Effects of New 'Social Pension' Provision on Lives of the Elderly

Wei Huang and Chuanchuan Zhang*

April 7, 2016

Abstract

This paper presents new evidence on the effects of social pension on lives of the elderly. Analysis using historical mortality data from 10 countries shows that mortality of the age-eligible elderly reduced by 1.7-2.2 percent just after the social pension provision. Using the institutional variation of a new social pension provision in rural China, we further find that, among the pension-eligible people, the scheme increased their household income and food expenditure by 17.6 and 9.6 percent, and reduced labor supply and insurance participation by 6.2 and 5.7 percent. In addition, it also significantly improved their health status in terms of less reported disability, underweight and lower mortality rate. (***JEL*** classifications: E21, H55, I38, O22)

Keywords: Pension, Health, Mortality

*Wei Huang: Harvard University and NBER, 1050 Mass Ave Fl 4, Cambridge MA 02138, United States (e-mail: huangw@nber.org); Chuanchuan Zhang: School of Economics, Central University of Finance and Economics, No 39, South College Road, Haidian District, Beijing, 100081, China (e-mail: ccz.zhang@gmail.com). We thank Amitabh Chandra, David Cutler, Richard Freeman, Edward Glaeser, Lawrence Katz, and Adriana Lleras-Muney for their constructive suggestions. We also thank the participants at different seminars and conferences for their helpful comments. All errors are ours.

I. Introduction

As most of the countries are aging fast, governments nowadays are considering to start or reform social pension schemes to better support lives of the elderly but they usually face tight fiscal budget at the same time. A natural question to ask is how much impact of social pension has on the individual behaviors and health status. The answer is important because the effects on income, expenditure, health and mortality are key parameters to evaluate and design *efficient* pension programs and retirement policies.

Although many economists recognized the importance of above question and there is a long literature on this, most of the empirical evidence is correlation rather than causality due to the severe data limitations and little exogenous variation of pension wealth (Bernheim et al., 2002; Attanasio and Rohwedder, 2003). Although there are some exceptions,[1] the answers are still far from satisfactory and even mixed. For example, the universal pension expansion in South Africa is has little institutional variation, and the data are usually *ex post* and have very small sample size;[2] the pensions in industrial countries are usually based on the previous earnings or wages, and thus are correlated with underlying personal tastes or characteristics (Coile and Gruber, 2000; Chan and Stevens, 2004). For another, Snyder and Evans (2006) found that higher pension income leads to higher mortality due to social isolation, while Case (2004) and Jensen and Richter (2004) found that higher pension income makes people healthier and have lower mortality.

This study builds up the growing literature by providing new evidence on the effects of pension scheme on income, labor supply, expenditure, health and mortality. To do so, we first provide cross-country evidence for the effects of social pension on mortality. Matching human mortality database (HMD) to the official starting year of social pension in 10 countries,[3] we find that mortality rate

[1] For example, South Africa expanded the social pension to black elderly in early 1990s, and some researchers thus used this exogenous shock to identify the effects on income, levels of living, expenditures, private transfers, intrahousehold allocation, and health (Case and Deaton, 1998; Case and Wilson, 2000; Case, 2004; Duflo, 2000, 2003; Jensen, 2004; Edmonds, 2006; Ardington et al., 2009). For another, Snyder and Evans (2006) and Jensen and Richter (2004) used the exogenous variation in pension caused by "Notch" cohorts in the United States and the collapse of pension system in Russia, respectively, to identify the effects on mortality.

[2] For example, the sample size of Case (2004) is smaller than 500 and that in Jensen (2004) is smaller than 1,000.

[3] The 10 countries are Belgium, Canada, Denmark, Finland, France, Italy, Norway, Sweden, Switzerland and United States.

of the age-eligible people (i.e., people whose age is above the pension age threshold) significantly reduced 1.7-2.2 percent *just* after the introduction of pension programs, while that among the age-ineligible group (i.e., people whose age is below the pension age threshold) changed little and insignificantly. However, it is difficult to find evidence from micro data since most of the pension schemes started in the late 18th or the early 19th century when few individual surveys were conducted.

The New Rural Pension Scheme (NRPS) in China provides a natural setting to fill in the gap and answer the above question. It covered 320 counties (about 10 percent of the total counties) in 2009, remarkably expanded in the next couple of years, and reached full coverage by the end of 2012. Once the county was covered, all the rural *hukou* people who are aged 16 or above can *voluntarily* participate in the scheme.[4] All the enrollees with ages 60 years or above are eligible to get a fixed amount of money, 55 yuan per month (9 US dollars), regardless of previous earnings or income.[5] But the condition is their offsprings, no matter age-eligible or age-ineligible, need to participate in the program and pay for the premiums.[6] Therefore, the pension scheme can be viewed as a conditional cash transfer program for the rural enrollees with ages 60 or above. By the end of 2014, 65 percent of rural *hukou* people participated in the pension scheme, and 140 million pensioners started to receive pension.

Base on the institutional variation in pension coverage, we use a national representative sample with ages 45 and above from China Health and Retirement Longitudinal Studies (CHARLS) and China Family Panel Studies (CFPS) to identify the effects of pension scheme provision on income, expenditure, transfers, and health. The time period in the sample spans the years from 2011 to 2014, exactly covering the period NRPS expansion.[7] This sample is composed of over 70,000 observations from more than 300 counties in China. Using the regional and temporal vari-

[4]A *hukou* is a record in the system of household registration required by law in mainland China. For the elderly, it is very difficult to change their *hukou* type.

[5]According to the 2005 inter-census population sample survey, 55 yuan is about 30 percent of the median of the individual income in rural areas.

[6]The age-ineligible enrollees need to choose one of the following levels of annual contribution: 100, 200, 300, 400, 500 RMB. They have to pay for the premium yearly until they reach age 60.

[7]CHARLS and CFPS are two on-going surveys and this study used the first two waves of both - CHARLS 2011, 2013 and CFPS 2010, 2012. All these are the latest two waves for both data.

ation in NRPS coverage across different counties, we exploit the Difference-in-Differences (DID) methodology to identify the effects of NRPS.

