ADL, IADL), and family characteristics (number of offspring, number of siblings alive, number of parents alive, log of household income).

For objective well-being, household NRP participation is defined as a dummy variable by counting how many respondents in the household have joined NRP. It equals to 1 if there is at least one individual in household j who has participated in NRP while it equals to 0 if no one in household participated NRP.

$$hhNRP_j = \begin{cases} 1 & ,if\ \#\big(NRPpar_{ij} = 1\big)_j \geq 1 \\ 0 & ,if\ \#\big(NRPpar_{ij} = 1\big)_j = 0 \end{cases}$$

By the definition, an alternative measure of household NRP participation can be defined by the number of respondents in household j who join NRP directly. Since each household would have only one (main respondents only) or two respondents (main respondents and spouse), the second indicator of household NRP participation will take value 0, 1 and 2.

$$hhNRP_j numhhNRP_j = \#\big(NRPpar_{ij} = 1\big)_j$$

and

$$hhNRP_j \in \{0, 1, 2\}$$

Control variables for objective well-being would be slightly different from the control variables used in individual data. First, family characteristics like number of offspring, number of siblings alive, number of parents alive, log of household income would still be included. In addition, number of family member who eat at home recently (last week) is also included as the change in it will be very sensitive to expenditures. Considering health status (any disability, any chronic, ADL, IADL) among respondents within the same household could vary a lot, heath status indicators will be taken its mean values to capture average of the health status within the household. However, it is impossible to take average of the individual demographics (gender, age and squared, education) like what has been done to individual health status. Only the individual demographics of the main respondent in the household will be controlled. Number of respondents interviewed in a household will be controlled as well to replace individual's marital status.

3. Empirical Strategy

To answer the question raised at the beginning of this paper that how does NRP participation affect people's well-being, and to establish the causal link between NRP participation and rural residents' well-being, the same identification strategy that is adopted in previous chapter can still be applied here.

The potential endogeneity in NRP participation is still a big concern because NRP is a voluntary and contributory public pension scheme. Individuals and households who can afford the contribution or who can directly benefit from the pension (mainly through family binding policy) are more likely to participate in NRP. Therefore, a combined estimation strategy is used here to address our concern of endogeneity, which is instrument variable method along with FE effects model (name as IVFE for short). It is supposed that instrument variable method could well predict individuals and households' endogenous decision on NRP participation while fixed effect model could control for household and individual level unobserved time-invariables. Village level NRP participation rate serves as instrument in the IV estimations.

For individuals' subjective well-being measures, the model is constructed the same as for individual labor supply outcomes in previous chapter, which is

$$\Delta y_{ij} = \beta_0 + \beta_1 \Delta \widehat{NRPpar}_{ij} + \Gamma \Delta X_{ij} + \delta \Delta F_j + u_{ij}$$

$$\Delta NRPpar_{ij} = \theta_0 + \theta_1 \Delta rNRPpar_k + \tau \Delta X_{ij} + \varphi \Delta F_j + u_{ij}$$

For households' objective well-being measures, the model is constructed as follows:

$$\Delta y_j = \beta_0 + \beta_1 \Delta h\widehat{hNRP}_j + \delta\Delta F_j + \Phi\Delta H_j + \Gamma\Delta R_j + u_{ij}$$

$$\Delta hhNRP_j = \theta_0 + \theta_1\Delta rNRPpar_k + \varphi\Delta F_j + \phi\Delta H_j + \tau\Delta R_j + u_{ij}$$

Apart from IVFE, estimation results from OLS, pooled IV and FE will also be provided for reference.

4. Main Results

4.1 Does NRP make participants "happier"?

Before answering the question that how does NRP participation affect rural residents' happiness which is measured by three subjective well-being measures, here are some descriptions on the general pattern of happiness among rural residents who aged 40 and above. This was done by a multiple linear regression to simply regress each of these happiness measures on a group of control variables including individual demographics, individual health and household characteristics. In addition, year fixed effect and county fixed effect will also be considered.

The results can be found in Appendix 3.3. Remembering that the target population here are rural residents who have aged at least 40. Generally speaking, male rural residents are less depressed and more satisfied with life compared to their gender counterparts. As people are becoming older, they feel less depressed and have higher life satisfaction. More education also links with less depression and higher life satisfaction. Compared to people who are single or divorced, people stay in marriage or become widowed also feel better with their life. More presence of health issues decrease their subjective well-being. Household income are positively related to the feeling of happiness. Having more offspring also make people happier while the number of sibling and parents who are still alive do not affect much.

In this section, the effects of NRP participation on rural residents' subjective well-being are evaluated. Table 6 presented the main results for all subject well-being measures using both fixed effect and IV with fixed effect estimations. Estimations from IV with fixed effect model was the main results that we referred to. Cluster standard errors were given in the parenthesis with clustering at the individual level. Participating in NRP significantly reduced rural residents' depression symptoms with less incidence of clinical depression and increased their general life satisfaction. Joining NRP could lead to a 0.68 points decrease in CES-D index out of the total 30 points, which was equivalent to a 0.1092 standard deviation change. What's more, it significantly reduced the incidence of clinical depression by 12.7 percent. At the same time, the rating for general satisfaction with life raised by 0.05 points out of the 5-point scales.

Apart from NRP, rural residents' subjective well-being would be affected by health conditions. As there is more presence of disability, chronic, ADL and IADL symptoms along with aging, they would feel more depressed and less satisfied with life. On the contrary, the change in household income did not matter much for their level of depression or life satisfaction.

Table 7 reported the effect of participating NRP on subjective feelings of depression. The structure of the table was the same as Table 6. It showed that the negative feeling of depressed or fearful were eased by 0.091 points and 0.087 points respectively if rural residents joined NRP, which were equivalent to 0.084 and 0.1088 standard deviation change. But there is no significant effect in boosting the positive feeling of happiness.

Furthermore, Table 8 denoted the heterogeneity in effects of introducing NRP. The heterogeneity between age groups and between gender groups are discussed separately in panel A and panel B.

As discussed in previous chapter, according to age, pension participants would have different role under NRP scheme. For pension participants in age 40-60, they are pension contributors who have to pay for premium. For pension participants in age 60 and above, they are considered as pension recipients who have got rid of the obligation of contribution and start to receive pension benefits. This different role under NRP scheme would perhaps lead to the heterogeneity in the effects of joining NRP on participants' happiness levels.