We first examine the mechanical effects, which suggests that the rural people aged 60 and over are 25 percentage points more likely to receive the pension just after the NRPS was in present. Consistent with the pension policy, we do not find any significant effect of the NRPS on pension receipt among the rural people aged below 60 or the urban people. Thus we divide the sample into four subsamples based on both age- and *hukou*- eligibility for the pension receipt: both age- and hukou- eligible, age-eligible but *hukou*-ineligible, age-ineligible but *hukou*-eligible, neither age nor hukou eligible (for simplicity, we name the first group as pension eligible group and all the rest three pension ineligible groups in the rest of this paper). And we separately examine the effects of NRPS in each subsample. Among the pension-eligible group, we find that 1) the NRPS significantly increased household income and food expenditure by 17.6 and 9.6 percent, respectively; 2) the scheme significantly reduced the labor supply by 3.0 percentage points (6.2 percent of the mean), and most of this came from the decline in farm work while little change in non-farm work; and 3) the scheme did not significantly affect received private transfers or total household expenditures. For the pension ineligible groups, however, we do not find any significant effects on income, labor supply, expenditure or private transfers. The only exception is that the NRPS shifted the younger rural people (i.e. *hukou*-eligible but age-ineligible) from farm work to non-farm work - the scheme reduced the farm work by 5.8 percentage points but increased the non-farm work by 3.3 percentage points.

We follow the same methodology to further investigate the NRPS-induced health consequences. Among the pension-eligible people, we find that 1) the rates of reported disability and underweight reduced by 3.2 percentage points (11.4 percent) and 1.8 percentage points (11.3 percent) after NRPS implementation, respectively; 2) the implementation of NRPS reduced the mortality by 2.2 percentage points (14.4 percent) among the rural people with ages over 65 and above in individual-year panel from Chinese Longitudinal Healthy Longevity Survey (CLHLS);[8] and 3) the

[8]Our calculation suggests that the income-mortality elasticity ranges from 0.18 to 0.60; estimates in Jensen and Richter (2004) suggest the elasticity is 0.21 since the mortality increased by 5 percent when the income reduced by 24

NRPS crowded out the health insurance participation by 4.2 percentage points (5.7 percent),[9] but it did not significantly affect health behaviors like smoking, or medical care usage such as inpatient and outpatient cares. As a comparison, we do not find that the NRPS had any significant effects on all the above outcomes among those pension ineligible groups with the exception that NRPS reduced health insurance participation by 3.5 percentage points (3.9 percent) for the rural people with ages below 60.[10]

The validity of DID estimation cannot be taken for granted since the counties are not chosen randomly.[11] One obvious concern is the heterogeneous trends across different counties since the effects from DID may just reflect the different trends across the counties. The empirical results above may help to alleviate this concern since they show that the NRPS-induced effects on income and health are much smaller and insignificant among the age-ineligible group and *hukou*-ineligible group in the same counties. Yet we provide more direct evidence by showing the pre-trends for different counties. In practice, for the counties with different stating years of NRPS, we separately plot a series of local macro economy indexes over years before 2009, including GDP per capita, salary of workers, government expenditure, government revenue, number of doctors, and number of beds in hospitals. We do not find any significant unparalleled trends across the counties for these indexes. Similarly, we did not find unparalleled pre-trends in mortality using CLHLS data either.

These findings contribute to several ongoing literatures. First, as mentioned above, the findings build up the literature investigating the effects of welfare or pension programs on individual behaviors such as expenditure, labor supply, retirement and insurance participation (Case and Deaton,

percent.

[9]The results here are consistent with those in Bitler et al. (2005). A possible explanation for the crowd-out effect of NRPS on health insurance for all ages is the reduced uncertainty in (future) income because of introduction of social pension. Therefore, the effects of NRPS on health insurance can be viewed as the net effects of the reduced demand and increased income.

[10]The exceptions (i.e., the effects on labor supply and health insurance participation) reflect some effects of cash transfer programs on those *hukou*-eligible people whose age had not reached the pension threshold. One possible explanation can be the NRPS-induced expectation (Atalay and Barrett, 2015; Staubli and Zweimüller, 2013; Gustman and Steinmeier, 2015). Since the program enrollees with ages below 60 would be able to receive pension when they reach the pension age, the higher and more stable (expected) income would change their current behaviors such as labor supply and insurance participation.

[11]To become eligible for NRPS, the counties need to first apply to the provincial government, then to the central government. It is the central government who made the decision to approve the application or not.

1998; Madrian and Shea, 2001; Attanasio and Rohwedder, 2003; Attanasio and Brugiavini, 2003; Bitler et al., 2005; French, 2005; Ardington et al., 2009; Aizer et al., Forthcoming). In addition, the findings also provide new evidence on effects of income on health in the literature (Case and Wilson, 2000; Case, 2004; Frijters et al., 2005; Jensen and Richter, 2004; Snyder and Evans, 2006; Evans and Moore, 2011, 2012; Aizer et al., Forthcoming). Finally, our results on health insurance participation and labor supply for those *hukou* eligible but age-ineligible people are relevant to the literature on the effects of policy-induced expectation and the indirect effects of public policies (Atalay and Barrett, 2015; Staubli and Zweimüller, 2013; Gustman and Steinmeier, 2015).

The paper is organized as follows. Section II provides cross-country evidence for the effects of social pension. We introduce human mortality database, show the RD methodology and relevant results. Section III provides evidence from micro level data in China, including the background of NRPS, data, methodology and empirical results. Section IV concludes.

II. Cross-Country Evidence from Cohort Data Analysis

This section investigates whether the introduction of social pension reduced mortality in human history.

2.1 Data: Human Mortality Database and Birth Year of Social Pension

Mortality data are taken from the Human Mortality Database (HMD). The HMD contains detailed cohort life tables by year of birth and gender. A typical observation in the HMD is the mortality rate, per 100,000, for men (women) in a particular year in a particular country at certain age ranging from 0 to 110. The HMD data provide the mortality tables with different various years across 38 countries or regions.[12] The country specific timing of introduction of social pension is from Cutler and Johnson (2004) and pension-watch website.

We match the HMD data to the countries with available information of first social pension

[12]The country list and available years can be found here: http://www.mortality.org/.

scheme introduction, and restrict to the countries with both mortality information before and after the introduction of social pension. We have 10 countries in total in the end. These countries are Belgium, Canada, Denmark, Finland, France, Italy, Norway, Sweden, Switzerland and United States. Among these countries, the earliest one introducing social pension is Denmark (1891) and the latest is Italy (1969). Table 1 shows the countries and the birth year of social pension in each of them.[13]

[Table 1 about here]

2.2 Methodology and Empirical Results

Because both the level and trends in mortality differ largely when we use a long time panel, we use regression discontinuity (RD) to identify the effects of social pension scheme provision on mortality. We restrict the sample to those aged above age 45 because the elderly people are targeted population for social pension schemes. We also drop those aged above 90 because of possible misreporting issues and large measurement errors. For convenience, we define relative year t as the years difference of current year with the introduction year of social pension scheme. For example, it equals to -1 if the current year is the year before scheme introduction, and equals to 1 if the current year is just one year after that.

To control for the invariant factors such as country, gender, and age may also influence mortality, we keep the sample with 10 years bandwidth (i.e., $\mid t \mid \leqslant 10$), divide the sample into 900 different groups (s) based on country (10), gender (2), and age (45), and detrend the logarithm of mortality rate over the relative year by conducting the following regression within each group s:

$$lnMR_t^s = t^s + Post \times t^s + \varepsilon_t^s \tag{1}$$

In the equation above, t^s is the relative year in the group s, *Post* is a dummy variable which

[13]Table 2 of Cutler and Johnson (2004) provides the detailed year of introduction, case of introduction, type of system, and later changes for the social pension in 20 different countries, and the pension watch website provide the policy-designed eligible ages for the pension schemes across the countries. The pension watch website is http://www.pension-watch.net/about-social-pensions.

equals to one if the calendar year is later than the introduction of the social pension, and $Post \times t^s$ is the interaction between the two. By doing so, we control for the linear trends both before and after the introduction of social pension.[14] We then keep and pool the residuals of all the groups, plot the linearly fit lines and confidential intervals (CI) over the relative year in Figure 1.[15] Figures 1a and 1b present the patterns for age-eligible and age-ineligible people, respectively. Figure 1a shows the social pension scheme introduction significantly reduced the mortality by 1.7 percent. However, we do not find any significant reduction in mortality in age-ineligible group.

[Figures 1a and 1b about here]

We estimate the following equation to further test robustness of the results:

$$lnMR_{gact} = \alpha Post_{ct} + \delta_{gac} + t_{gac} + Post \times t_{gac} + \varepsilon_{cagt} \tag{2}$$

The dependent variable, $lnMR_{cagt}$, is the logarithm of mortality rate of people of age a, gender g in country c in relative year t. $Post_{ct}$ is an indicator variable which equals to one if the country c had social pension in year t, and equals to zero if not. The coefficient, α, captures the effects of introduction of social pension on mortality in the interested sample. To control for the potential unobserved confounding factors, we include the fixed effects of gender, age, country and all the three combinations (δ_{gac}) in the regression. And, for each combination of gender (g), age (a) and country (c), we also control for the linear trends in relative year, t_{gac}, and the linear trend after the scheme introduction, $Post \times t_{gac}$.[16]

Following the graphic analysis, we also divide the sample into age-eligible group and age-ineligible group to conduct the analysis, and report the OLS estimates in Table 2. Panel A and Panel B show the results for age-eligible and age-ineligible groups, respectively. Different columns

[14]This methodology follows that in Card et al. (2008), which applied regression discontinuity design to identify the causal effects of medicare eligibility on the mortality.

[15]We follow Ruhm (2000) and weight the residuals by the squared root of represented population size.

[16]For example, for those men aged 70 in Belgium, we have two linear trends - both before and after the scheme introduction; and we have another two linear trends for the women of the same age in Belgium. That is to say, if we estimate the equation in the whole sample used, we will have 900 dummies (δ_{gac}) and 1800 linear trend terms.

show the RD regression results for different bandwidths - 5, 6 and 7 years.[17] The estimates in panel A consistently show that introduction of social pension significantly reduce the mortality of those age-eligible people by around 2 percent. In contrast, we do not find any significant evidence for the effects among age-ineligible group, and the difference between age-eligible group and age-ineligible group are significant for the three columns.[18]

III. Evidence from New Rural Pension Scheme (NRPS) in China

Using the introduction year of pension scheme in different countries in human being history, the above analysis finds that provision of new pension scheme significantly reduced mortality by 1.7-2.2 percent among the age eligible people. However, the aggregated level data cannot tell more. Due to lack of the detailed official documentation, it is difficult to know how much money was spent and how the pension was distributed. In addition, without reliable micro level data, it is even more difficult to know individual associated behavior response to the scheme establishment. These limitations call for micro evidence on the pension-induced individual behavior responses and the health consequences, and the NRPS in China provides a natural setting to fill in the gap.

3.1. Background

Some rural regions in China are really poor. According to 2005 inter-census population sample survey, the median earning among the rural adults is about 200 yuan (about 30 US dollars) per month. The poverty is even more serious for the elderly; 67.5 percent of the rural people aged over 60 have no labor earnings in 2005, and 91 percent of them were living with and relied on their offsprings. According to a recent survey on the website, the pension reform is the number one issue among the rural people - 35.4 percent of individuals considered the pension reform as the most important problem in rural China.[19] These motivated the Chinese government to initiate the

[17] We choose these bandwidths because the "optimal" bandwidth according to Calonico et al. (2014) is 6 years.

[18] It should be noted that using different smoothed functions such as linear and square time trends yields consistent estimates, though they are not reported here.

[19] Source: http://toutiao.com/i6243882674679726593/.

social pension program in rural regions.

The new social pension program for rural people started in September 2009,[20] and it reached a universal coverage by the end of 2012 after four rounds of expansions - the first round in the end of 2009, the second in middle 2010, and the rest two in middle 2011 and in late 2012. The scheme was implemented at county level, and it is the central government who made the decision to approve the counties to initiate the NRPS each year.[21] According to the official government documents we collect, the government aimed to make sure the approved counties distributed "balanced" across different regions in the first wave, but the program tended to start earlier in the middle and western (where is poorer) regions in the next two waves. We requested the data of timing of NRPS coverage in the counties from State Council Leading Group Office of Poverty Alleviation and Development, which officially replied with a formal documentation in two weeks. Figures 2a-2d show the geographical coverage year by year in mainland China. About 12 percent (about 320) of all the counties were covered in the first wave (2009), and 16 percent (450 counties) were covered in the next year (2010); 38 percent (about 1075 counties) started the program in the third wave (2011) and all the rest 33 percent were covered in the last wave (2012). According to the figures, the NRPS-covered counties are geographically distributed balanced in the first wave. And consistent with the official document, more mid- or west- counties were covered. By the end of 2012, as shown in Figure 2d, all the counties were covered. In this study, we exploit the variation in the timing of NRPS implementation, and conduct Difference-in-Differences (DID) regressions to identify the effects of the new pension scheme provision.