Table 8 panel A illustrated the difference between different age groups and its corresponding roles. The good news was that NRP had positive effects rural residents' subjective well-being on both of the age groups while the magnitude would be different. Becoming pension contributors made respondents have less depression symptoms as their CES-D scores decreased by 0.1021 standard deviation and the incidence of clinical depression was reduced by 9.6 percentage points. Pension contributors would also reported less negative feelings of depressed or fearful. Meanwhile, becoming pensioners had even stronger effect in reducing the incidence of clinical depression (14.9 percentage points), increasing general life satisfaction (0.1267 standard deviation change), and making respondents feel happier (0.1125 standard deviation change).

The difference of NRP's effects between male and female was another matter of our interest because different gender has proven to have different level of subjective well-being generally as is denoted in the Appendix 5. The heterogeneity in effects of NRP between gender groups was given in Table 8 panel B. Only female group, who were with lower level of happiness in general, had large and significant improvement in happiness measures through joining NRP. For a rural woman, joining NRP reduced

her depression symptoms by 0.1146 standard deviation, general satisfaction with life recovered by 0.1267 standard deviation. The likelihood of being at risk of clinical depression had been decreased by 14.9 percentage points. On the contrary, there is no significant evidence that men's depression symptoms as well as general life satisfaction had been affected by their NRP participation despite men had 9.1 percent less incidence of clinical depression.

In addition, Table 9 presented the results for NRP participation on all subjective well-being measures using different combinations of instruments. Column 1 first repeated the main results of estimation using IV with fixed effect model using village level NRP participation rate as instrument. Column 2 used the same estimation strategy but taking the interactions between village level NRP participation rate and village size dummy[8] as the instruments. The instruments used in column 3 were the interactions between village level NRP participation rate and region dummies[9]. The instrument used in column 4 was county level NRP participation rate. Clustering standard errors were given in the parenthesis with clustering at the individual level. P-values from overidentification test were given in the brackets when multiple instruments were used for estimation.

The estimates for individual NRP participation remained robust across all subjective well-being indicators even using different combination of instruments. Overidentification test supported exclusion restriction expect for the case when using participation rate and region interactions as instruments to estimate changes in risk of clinical depression.

4.2 Does NRP deteriorate participants' living standards?

Pension coverage has proved to bring good for rural residents' in the sense of improving their values of happiness. The concern is then whether NRP would still have some "side effect". Being a voluntary and contributory public pension scheme, NRP could have impose cash constraint on households in order to cover the required "extra" premiums if they want to join NRP. This, in return, would affect households' decisions on how to manage their expenditures, savings and financial wealth. Would they choose to reduce consumption, cut down savings, withdraw deposits, or even turn to loans? In this section, the effects of NRP participation on rural residents' objective well-being are evaluated.

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[8] Village size dummies are generated according to village population reported in wave1 community survey. A village is defined as small with less than 1,000 residents, median with 1,000-2,000 residents and large if having more than 2,000 residents. Dummy for small village was excluded in the estimation to serve as reference group.
[9] Regional dummies are generated according to the economic zone division announced by National Bureau of Statistics of China. All provinces are divided into four regions i.e. eastern region, central region, western region and northeast region. Dummy for central region was excluded in the estimation to serve as reference group.

Table 10 presented the main results for households' savings and financial wealth, which is indicated by saving rate, cash at hand, and bank loan, using IV with fixed effect estimations. Cluster standard errors were given in the parenthesis with clustering at the individual level. Two different measures of household NRP participation status are used for each of the outcomes, which are a dummy indicating whether household has at least one respondents participated in NRP in the odd columns, and a continuous variable counting the number of respondents who joined NRP in the household in the even columns.

The results indicated that household tended to reduce saving rate and increase cash at hand if joining NRP. There was no significant evidence on bank loan changes. Compared with household with no NRP participants, household who joined NRP would keep saving rate 12.5 percentage points less and increase cash holding at hand by 56.6 percent. In addition, if one more household member joined NRP, it would decrease the household saving rate by 7.6 percentage points on average and increase cash holding by 34.4 percent further.

Considering the large disparity in household reported financial items, we performed several robustness checks using different subsamples. The main aim of changing different subsamples were to attempt to exclude potential outliers in the analysis sample. The strategy of data filtering followed the previous study on China's competitive saving motives (Wei and Zhang, 2011). First, we excluded samples who reported annual household income or expenditure less than 2,000 RMB. This resulted in a loss of approximately 1,000 observations. Second, we excluded households who were on bottom and top 2 percent regarding changes in saving rate between two waves. This deducted the around 200 observations. Third, we excluded households who were on bottom and top 5 percent of saving rate changes. This removed the almost 450 observations from the full analysis sample.

Table 11 presented this robustness check. Main results were illustrated first in column 1 as millstones. The estimates after applying the three data restriction strategies were then reported in the following three columns. Results remained robust with the same qualitative patterns preserved.

These changes in household wealth could imply a fact that household get to be in need of more financial mobility after joining NRP scheme. But the reason behind the demand of financial mobility was still ambiguous. It could be attributed to two penitential reasons. First, the contributory pension scheme could have imposed budget constraint to household who choose to join NRP because pension contribution became the extra expenses they should cover apart from daily consumptions. Second, joining NRP could have reshaped household's expectations toward higher future income so that they would like to increase or reallocate household expenditures to improve living quality.

It was still vague to distinguish which reason actually dominated the demand for financial mobility in the household. After reviewing the data availability in CHARLS survey, we were able to explore the detailed list of household consumptions, although there was very limited information on amount of individual pension contribution.

Table 12 then depicted how the households' expenditure allocation responds to NRP participation using IV with fixed effect estimations on household level constructed data. All the expenditure categories has taken the logarithm transformation. Cluster standard errors were given in the parenthesis with clustering at the individual level. Column 1-2 showed the estimation results using all of the household samples using two different household pension participation indicators. Column 1 could be interpreted as, compared to households who did not join NRP, households who joined NRP would increase the total expenditure by 10.9 percent. This increase in consumption could then be translated into 18.7 percent increase in food consumption (including both eating at home and eating outside), 12.9 percent increase in daily goods, 25.7 percent increase leisure, and 16.5 percent increase in communication and transportation, and 38.4 percent increase in medical and fitness expenses. The rest of the consumption categories did not change significantly. Column 2 could then show the marginal effect of having one more household member joining NRP.