[Figure 2a - 2d about here]

[20]This is a first time of the rural China starting such a large and generous welfare program. It was the "new" rural pension program to distinguish it from the old rural pension program initiated in 1992. The old rural pension program is somewhat like an organized saving account, with premiums accumulated in an individual account and accrued at a low interest rate (Leisering et al., 2002). At the height of the old rural pension program, 75.4 million people invested in the accounts, but the amount of pension it afforded was extremely insignificant. However, the development of the old pension scheme stagnated after 1998, partly because of the widespread mismanagement of the funds and the insignificance of the program (Shi, 2006; Wang, 2006). In 2005, the enrollment rate for the old pension scheme is below 3 percent.

[21]The governments of county level applied to the provincial government, then to the central government. Then the central government select which counties to start the NRPS. There is no official files to document what the candidate counties are and how the central government approve or deny the candidate counties.

After the county was covered, all the rural *hukou* people who are aged 16 or above (not including students) can voluntarily participate in the scheme. All the enrollees with age above 60 years at start of pension scheme are eligible to get 55 yuan (9 US dollars) per month, regardless of previous historical earnings or income.[22] But the pre-requisite is the participation of their offsprings, no matter age-eligible or age-ineligible. The age-ineligible enrollees need to choose one of the following levels of annual contribution: 100, 200, 300, 400, 500 RMB.[23] The distribution method of NRPS pension is determined by local government. Some developed regions such as Jiangsu and Zhejiang, the local governments established the individual bank account for the senior enrollees and automatically transfer the pension to these accounts independently; however, in some less developed regions, the seniors or their offsprings have to go to the designated place in local village to get the pension by themselves. The funding is under strict regulations to avoid corruption or benefit fraud.[24] By the end of 2014, 65 percent of rural *hukou* people participated in the pension scheme, and 140 million pensioners started to receive pension. By the end of 2012, the central and local governments have input more than 262 billion Yuan in NRPS, with more than 232 billion from the central government.

[22] In 2014, the benefits increased to 75 yuan per month.

[23] Starting from pension eligible age, 60 years old, the pension benefits for a beneficiary is the sum of the accumulated total funds in the individual account, plus the basic pension benefits. The way funds in accumulated individual account are paid out, according to the formula, is as follows: when a beneficiary turns 60, he/she starts to receive a monthly benefit (1/139 of the total accumulation) from the individual account. At the same time, he/she receives a basic pension benefit (currently 55 RMB per month). For instance, one person who participates in the program at the age of 45 and chooses to pay a yearly premium of 100 RMB will have a total amount of 1,838 RMB accumulated in the individual account (assuming at one-year deposit rate at the age of 60) and will receive a monthly benefit of 68.22 RMB (1838/139+55). Those who are already 60 years old at the time the program starts automatically receive a basic pension benefit (i.e., 55 RMB per month) without paying any premiums. Therefore, this pension scheme was fully funded defined contribution plan with added attraction of government subsidy toward contributions, coupled with a minimum pension guarantee wholly funded by the government.

[24] To make sure the eligible enrollees to get the pension, the central government required the local governments to provide the personal information of each enrollee and then appropriate the corresponding funding after careful verification; and this information is needed to updated year by year. Because the offsprings of eligible pensioners can go and get the pension in case the seniors are ill or in bed, the evidence for aliveness of the pensioners has to be in presence whenever receiving pension. The evidence could be a recent video or a certification from a local government officer who personally visited the pensioner recently.

3.2. Data

China Family Panel Studies (CFPS) and China Health and Retirement Longitudinal Studies (CHARLS)

The main sample used in this study is from CFPS and CHARLS. CFPS is a biennial survey and is designed to be complementary to the Panel Study of Income Dynamics (PSID) in the United States. The first national wave was conducted in 2010. The five main parts of the questionnaire include communities, households, household members, adults and children data. The China Health and Retirement Longitudinal Study (CHARLS) is also a biennial survey, and aims to collect a high quality nationally representative sample of Chinese residents ages 45 and older, and is designed to be complementary to the Health and Retirement Survey (HRS) in the United States. More details about the two datasets are provided in data appendix. The baseline national wave of CHARLS is being fielded in 2011. This study used the 2010 and 2012 waves of CFPS, and the 2011 and 2013 waves of CHARLS.

Because of the consistency in variables and sampling, we pooled the CFPS and CHARLS data together to make a larger sample and to best exploit the regional and temporal variation in the NRPS expansion during 2009-2012. Note that both of CFPS and CHARLS both are nationally representative, and each covers about 5 percent of the total counties in mainland China.[25] The main sample we use for this study have over 70 thousand observation (i.e., about 34 thousand from CFPS and 36 thousand from CHARLS) and 312 counties (162 counties from CFPS and 150 from CHARLS).[26]

Chinese Longitudinal Healthy Longevity Survey (CLHLS)

The CLHLS is a longitudinal survey with aims for a better understanding of the determinants of healthy longevity of human beings in China. The baseline survey of CLHLS was conducted in

[25] In our analysis, we include the data source dummy and interact it with the counties all the time. Because the number of counties covered by both CHARLS and CFPS is small (i.e., only 5 counties), we name "county dummies" short for the county dummies interacting with data source.

[26] The number of observations and counties are consistent with the population distribution in mainland China.

1998, with follow-up surveys with replacements for deceased elders were conducted every three years in a randomly selected half of the total number of counties and cities in the 22 out of 31 provinces in mainland China. However, the earlier waves only surveyed people aged over 80 and had a smaller sample size, and thus we choose the sample started in 2005. Since the survey 2005, CLHLS followed the respondents in 2008, 2011 and 2014. Besides the information on basic demographic and socioeconomic status, the data also provide the survival status for all the seniors in each wave, as well as the date for the deaths.

3.3. Methodology and Empirical Results

3.3.1 Who Received Pension from NRPS?

The first question we want to answer is who received money from the new social pension scheme. The answer is important to understand and interpret the results for the possible effects of NRPS provision. Above all, we would expect some effects of NRPS if only the rural enrollees received money from the program. We can also test the mechanical effects of NRPS provision and provide evidence for the policy effectiveness by doing so. We thus follow the strategy in Hoynes et al. (2012) and estimate the following equation:

$$Receipt_i^s = \alpha_0^s + \alpha_1^s NRPS_{ct}^s + \delta_c^s + \delta_t^s + X_{ict}^s + \varepsilon_{ict}^s \tag{3}$$

The superscript s indicate a specific subsample, which can be a group of people with certain characteristics. The dependent variable $Receipt_i^s$ is an indicator for the household of individual i received any pension, which is consistently measured in both CFPS and CHARLS. $NRPS_{ct}$ is another indicator whether county c had the NRPS in year t. The covariates also include county dummies (δ_c), year dummies (δ_t), and other demographic controls (X_{ict}) such as gender, age and its square and education level. The coefficient on $NRPS_{ct}$, α_1^s, captures the short-term effects of new pension scheme provision on social pension receipt in subsample s. All the standard errors are clustered at county level (Bertrand et al., 2004).

We first divide the sample by their *hukou* status and age in years to verify whether people aged over 60 of rural *hukou* are the only eligible group of pension receipts. The results are shown in Figure 3a. Each point and the corresponding intervals in the figure shows the coefficient, α_1^s and 90 percent CIs, derived by a separate regression in subsample s. The effects among urban people are always insignificant. Among the rural people, consistent with the policy design, the effects are positively significant for those aged over 60 but insignificant among those aged below 60. The pattern for rural people shows a significant jump at the threshold - age 60. We emphasize here the estimation identified *short-term* effects, which reflects how much the outcome variables change *just* after the NRPS coverage.[27]

[Figure 3 about here]

Then we restrict the sample to those aged 60 with rural *hukou* to conduct further analysis. Panel A of Figure 3b presents the point estimate and 90 percent CIs for men and women, respectively. The effects are significant for both men and women, with insignificant difference in between. Panel B divides the sample by education level, and we find that the effects among the three groups are similar (i.e., all the coefficients are between 0.2 and 0.3). Panel C divides the sample by the county income level in 2005, and we find that the effect of NRPS on receipts in poorer regions are much larger than that in richer regions. This is consistent with expectation that people in the regions with more poverty have higher incentive to enroll.

3.3.2 Effects of NRPS on Income, Labor Supply and Expenditure

We also use the same framework to investigate behavior responses to the NRPS:

$$Y_{ict} = \beta_0 + \beta_1 NRPS_{ct} + \delta_c + \delta_t + X_{ict} + \varepsilon_{ict} \tag{4}$$

[27]There are some reasons why the older people may not fully participate in the program just after its implementation. First, they might not trust the policy in the early stage, especially peasants who have experienced the introduction and collapse of the old rural pension scheme; Second, some local governments need time to prepare documents and setup individual account; Third, information transition took some time because some potential enrollees may even not know the NRPS after the NRPS implementation and surveys.

The dependent variable Y_{ict} is the candidate outcomes to examine, which can be household income, health status and other interested outcomes. All the other variables are the same with those in equation 3. Same as above analysis, all the standard errors are clustered at county level. The estimation is based on the differences between before-after changes in outcomes of treated group and that in the same time period in control group. Since no evidence shows that the counties starting NRPS in different years were randomly selected, the DID estimator, β_1, is subject to a number of limitations. Most importantly, the estimation presumes that the trend of outcome variable Y_{ict} in treated group would be parallel to that in control group had the NRPS been not conducted. Therefore, we need to examine whether the counties covered in different waves have parallel trends in the outcome variables before NRPS coverage (i.e., pre-trend tests), and Section 3.4 provides details about this.

According to the policy design and based on the findings above, we have a couple of potential comparison groups to test the robustness and validity of our results, and alleviate the concern about the non-parallel trends as well.[28] The first is composed by the urban *hukou* people in the same counties, we would expect no effects among them due to *hukou*-ineligibility. The other comparison group is the people with rural hukou but ages below 60. However, we should bear in mind that the two comparison groups are not perfect. Urban people may not be comparable to the rural ones, and the differences between urban and rural people differ across region over time. For the other, those aged 60 in the same village may form different expectation because of introduction on NRPS since enrollees are eligible to receive pension once they reach age 60, and the enrollees also need to pay premium of NRPS because of enrollment.[29]

With the above considerations, we divide the whole sample by both age and *hukou* eligibility - rural people aged 60 and above, rural people aged below 60, urban people aged 60 and above, and urban people aged below 60. The first is the only group people who are eligible to both enroll in the pension scheme and receive 55 yuan per month once enrollment in the NRPS. The second

[28] If the effects in treated group were mainly driven by the non-parallel pre-trends, we should expect the effects would also appear in these comparison groups.

[29] Previous literature such as Angelucci and De Giorgi (2009) found that cash transfer program also indirectly affects the consumption of the ineligible households in the same villages.

group people are eligible to participate but not to receive pension. The third and the fourth group are not eligible to participate in NRPS.

Table 3 shows the results on the effects of NRPS on pension receiving and household income. Panel A and Panel B present the results for those aged 60 or above and those aged below 60, respectively. First two columns examine the effects for those with rural *hukou*. Consistent with Figure 3, the estimates suggest that NRPS coverage ($NRPS_{ct}$) significantly increased the probability of household pension receiving by 24.5 percentage points among rural people with ages 60 and above. The NRPS coverage also significantly increased the household income by 17.6 percent. In contrast, we do not find any significant evidence for the effects among rural but age-ineligible people in Panel B, whereas the coefficients are much smaller. The last two columns examine the effects for urban people. Consistently, the estimates do not present any significant effects of NRPS on pension receiving and household income in this group, no matter those aged above or below 60.

[Table 3 about here]

The NRPS-induced household income changes may not originate from the mechanical effects (i.e., pension receiving). Table 4 further examines the labor supply response to the NRPS coverage. Among rural people, the labor supply of those aged 60 and over reduced by about 3.0 percentage points (6.4 percent) significantly, and that of those aged below 60 also reduced by 2.6 percentage points (3.6 percent), though it is not statistically significant.

[Table 4 about here]

The next two columns further investigate the effects by decomposing the type of work into farm work and non-farm work. NRPS significantly reduced the proportion of farm work by 3.6 and 5.4 percentage points, for the age-eligible and age-ineligible people, respectively. For the age-ineligible people, however, the implementation of NRPS increased the proportion of non-farm work by 3.3 percentage points. One explanation for the "shift" is that farm work is generally more labor intensive and unfavorable, and thus people tend to "escape" from farm work in presence of

stable income flow in the future. Our results are consistent with Angelucci and De Giorgi (2009), and also suggest that we need to be careful to interpret the results from econometric framework combining the age-ineligible people as control group. Consistent with expectation, the last column shows there is no significant effect among urban people.