The changes in household expenses reallocation is partially consistent with the existing qualitative view declaring that having pension benefits could help old-age rural residents pay for living necessities such as food, medicine, clothing, and water and electricity (Shen and Williamson 2010). Our results showed the similar trend in increased expenditure on food, daily goods and medicine while there was no evidence of increased expenses on clothing and utilities. And these expenditures could help fulfill rural households' basic living necessities.

Despite changes on expenditure categories mentioned above, it was a little bit surprising to observe the significant increase in communication and transportation as well as leisure. The significantly increased expenditure in communication and local transportation may be linked with the increased off-farm labor supply in the households for both respondents themselves and their offspring. It should be aware that the large increase in leisure expenses was actually based on a very small amount of initial basis (around 11 RMB per month). Anyway, the increased expensed on leisure, along with fulfilled living necessities, could have contributed to the improved subjective well-being as is discussed in section 4.1.

5. Conclusions

This paper tries to contribute to the existing studies on China's NRP reform in the perspectives of its welfare effect represented by different measures in both rural residents' subjective well-being and rural households' objective well-being.

Similar to the previous chapter, this paper takes the NRP reform's gradual geographical expansion as a quasi-experiment to evaluate the effect of pension reform on rural residents' labor supply behaviors. By constructing a two-period panel data from CHARLS wave 1 and wave 2 study, we mainly targeting the rural residents who are in their mid-age and old-age. And IV with fixed effect model is estimated to identify the change in rural residents' subjective well-being and rural households' objective well-being along with the pension expansion in China.

First, the individual who participated in the pension program have significant improvement in their subject well-being which are represented by deceased depression symptoms along with less incidence of clinical depression, and recovered general satisfaction with life. Heterogeneity in effects existed between different age and gender groups as older people and women could have benefited more from the NRP participation.

Meanwhile, with the expansion of the pension program, we didn't find enough evidence of deterioration of rural household's living standards. Although households seemed to fell in trouble with financial mobility as they had to reduce saving rate and were in great need of cash if joining NRP. This turned out to be related to shifted patterns in household consumptions. Households who joined NRP tended to increase total expenditures while diverting to categories of medical and fitness, communication and allocation other than the basic needs. In addition, the increased expenses on communication and transportation could be explained by the increased off-farm labor supply by the household members. And increased medical and fitness expenses reflected the increasing attention on health care.

In general, the expansion of the new rural public pension can be viewed successful trial in recovering the people life satisfaction which have been declined from 1990 till 2007 which is aligned with the ongoing research on happiness in China (Happiness report 2017). NRP could also lead to improved household consumption with higher ability to pay for basic living goods (such as food and daily goods) as well as more spending on health and work related expenditures.

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Table 1 General satisfaction with life among age groups

Age group	All samples		Not join NRP		Joined NRP	
	Mean	Obs.	Mean	Obs.	Mean	Obs.
40-50	2.99	2,547	2.95	1,444	3.04	1,103
50-55	3.01	2,464	2.98	1,175	3.04	1,289
55-60	3.04	3,155	3.00	1,521	3.07	1,634
60-65	3.07	2,902	3.03	1,315	3.10	1,587
65-70	3.12	1,972	3.06	893	3.18	1,079
70-75	3.16	1,221	3.14	582	3.19	639
75 and above	3.20	1,136	3.17	545	3.23	591
Total	3.06	15,397	3.02	7,475	3.10	7,922

Note: The unit of observation is an individual. Age group 40-45 and 45-50 are combined because there are very few observations (202 obs.) in the former group. The mean presented are values weighted by individual longitudinal weights. General satisfaction with life is measured as 1=not at all satisfied, 2=not satisfied, 3=somewhat satisfied, 4=very satisfied, and 5=completely satisfied.

Table 2 CES-D among age groups

Age group	All samples		Not join NRP		Joined NRP	
	Mean	Obs.	Mean	Obs.	Mean	Obs.
40-50	8.00	2,681	8.13	1,565	7.81	1,116
50-55	8.24	2,583	8.49	1,268	8.00	1,315
55-60	8.71	3,345	9.03	1,669	8.38	1,676
60-65	9.23	3,046	9.43	1,432	9.04	1,614
65-70	9.45	2,080	9.59	977	9.33	1,103
70-75	9.25	1,347	9.38	693	9.11	654
75 and above	9.01	1,306	9.18	684	8.81	622
Total	8.76	16,388	8.94	8,288	8.57	8,100

Note: The unit of observation is an individual. Age group 40-45 and 45-50 are combined because there are very few observations (214 obs.) in the former group. The mean presented are values weighted by individual longitudinal weights. The Center for Epidemiological Studies - Depression (CES-D) scores range from 0 to 30, with high scores indicating greater depression symptoms.

Table 3 Summary Statistics for individual subjective well-being and individual control variables

Variable	All sample			Not in NRP			Joined NRP		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Individual subjective well-being:									
CES-D	16,388	8.86	6.25	8,288	9.09	6.35	8,100	8.62	6.14
=1 if being at risk for clinical depression (*CES-D≥10*)	16,388	0.39	0.49	8,288	0.41	0.49	8,100	0.37	0.48
General satisfaction with life	15,397	3.06	0.75	7,475	3.03	0.75	7,922	3.10	0.75
Felt depressed	16,142	0.95	1.08	8,160	1.01	1.09	7,982	0.89	1.07
Felt fearful	16,309	0.35	0.80	8,248	0.39	0.82	8,061	0.32	0.77
Felt happy	16,273	1.34	1.20	8,229	1.26	1.17	8,044	1.41	1.22
Main respondent's demographics:									
=1 if male*	17,818	0.47	0.50	9,018	0.47	0.50	8,800	0.47	0.50
age	17,818	59.93	9.75	9,018	59.52	9.97	8,800	60.35	9.49
=1 if attained at least secondary education	17,748	0.23	0.42	8,972	0.23	0.42	8,776	0.23	0.42
=1 if married*	17,816	0.86	0.35	9,016	0.85	0.35	8,800	0.86	0.34
=1 if divorced*	17,816	0.01	0.10	9,016	0.01	0.11	8,800	0.01	0.09
=1 if widowed*	17,816	0.12	0.33	9,016	0.12	0.33	8,800	0.12	0.32
Household average heath status:									
=1 if has any disabilities*	17,799	0.25	0.44	9,004	0.24	0.42	8,795	0.27	0.45
=1 if has any chronic diseases*	17,799	0.67	0.47	9,004	0.66	0.47	8,795	0.68	0.46
ADL	17,801	0.02	0.10	9,005	0.02	0.09	8,796	0.02	0.10
IADL	17,801	0.07	0.18	9,005	0.06	0.17	8,796	0.07	0.18
Household characteristics:									
Log of household income	16,139	8.81	1.79	8,077	8.83	1.83	8,062	8.78	1.75
Children alive	17,811	2.96	1.45	9,013	2.93	1.48	8,798	2.98	1.42
Siblings alive	17,774	3.24	1.97	8,989	3.25	1.98	8,785	3.22	1.95
Parents alive	17,818	0.76	1.02	9,018	0.80	1.05	8,800	0.72	0.99