The first two columns in Table 5 examine the effects of NRPS on received private transfer of the household. The estimates show no significant effects, suggesting that the provision of NRPS scheme might not have crowded out the private transfer to the elderly.[30] The last two columns examines the effects on total expenditure and the expenditure on food. The results suggest that NPRS significantly increased food expenditure by 9.6 percent, respectively. The effect on total expenditure is positive but small and statistically insignificant. The magnitude is consistent with the NRPS-induced increase in food expenditure.

[Table 5 about here]

The effects on living arrangement and migration are important because the above results would be misleading had NRPS induced changes in living arrangement (e.g., the size of household increased and thus the total income increased).[31] Table A1 in Appendix examines the effect of NRPS on household size and cross-county migration for those rural people. First, only 3 percent of people have different registered *hukou* county and current living county. Consistent with the expectation in Case and Deaton (1998), the estimates does not show any evidence for the short-term effects of NRPS on household size or migration.

[30] Jensen (2004) used the pension expansion in South Africa and found that each rand of public pension income to the elderly leads to a 0.25–0.30 rand reduction in private transfers. One possible reasons is that the pension expansion in South Africa increased the individual income by almost 200 percent, which is much larger than NRPS.

[31] The seminal work in this literature, Case and Deaton (1998), expected that the short-term effect of pension on living arrangement and migration decision should be small. However, Case and Deaton (1998) did not provide empirical evidence on this important presumption on this because of data limitation.

3.3.3 Effects of NRPS on Health and Healthcare Usage

Then we move forward estimate the effects of NRPS on health outcomes. We use self-reported fair/poor health, reported disability,[32] and underweight as triple-dimension measures for health status. In addition, we exploit the methodology in Poterba et al. (2013), use a principal component analysis (PCA) on the three dimensions, and get a unhealthiness score for a health measure for the full sample. This measure has zero mean and varies from -1.37 to 3.35, with standard deviation 1.1. As pointed out in Poterba et al. (2013), the comprehensive measure is shown to be strongly associated with current health status and future mortality.

Table 6 shows the results. First column presents the results for unhealthiness score for rural people. First four columns show the results for rural people. Results in Panel A show that the mean value of the unhealthiness score is 0.33 for the age-eligible and -0.14 for the age-ineligible ones. Estimates in Panel A show that NRPS coverage significantly reduces unhealthiness score by 0.12 among age-eligible people, indicating that 0.1 standard deviation improvement in healthiness. In contrast, the estimate for age-ineligible group is insignificant and much smaller magnitude, which is about one-third of that in Panel A.

[Table 6 about here]

The next three columns present the results for different health measures. We find significant effects of NRPS on health improvement for all measures except for self-reported health. Specifically, NRPS reduced the disability rate by 3.2 percentage points and underweight rate by 1.7 percentage points. In age-eligible group, although the estimates are negative suggesting the health is somehow improved, all the coefficients are about half or one-third of those in Panel A and insignificant. The F-tests suggest that the differences between the effects in age-eligible and those in age-ineligible group are significant at 10 percent level.

The final column shows the results for urban people. As expected, these people are healthier

[32]The disability variable is constructed based on a set of activities, including walking, cooking, dining, traveling, shopping, and doing housework. The respondents are asked whether have difficulty in doing these activities in both CHARS and CFPS, we define them disabled if they have difficulty in doing any of these activities..

than their counterpart group with rural *hukou*. Investigation in the effects of NRPS in this groups also yield little and insignificant coefficients. In addition, the F-statistic and P-value suggest a significant difference between the effects of NRPS on health for rural and urban people.

Table 7 examines the effects of NRPS on individual behaviors such as health insurance participation, healthcare usage and smoking. Estimates in column 1 show that NRPS discourages people to participation health insurance, for both age-eligible and age-ineligible people.[33] The provision of social pension scheme significantly reduced the health insurance participation rate by 5.2 percentage rate for the age-eligible group, but it also reduced the participation rate by 3.5 percentage points for the age-ineligible group, suggesting a crowd-out effects of NRPS on NCMS.[34] Although increased income would also enable rural people to purchase the insurance (i.e., increased income), the NRPS program also reduced insurance demand (i.e., reduced risk). People, no matter age-eligible or not, will face smaller income variation when the social pension program is in presence because of ensured pension at certain ages. This is especially true when most of the labor income is based on labor-intensive work such as farming in rural areas. The identified effects in column 1 can be interpreted as the net effects from both reduced demand and increased income. The reduced risk in future income also applies to those aged below 60 because expectations can be formed.

[Table 7 about here]

The next few columns in Table 7 examine the effects on other behaviors. All the estimates suggest that there are little effects of healthcare usage measured by inpatient and outpatient care. The estimates for both outcomes are insignificant and of small magnitude. The last column examines the smoking behaviors because previous literature suggests that higher income does not induce better health because of increased smoking (Chaloupka and Warner, 2000; Ruhm, 2000). However,

[33]The health insurance program for rural people is mainly New Rural Cooperation Medical Insurance Scheme (NCMS) began in 2003 and reached a universal coverage in 2008, which is a heavily subsidized voluntary health insurance program targeting rural residents(Wang, 2006). The participation of NCMS is also voluntary and the enrollees need to pay for a yearly premium.

[34]The results are consistent with the findings in Bitler et al. (2005), who found the welfare program deterred people to participation in health insurance in the US.

the estimates for smoking in last column only yields significant effects of NRPS. Therefore, we conclude that NRPS improved individual health and crowded out health insurance participation, and there is no evidence for the effects of NRPS on other behaviors such as healthcare usage and smoking.

Note that we pool the two datasets and conduct the above regressions. Table A2 provides the regression results weighted by the represented population size of each datasets, which are fairly consistent with what have been represented.

3.3.4 Effects of NRPS on Mortality

We transfer the data to an individual balanced panel from 2006 to 2014, then use a dummy variable to depict the individual mortality status in the period. If the person is alive in 2014, then this variable is consistently equal to zero for the 9 years; and if the person died in year t, the value of this variable is set to zero for the years prior to year t, and is equal to one for year t and missing for the years afterwards. By doing so, we use best the time of the death and its variation. We then use this individual panel data to match the NRPS availability and conduct the following regression:

$$Die_{it} = \gamma_0 + \gamma_1 NRPS_{ct} + \delta_c + \delta_t + X_{ict} + \delta_{ia} + \varepsilon_{ict} \tag{5}$$

The new independent variable is an indicator whether individual i died in year t. It equals to one if yes. All the other variables are the same with those in equation 4 except that we include a indicator δ_{ia} here to capture whether individual i is lost to follow during the years (i.e., attrition). All the standard errors are also clustered at county level. However, CLHLS does not provide information for *hukou* type. As a result, we use their residency type and the eligibility for retirement scheme instead.[35] In practice, we choose the people living in rural regions and having no retirement scheme as the treated group, and those living in urban regions and having retirement scheme as a comparison group. Column 1 of Table 8 presents the results. Panel A shows that NRPS re-

[35]Only using residency type is incorrect because people living in urban region may have migrated from rural regions and have rural *hukou*. We additionally use whether the individual i is eligible for retirement scheme because of the fact that those who enjoyed retirement scheme generally have urban *hukou* and are not eligible for NRPS.

duced the mortality by 2.2 percentage points (14.4 percent of the mean value) among the treated group and had no significant effects in the comparison group.[36] Therefore, the estimates provide significant evidence for the effects of social pension on mortality.

[Table 8 about here]

The findings in previous literature are mixed: Jensen (2004) found 5 percent increase in mortality after a pension system collapse in Russia in 1998 because of worse nutrition intake,[37] but Snyder and Evans (2006) found a significant drop in mortality when the elderly received less pension. Therefore, our findings build up the literature and provide consistent evidence for Jensen (2004). A natural question is whether the magnitude here is consistent with that in Jensen (2004). Since the oldest-old people in rural areas are the poorest group in China, the basic pension matters significantly to them, the back-of-envelop calculation of mortality-income elasticity in our study ranges from 0.18 to 0.60, which has the same scale as 0.21 in Jensen (2004).[38]

The next two columns divide the causes of death by whether the death is caused by a severe disease, and the results show that the NRPS induced mortality reduction is mainly contributed by less likelihood of deaths without severe disease. Since the deaths caused by severe disease usually took a relatively longer time than deaths of other causes, this is reasonable that the short-term effects of NRPS are mainly in present for the deaths without severe disease.

Although the individuals who were lost are only 8 percent of the full sample, it is not trivial when compared to the mortality. Because we have no information about whether the lost ones were dead or not, we drop the individuals who are lost in these years and conduct the same regressions as equation (5). Table A3 shows the results and they are fairly consistent with those in Table 8.

[36] Although the F-test cannot reject the null hypothesis for the coefficient difference due to large standard errors in the comparison group, the magnitude in the treated group is over three times larger than that in the comparison group.

[37] Jensen (2004) found that the income reduced by 24 percent and the two-year mortality increased by 5 percent, thus mortality-income elasticity = 0.21.

[38] Note that this sample is different from the CHARLS and CFPS sample since it overweights the people aged over 80 and those with lower income. In this sample, the median household income is 3,000 yuan per year in 2005, and the average household size in the CLHLS sample is 2.9. However, there is no information in CLHLS about the participation of new pension scheme. We thus conducted a back-of-envelope calculation suggesting the mortality-income elasticity ranges from 0.18 to 0.6 (i.e., the elasticity 0.18 is derived under assumption all the seniors participated, the elasticity 0.6 is derived suppose the NRPS participation rate just coverage is 0.3).

3.4 Pre-trends Tests

Our previous analysis uses the DID to identify the effects of NRPS on income, health and mortality and the estimates provide some evidence for them. However, the validity of the DID methodology cannot be taken for granted. For example, if the wave 1 counties have a more rapid improvement in health or development in economy prior to 2009, the effects identified by DID may just pick up the heterogenous trends rather than the actual effects of NRPS. The heterogenous trends may be caused by county-year level unobserved factors. We provide some evidence above to alleviate this concern that the NRPS-induced effects on income and health are much smaller and insignificant among the rural people aged below 60 and the urban people aged above 60 in the same village or county. Still, we plot the trends before the treatment (i.e., pre-trends) to test whether the presumption is true.

However, our analysis on effects of NRPS is based on the micro data in 2010 and afterwards, and thus it is impossible to plot and compare the pre-trends for both treated and control groups using data from CHARLS and CFPS. To shed some light on this, we collect prefecture-year panel data during 2003-2009 about the local economy, which including the local GDP, local salary level, government revenue, government expenditure, and sanitary conditions such as number of registered doctors and number of beds in local hospital.[39]

Then we match the data to the counties and plot the macro economy indexes over the calendar years, by which wave the county started the NRPS. Panel A shows the pattern for logarithm of GDP per capita. Consistent with our hypothesis that the NRPS started in poorer regions first, given the GDP level of first three waves counties is lower than that of the last wave counties. However, the trends are very parallel. We also conduct a regression with interactions between the year and county groups dummies, and the F-test cannot reject the null hypothesis for the interactions (F-statistic = 0.19, P-value = 0.99). The similar patterns are also found for the other outcomes, including salary, government revenue and expenditure, and quantity of doctors and beds in hospitals. These patterns suggest that the counties starting the NRPS in different years actually have no significant

[39]Prefecture is one level higher than county according to administrative system in China. The data collect the balanced panel in 2003-2009 from local economy from 279 prefectures (97 percent of all counties) in mainland China.

differences in trends of local economy statistics.

The mortality record data since 2005 provides four years before the starting year of NRPS program. We thus also plot the mortality rates over each year since 2006 in Figure 5, by the counties with different starting years. Prior to 2009, there is no obvious different trends across the different groups. We also conduct a regression for the sample prior to 2009, and the joint F-test cannot reject the null hypothesis (F-statistic = 1.48, P-value = 0.15). After 2009, the mortality usually drops most when the county was just covered by NRPS. For example, the mortality of first wave counties dropped by 1.8 percentage points from 13.8 to 12.0 percent between 2009 to 2010, while the mortality of all the other counties actually increased during the same period. We emphasize that it is not just by accident because the second wave and fourth wave counties followed the similar pattern.[40]

[Figure 5 about here]

VII. Conclusions and Discussion

This paper examines the effects of social pension provision on the lives of mortality in terms of income, expenditure, private transfers, labor supply, health and mortality. To quantify the effects of pension program is important since they are key parameters to evaluate and design *efficient* pension programs and retirement policies.

We first conduct a cross-country analysis to investigate the effects of introduction of social pension in 10 countries on mortality. The RD results suggest that the mortality of age-eligible seniors dropped by around 2.0 percent just after the introduction of social pension, while that of those with ages below the pension age changed little and insignificant. These results from aggregated data suggest that social pension potentially has remarkable effects on the lives of the elderly and call for evidence from individual level data.