Note: The unit of observation is an individual. Variables marked with * are dummies. General satisfaction with life is measured as 1=not at all satisfied, 2=not satisfied, 3=somewhat satisfied, 4=very satisfied, and 5=completely satisfied. The Center for Epidemiological Studies - Depression (CES-D) scores range from 0 to 30, with high scores indicating greater depression symptoms. Both feeling of depression and fear is in scale of 0 to 3 with higher values indicating more presence of this feeling. Feeling of happy is in scale of 0 to 3 with higher values indicating less presence of this feeling. Following Anderson (1994), we use 10 as cutoff score to identify risk of clinical depression. ADL and IADL measures the incidence of difficulty among listed activities of daily living or instrumental activities of daily living, both of which range from 0 to 1. Household income mainly consists of individual wage income and individual-based transfer, agricultural net income, self-employed activities net income and public transfer.

Table 4 Household expenditure allocation in a month by household pension participation

No.	Categories of expenditure	Descriptions	All households		households not in NRP		households in NRP	
			Mean	Percent	Mean	Percent	Mean	Percent
1	Food	Food consumed at home and eating out	638.7	36.25	593.9	37.20	683.5	35.46
2	Smoking and drinking	=Alcohol, and cigarettes	157.0	8.91	154.0	9.65	160.0	8.30
3	Daily goods	Household items and personal toiletries (detergent, soap, toothpaste, cosmetics, etc.)	42.9	2.44	29.5	1.85	56.3	2.92
4	Leisure	Entertainment, travel and beauty	13.1	0.74	11.4	0.71	14.7	0.76
5	Communication and transportation	Communication fees, local transportation, fuel, and vehicle (excluding automobiles)	235.2	13.35	232.3	14.55	238.1	12.35
6	Utilities	Water, electricity, central heating, and management fees	75.2	4.27	71.2	4.46	79.2	4.11
7	Clothes	Clothing and bedding	74.1	4.20	73.2	4.59	74.9	3.89
8	Education	Education and training (including tuition, training fees, etc.)	51.1	2.90	21.8	1.37	80.4	4.17
9	Medical and fitness	Both direct and indirect medical and fitness expenses	187.8	10.66	102.8	6.44	273.0	14.16
10	Durable goods	Furniture, consumption of durable goods and electronics, and Automobiles	143.7	8.16	116.9	7.32	170.6	8.85
11	Other expenses	The expenses not included in above categories	143.2	8.12	189.4	11.86	97.0	5.03
	Total expenses		1762	100	1596.5	100	1927.7	100
	Obs.		8,470		3,365		1,245	

Note: The unit of observation is a household. For purpose of this paper, the data on expenditure has been adapted to the eleven categories accordingly. Expenditures in the table are measured in Chinese RMB on a monthly basis. Only households who had responses on all expenditure items were counted. Other expenses includes expenses on servants, taxes other than VAT, and donations. The household is defined as in NRP if at least one respondent in the household joined NRP.

Table 5 Summary Statistics for household financial behaviors and household control variables

Variable Names	All households			Households not in NRP			Households in NRP		
	Obs.	mean	Std. Dev.	Obs.	mean	Std. Dev.	Obs.	mean	Std. Dev.
Household financial behaviors:									
Saving rate	9,590	-0.63	1.93	7,050	-0.59	1.95	2,540	-0.77	1.87
Log of cash at hand	10,744	5.77	2.88	7,925	5.85	2.94	2,819	5.56	2.66
Log of bank loan	10,521	0.98	2.96	7,827	1.18	3.22	2,694	0.39	1.88
Household characteristics:									
Log of household income	9,626	8.74	1.81	7,068	8.87	1.86	2,558	8.37	1.60
Number of respondents have any disability	10,764	0.42	0.61	7,944	0.37	0.58	2,820	0.57	0.65
Number of respondents have any chronic	10,764	1.11	0.71	7,944	1.10	0.72	2,820	1.16	0.68
Mean prevalence of difficulty in ADL	10,755	0.02	0.08	7,937	0.02	0.07	2,818	0.03	0.10
Mean prevalence of difficulty in IADL	10,755	0.07	0.16	7,937	0.06	0.14	2,818	0.12	0.20
Brother alive	10,722	1.59	1.31	7,917	1.69	1.31	2,805	1.29	1.24
Parent alive	10,764	0.71	1.00	7,944	0.88	1.07	2,820	0.21	0.51
Children	10,757	3.00	1.51	7,938	2.78	1.41	2,819	3.64	1.59
Individual characteristics of main respondent:									
=1 if male*	10,764	0.45	0.50	7,944	0.46	0.50	2,820	0.42	0.49
age	10,764	60.81	10.24	7,944	58.14	9.74	2,820	68.34	7.49
=1 if married*	10,762	0.77	0.42	7,942	0.81	0.39	2,820	0.66	0.47
=1 if divorced*	10,762	0.01	0.12	7,942	0.01	0.12	2,820	0.01	0.11
=1 if widowed*	10,762	0.20	0.40	7,942	0.16	0.37	2,820	0.31	0.46
=1 if attained at least secondary education	10,720	0.22	0.41	7,909	0.26	0.44	2,811	0.09	0.29

Note: The unit of observation is a household. Variables marked with * are dummies. Saving rate is defined as log(income)-log(expenditure) following Wei and Zhang (2011) and Chamon and Prasad (2010). Household income mainly consists of individual wage income and individual-based transfer, agricultural net income, self-employed activities net income and public transfer. The household is defined as in NRP if at least one respondent in the household joined NRP.

Table 6 Main results for individuals' subjective well-being

	CES-D		=1 if being at risk of clinical depression (*CES-D≥10*)		General satisfaction with life	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	FE	**IVFE**	**FE**	**IVFE**	**FE**	**IVFE**
Panel A: Main results						
Individual NRP participation	-0.237+	-0.683***	-0.043***	-0.127***	0.018	0.051+
	(0.130)	(0.205)	(0.010)	(0.016)	(0.019)	(0.030)
Married	2.625	2.740	-0.176	-0.155	0.132	0.118
	(3.344)	(3.302)	(0.153)	(0.149)	(0.581)	(0.585)
Divorced	2.273	2.450	-0.349*	-0.316*	0.243	0.225
	(3.330)	(3.297)	(0.151)	(0.148)	(0.615)	(0.619)
Widowed	-0.878	-0.726	-0.539***	-0.510***	0.326	0.309
	(3.447)	(3.407)	(0.155)	(0.152)	(0.586)	(0.589)
Any disability	0.127	0.127	-0.135***	-0.134***	-0.012	-0.012
	(0.273)	(0.273)	(0.020)	(0.020)	(0.041)	(0.041)
Any chronic	0.626**	0.638**	0.021	0.023	-0.069*	-0.070*
	(0.221)	(0.221)	(0.016)	(0.016)	(0.032)	(0.032)
ADL	3.133**	3.096**	0.005	0.003	-0.287	-0.283
	(1.131)	(1.132)	(0.075)	(0.076)	(0.196)	(0.195)
IADL	2.951***	2.958***	0.074+	0.075+	-0.253**	-0.252**
	(0.608)	(0.607)	(0.042)	(0.042)	(0.094)	(0.094)
Log of household income	-0.020	-0.020	-0.001	-0.001	0.010+	0.010+
	(0.039)	(0.039)	(0.003)	(0.003)	(0.005)	(0.005)
Sibling	-0.008	-0.010	0.001	0.000	-0.002	-0.002
	(0.055)	(0.055)	(0.004)	(0.004)	(0.008)	(0.008)
Parents	0.162	0.166	-0.029*	-0.028*	-0.009	-0.009
	(0.159)	(0.158)	(0.012)	(0.012)	(0.023)	(0.023)
Panel B: First stage for IVFE						
Village level NRP participation rate		0.0102***		0.0102***		0.0103***
		(0.000)		(0.000)		(0.000)
F statistics		459.73		484.29		420.79
Obs.	6,514	6,514	6,814	6,814	5,863	5,863

Note: The table reports FE and IVFE estimates. The unit of observation is an individual. Both dependent and independent variables are differenced. Cluster standard errors are given in the parenthesis with clustering at the individual level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001. The instrument used in IVFE is village level participation rate. Fixed effect is done by first differencing. CES-D is in scale of 0 to 30 with higher values indicating higher depression symptoms. General satisfaction with life is in scale of 1 to 5 with higher values indicating higher satisfaction level.

Table 7 individuals' subjective feelings of depression

	Felt depressed		Felt fearful		Felt happy	
	(1)	(2)	(3)	(4)	(5)	(6)
	FE	IVFE	FE	IVFE	FE	IVFE
Panel A: Main results						
NRP participation	-0.054*	-0.091*	-0.028	-0.087**	-0.000	-0.074
	(0.027)	(0.043)	(0.020)	(0.032)	(0.031)	(0.048)
Married	0.381	0.391	-0.150	-0.135	-0.042	-0.026
	(0.414)	(0.408)	(0.328)	(0.322)	(0.671)	(0.672)
Divorced	0.266	0.281	-0.218	-0.195	0.015	0.042
	(0.404)	(0.398)	(0.325)	(0.320)	(0.698)	(0.700)
Widowed	-0.178	-0.165	-0.256	-0.236	-0.639	-0.617
	(0.426)	(0.420)	(0.366)	(0.361)	(0.686)	(0.688)
Disability	0.122*	0.122*	-0.006	-0.006	-0.193**	-0.192**
	(0.057)	(0.056)	(0.045)	(0.045)	(0.062)	(0.062)
chronic	0.108*	0.109*	0.013	0.014	0.022	0.025
	(0.046)	(0.046)	(0.032)	(0.032)	(0.051)	(0.051)
ADL	0.529*	0.525*	0.401*	0.397*	0.388	0.382
	(0.227)	(0.228)	(0.199)	(0.199)	(0.239)	(0.239)
IADL	0.418***	0.419***	0.296**	0.297**	0.169	0.170
	(0.123)	(0.122)	(0.104)	(0.104)	(0.129)	(0.129)
Log of household income	0.003	0.003	0.001	0.001	0.002	0.002
	(0.008)	(0.008)	(0.006)	(0.006)	(0.009)	(0.009)
Sibling	-0.007	-0.008	-0.008	-0.008	0.016	0.016
	(0.011)	(0.011)	(0.008)	(0.008)	(0.013)	(0.013)
Parents	0.045	0.046	-0.004	-0.003	-0.010	-0.009
	(0.034)	(0.034)	(0.024)	(0.024)	(0.037)	(0.037)
Panel B: First stage for IVFE						
Village level NRP participation rate		0.0103***		0.0102***		0.0102***
		(0.000)		(0.000)		(0.000)
F Statistics		457.81		456.85		458.35
Obs.	6,344	6,344	6,456	6,456	6,432	6,432

Note: The table reports FE and IVFE estimates. The unit of observation is an individual. Both dependent and independent variables are differenced. Cluster standard errors are given in the parenthesis with clustering at the individual level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001. The instrument used in IVFE is village level participation rate. Fixed effect is done by first differencing. Both feeling of depression and fear are in scale of 0 to 3 with higher values indicating more presence of this feeling. Feeling of happy is in scale of 0 to 3 with higher values indicating less presence of this feeling.

Table 8 Heterogeneity in effects among different age and gender groups

	CES-D	=1 if being at risk of clinical depression (*CES-D≥10*)	General satisfaction with life	Felt depressed	Felt fearful	Felt happy
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Panel A: by age group						
age 40-60	-0.638*	-0.096***	0.051	-0.114+	-0.117*	-0.004
(pension contributors)	(0.302)	(0.023)	(0.042)	(0.063)	(0.048)	(0.072)
Obs.	3700	3857	3382	3634	3675	3665
age ≥60	-0.404	-0.149***	0.095*	-0.008	-0.040	-0.135+
(pension recipients)	(0.311)	(0.024)	(0.046)	(0.066)	(0.048)	(0.074)
Obs.	2814	2957	2481	2710	2781	2767
Panel B: by gender						
Male	-0.343	-0.091***	0.035	-0.086	-0.066	-0.076
	(0.303)	(0.024)	(0.043)	(0.063)	(0.044)	(0.077)
Obs.	3022	3176	2767	2976	3004	2991
Female	-0.716*	-0.148***	0.108*	-0.049	-0.097+	-0.052
	(0.310)	(0.023)	(0.045)	(0.065)	(0.051)	(0.069)
Obs.	3,492	3,638	3,096	3,368	3,452	3,441

Note: The table reports IVFE estimates of NRP participation. Each coefficient is estimated from an independent regression using the same setting as is shown in Table 7 while restricting samples to the subgroup of interest. The unit of observation is an individual. Cluster standard errors are given in the parenthesis with clustering at the individual level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001. The instrument used in IVFE is village level participation rate. Age group is defined based on respondents' age in wave1.

Table 9 Robustness using different instruments

Instruments	Village level NRP participation rate	Village level NRP participation rate and village size interaction	Village level NRP participation rate and region interaction	County level NRP participation rate
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**
CES-D	-0.683*** (0.205)	-0.694** (0.268) [0.938]	-0.807** (0.252) [0.514]	-0.548* (0.218)
=1 if being at risk of clinical depression (*CES-D≥10*)	-0.127*** (0.016)	-0.149*** (0.021) [0.191]	-0.111*** (0.019) [0.000]***	-0.123*** (0.017)
General satisfaction with life	0.051+ (0.030)	0.077+ (0.039) [0.119]	0.080* (0.037) [0.112]	0.073* (0.031)
=1 if perceive pension as main source of old-age financial support	0.085*** (0.014)	0.105*** (0.018) [0.108]	0.063*** (0.016) [0.101]	0.105*** (0.014)
Felt depressed	-0.091* (0.043)	-0.118* (0.057) [0.524]	-0.121* (0.053) [0.339]	-0.067 (0.045)
Felt fearful	-0.087** (0.032)	-0.096* (0.041) [0.63]	-0.117** (0.041) [0.099]	-0.082* (0.034)
Felt happy	-0.074 (0.048)	-0.111+ (0.064) [0.712]	-0.013 (0.058) [0.237]	-0.066 (0.051)

Note: The table reports IVFE estimates of NRP participation. Each coefficient is estimated from an independent regression using the same setting as is shown in Table 7 while using different instrument. The unit of observation is an individual. Cluster standard errors are given in the parenthesis with clustering at the individual level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001. P-values from overidentification test are given in the brackets for column 2 and 3. Column 1 instruments using village level NRP participation rate. Column 2 instruments using interactions between village level NRP participation rate and two village size indicators (small size village excluded). Column 3 instruments using interactions between village level NRP participation rate and three region indicators (central region excluded). Column 4 1 instruments using county level NRP participation rate.

Table 10 Main results for household wealth

	Saving rate		Log of cash at hand		Log of loan	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
=1 if any respondents joined NRP	-0.125* (0.062)		0.566*** (0.138)		-0.083 (0.145)	
Number of respondents joined NRP		-0.076* (0.038)		0.344*** (0.084)		-0.051 (0.088)
Log of household income	0.944*** (0.012)	0.945*** (0.012)	0.114*** (0.027)	0.113*** (0.027)	0.032 (0.027)	0.032 (0.027)
Number of respondents have any disability	-0.017 (0.050)	-0.013 (0.050)	0.336** (0.124)	0.315* (0.124)	0.125 (0.135)	0.128 (0.136)
Number of respondents have any chronic	-0.017 (0.038)	-0.018 (0.038)	-0.125 (0.101)	-0.118 (0.101)	0.197+ (0.106)	0.196+ (0.106)
Mean prevalence of difficulty in ADL	-0.617 (0.390)	-0.606 (0.389)	0.107 (0.807)	0.056 (0.803)	0.125 (0.689)	0.132 (0.689)
Mean prevalence of difficulty in IADL	-0.635* (0.264)	-0.641* (0.263)	0.960* (0.461)	0.989* (0.459)	0.391 (0.408)	0.387 (0.408)
Brothers alive	-0.016 (0.018)	-0.015 (0.018)	-0.008 (0.051)	-0.012 (0.051)	0.034 (0.059)	0.034 (0.059)
Parents alive	0.034 (0.047)	0.033 (0.047)	-0.055 (0.101)	-0.048 (0.101)	0.143 (0.114)	0.142 (0.114)
Children in wave1	0.046** (0.017)	0.045** (0.017)	0.011 (0.037)	0.014 (0.037)	0.022 (0.033)	0.022 (0.033)
Obs.	4,272	4,272	4,296	4,296	4,284	4,284

Note: The table reports IVFE estimates. The unit of observation is a household. Cluster standard errors are given in the parenthesis with clustering at the household level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001. The instrument used in IVFE is village level participation rate. Both dependent and independent variables are differenced except for children. The saving rate is defined as log(income)-log(expenditure) following Wei and Zhang (2011) and Chamon and Prasad (2010).

Table 11 Robustness using different subsamples

	Full sample	Subsample excluded in order to remove potential outliers		
		Income or Expenditure <2,000 RMB	Bottom and Top 2% in saving rate change	Bottom and Top 5% in saving rate change
	(1)	**(2)**	**(3)**	**(4)**
Saving rate	-0.125*	-0.130+	-0.115**	-0.110**
	(0.062)	(0.068)	(0.043)	(0.042)
Obs.	4,272	3,249	4,099	3,842
Log of cash at hand	0.566***	0.594***	0.586***	0.539***
	(0.138)	(0.154)	(0.142)	(0.145)
Obs.	4,296	3,266	4,094	3,837
Log of loan	-0.083	-0.186	-0.098	-0.116
	(0.145)	(0.172)	(0.149)	(0.152)
Obs.	4,284	3,257	4,083	3,828

Note: The table reports IVFE estimates of binary household NRP participation. Each coefficient is estimated from an independent regression using the same setting as is shown in Table 3.10 while using different subsamples. The unit of observation is a household. Cluster standard errors are given in the parenthesis with clustering at the household level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001. F-statistics of each regression are reported in the curly brackets. The instrument used in IVFE is village level participation rate. Fixed effect is done by first differencing. The savings rate is defined as log(income)-log(expenditure) following Wei and Zhang (2011) and Chamon and Prasad (2010). The similar robustness check is also performed for number of respondents joined NRP and results are available upon request.

### Table 12 Main results for households' expenditure allocation

No.	Categories of expenditure	All sample		Obs.
		Instrument: =1 if any respondents joined NRP	Instrument: Number of respondents joined NRP	
		(1)	(2)	
1	Food	0.187*	0.113*	3,720
		(0.089)	(0.054)	
2	Smoking and drinking	-0.026	-0.015	4,100
		(0.115)	(0.070)	
3	Daily goods	0.129+	0.078+	3,887
		(0.076)	(0.046)	
4	Leisure	0.257***	0.156***	4,036
		(0.071)	(0.043)	
5	Communication and transportation	0.165*	0.100*	3,702
		(0.072)	(0.044)	
6	Utilities	-0.020	-0.012	3,952
		(0.050)	(0.030)	
7	Clothes	0.105	0.063	3,763
		(0.081)	(0.049)	
8	Education	0.160	0.097	4,091
		(0.105)	(0.063)	
9	Medical and fitness	0.384**	0.232**	3,936
		(0.118)	(0.071)	
10	Durable goods	0.175	0.106	4,115
		(0.124)	(0.075)	
	Total expenses	0.109*	0.066*	4,254
		(0.054)	(0.033)	

Note: The table reports IVFE estimates. The unit of observation is a household. Each coefficient is estimated from an independent regression using the same setting as is shown in Table 3.10. All expenditure categories are logarithm-transformed. One additional control variable is number of household members eating at home last week. Cluster standard errors are given in the parenthesis with clustering at the household level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001. The instrument used in IVFE is village level participation rate. Fixed effect is done by first differencing. Other expenses is not included in the regression analysis.

Note: the percentage is calculated based on the number the respondents who answered this question in which wave, which is 7,334 observations and 8,063 observations separately.

Figure 1 Distribution of general satisfaction with life
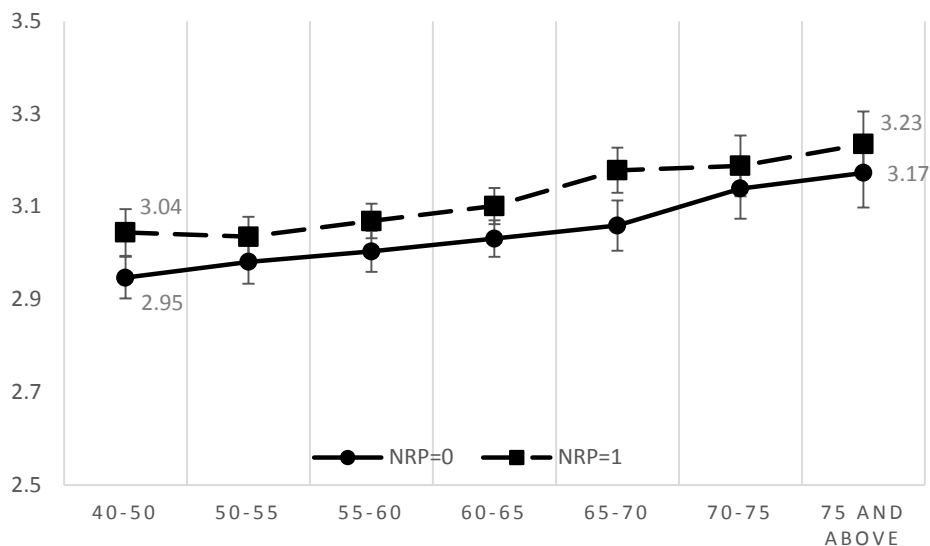
Note: Age group 40-45 and 45-50 are combined because there are very few observations (202 obs.) in the former group. The mean presented are values weighted by individual longitudinal weights. Confidence intervals are illustrated at 95% confidence level. General satisfaction with life is measured as 1=not at all satisfied, 2=not satisfied, 3=somewhat satisfied, 4=very satisfied, and 5=completely satisfied.

Figure 2 General satisfaction with life among age groups
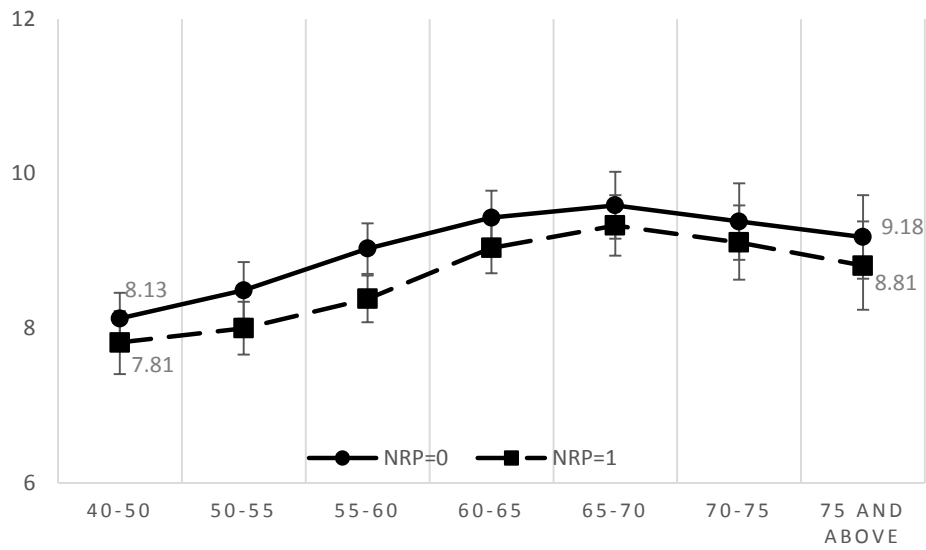
Note: Age group 40-45 and 45-50 are combined because there are very few observations (214 obs.) in the former group. The mean presented are values weighted by individual longitudinal weights. Confidence intervals are illustrated at 95% confidence level. The Center for Epidemiological Studies - Depression (CES-D) scores range from 0 to 30, with high scores indicating greater depression symptoms.

Figure 3 CES-D among age groups

**Appendix 1: CES-D scale, 10-item version list in CHARLS**

Questions:

I was bothered by things that don't usually bother me.

I had trouble keeping my mind on what I was doing.

I felt depressed.

I felt like everything I did was an effort.

I felt hopeful about the future.

I felt fearful.

My sleep was restless.

I was happy.

I felt lonely.

I could not get "going".

Response options:

Rarely or none of the time (< 1 day)

Some or a little of the time (1-2 days)

Occasionally or a moderate amount of the time (3-4 days)

Most or all of the time (5-7 days)

Appendix 2: Distribution of savings
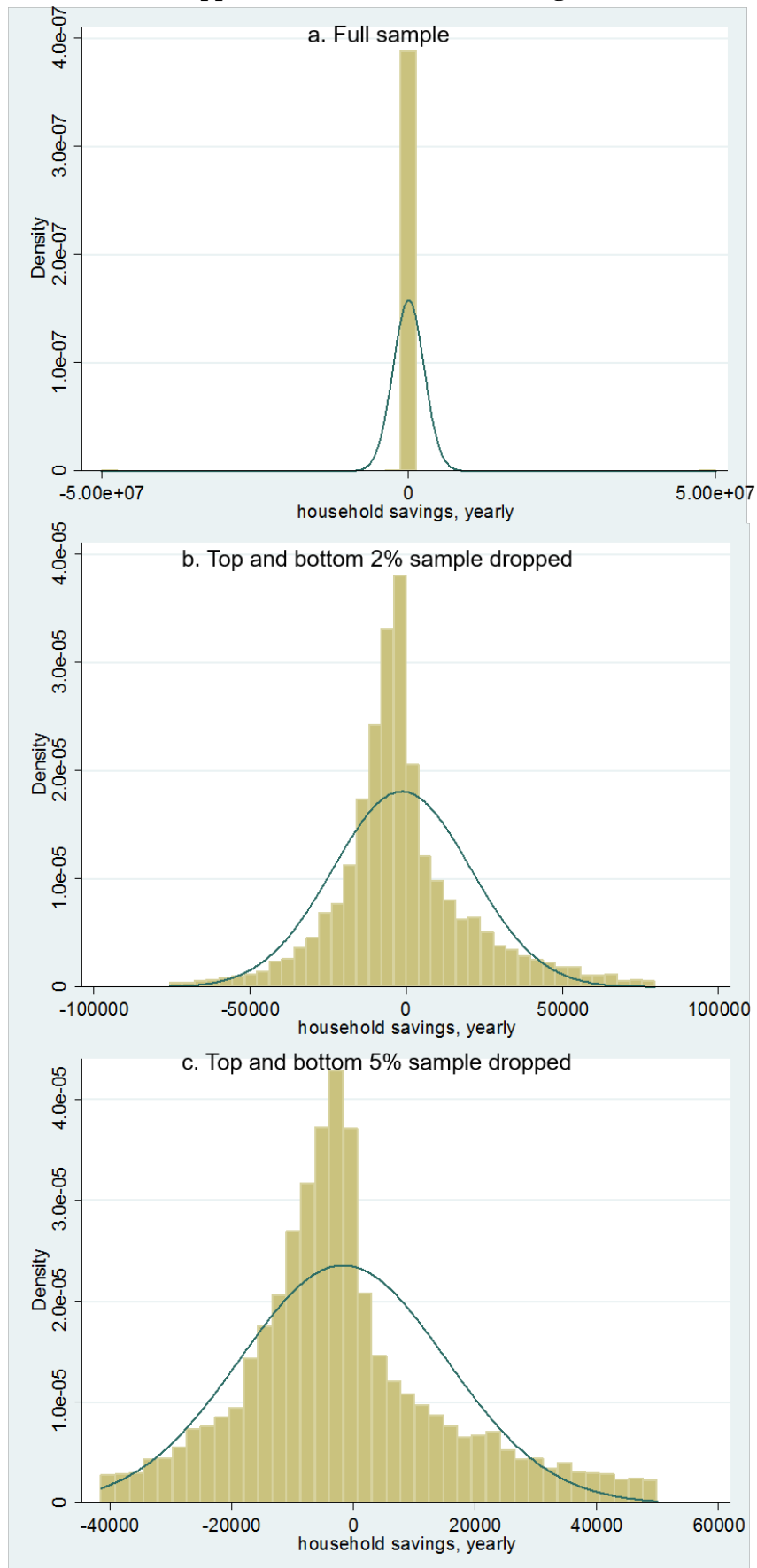
Appendix 3: General patterns of rural residents' subjective well-being

	CES-D	=1 if being at risk of clinical depression	General satisfaction with life
	(1)	(2)	(3)
Male	-1.716***	-0.121***	0.044**
	(0.111)	(0.009)	(0.014)
Age	0.367***	0.020***	-0.010
	(0.065)	(0.005)	(0.009)
Age squared	-0.315***	-0.017***	0.016*
	(0.053)	(0.004)	(0.007)
Secondary	-0.677***	-0.045***	-0.006
	(0.137)	(0.011)	(0.017)
Married	-1.824***	-0.073+	0.174*
	(0.526)	(0.041)	(0.072)
Divorced	0.634	0.020	0.018
	(0.836)	(0.059)	(0.108)
Widowed	-0.871	-0.028	0.139+
	(0.555)	(0.043)	(0.075)
Any disability	1.202***	0.068***	-0.081***
	(0.138)	(0.011)	(0.017)
Any chronic	2.001***	0.138***	-0.113***
	(0.109)	(0.009)	(0.014)
ADL	5.025***	0.185**	-0.459***
	(0.913)	(0.060)	(0.132)
IADL	5.507***	0.361***	-0.277***
	(0.449)	(0.032)	(0.061)
Log of household income	-0.209***	-0.014***	0.030***
	(0.029)	(0.002)	(0.004)
Children	-0.023	-0.003	0.015*
	(0.050)	(0.004)	(0.006)
Sibling	0.031	0.002	-0.003
	(0.028)	(0.002)	(0.004)
Parents	0.012	0.001	-0.004
	(0.063)	(0.005)	(0.008)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Obs.	15,002	15,002	14,168

Note: The unit of observation is an individual. Cluster standard errors are given in the parenthesis with clustering at the household level. The significance level is presented as + 0.10 * 0.05, ** 0.01, *** 0.001.