[40]For wave 2 counties, the mortality dropped by 4.36 percentage points from 2010 to 2011 and those for three other counties dropped 1.35, 4.12 and 1.82 percentage points; for wave 4 counties, the mortality dropped by 2.1 percentage points from 2012 to 2013.

Using the recent pension program in rural China - New Rural Pension Scheme, we present evidence for the NRPS-induced mechanical effects, individual behavior responses, and health consequences. For mechanical effects, we only find rural people with ages 60 and over were more likely to receive pension just after the NRPS. Among the pension-eligible group, the NRPS increased the proportion of household pension receipts by 24.5 percentage points. Meanwhile, it increased the household income by 17.6 percent, food expenditure by 9.6 percent, and reduced labor supply by 3.0 percentage points (6.2 percent) and health insurance participation by 5.0 percentage points. Furthermore, the rates of reported disability and underweight reduced by 3.2 percentage points (11.4 percent) and 1.8 percentage points (11.3 percent) after NRPS implementation, respectively. Finally, analysis of an individual-year panel composed of those aged 65 in CLHLS and above shows that the implementation of NRPS reduced the mortality by 2.2 percentage points (14.4 percent). In contrast, among the ineligible groups, we do not find any significant effects on pension receipt, income, labor supply, health and mortality. But the only exceptions are that, among the *hukou*-eligible people with ages below 60, the NRPS shifted their labor supply from farm work to non-farm work, and also reduced the health insurance participation. One possible explanation could be the higher and more stable expected income because of the NRPS.

Using the This paper systematically examined the effects of a new pension program provision on a series of outcomes and shed some light on the several on-going literatures. It also has some pitfalls, too. The first one is about the potential heterogenous pre-trends or non-randomness of the NRPS counties selection. Although the results for ineligible groups provides some suggestive evidence to alleviate this concern, the identified effects may still be biased due to the heterogenous trends across different counties. Because of data limitation, we provide further supportive evidence on this by showing the parallel trends in a series of macro economy indexes for counties with different starting years of the NRPS. The second is about the measurement errors of reported income and expenditure. As mentioned in previous literature (e.g., Moore and Welniak 2000; Bound et al. 2001; Meyer and Sullivan 2003 etc.), the reported income and expenditure suffer serious measure errors and the coefficients should be interpreted carefully. The third one is that

CLHLS data may not be nationally representative, and thus we should be careful when interpret or generalize the results to the full population or cases under other settings.

References

Aizer, Anna, Shari Eli, Joseph Ferrie, and Adriana Lleras-Muney, "The Long Run Impact of Cash Transfers to Poor Families," *American Economic Review*, Forthcoming.

Angelucci, Manuela and Giacomo De Giorgi, "Indirect Effects of an Aid Program: How Do Cash Transfers Affect Ineligibles' Consumption?," *American Economic Review*, 2009, *99* (1), 486–508.

Ardington, Cally, Anne Case, and Victoria Hosegood, "Labor Supply Responses to Large Social Transfers: Longitudinal Evidence from South Africa," *American Economic Journal: Applied Economics*, 2009, *1* (1), 22–48.

Atalay, Kadir and Garry F Barrett, "The impact of age pension eligibility age on retirement and program dependence: Evidence from an australian experiment," *Review of Economics and Statistics*, 2015, *97* (1), 71–87.

Attanasio, Orazio P and Agar Brugiavini, "Social security and households' saving," *The Quarterly Journal of economics*, 2003, pp. 1075–1119.

_ and Susann Rohwedder, "Pension wealth and household saving: Evidence from pension reforms in the United Kingdom," *American Economic Review*, 2003, pp. 1499–1521.

Bernheim, B Douglas et al., "Taxation and saving," *Handbook of Public Economics*, 2002, *3*, 1173–1249.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, "How Much Should We Trust Differences-in-Differences Estimates?," *Quarterly Journal of Economics*, 2004, *119* (1).

Bitler, Marianne P, Jonah B Gelbach, and Hilary W Hoynes, "Welfare reform and health," *Journal of Human resources*, 2005, *40* (2), 309–334.

Bound, John, Charles Brown, and Nancy Mathiowetz, "Measurement error in survey data," *Handbook of econometrics*, 2001, *5*, 3705–3843.

Calonico, Sebastian, Matias D Cattaneo, and Rocio Titiunik, "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs," *Econometrica*, 2014, *82* (6), 2295–2326.

Card, David, Carlos Dobkin, and Nicole Maestas, "The Impact of Nearly Universal Insurance Coverage on Health Care Utilization: Evidence from Medicare," *American Economic Review*, 2008, *98* (5), 2242–58.

Case, Anne, *Does Money Protect Health Status? Evidence from South African Pensions*, University of Chicago Press, June

_ **and Angus Deaton**, "Large Cash Transfers to the Elderly in South Africa," *Economic Journal*, 1998, pp. 1330–1361.

_ **and Francis Wilson**, "Health and well-being in South Africa: evidence from the Langeberg Survey," *Research Program in Development Studies, Princeton, NJ (December). Processed*, 2000.

Chaloupka, Frank J and Kenneth E Warner, "The economics of smoking," *Handbook of health economics*, 2000, *1*, 1539–1627.

Chan, Sewin and Ann Huff Stevens, "Do changes in pension incentives affect retirement? A longitudinal study of subjective retirement expectations," *Journal of Public Economics*, 2004, *88* (7), 1307–1333.

Coile, Courtney and Jonathan Gruber, "Social security and retirement," Technical Report, National Bureau of Economic Research 2000.

Cutler, David M and Richard Johnson, "The birth and growth of the social insurance state: explaining old age and medical insurance across countries," *Public Choice*, 2004, *120* (1-2), 87–121.

Duflo, Esther, "Child health and household resources in South Africa: Evidence from the Old Age Pension program," *American Economic Review*, 2000, pp. 393–398.

_ , "Grandmothers and Granddaughters: Old-Age Pensions and Intrahousehold Allocation in South Africa," *The World Bank Economic Review*, 2003, *17* (1), 1–25.

Edmonds, Eric V, "Child labor and schooling responses to anticipated income in South Africa," *Journal of Development Economics*, 2006, *81* (2), 386–414.

Evans, William N and Timothy J Moore, "The short-term mortality consequences of income receipt," *Journal of Public Economics*, 2011, *95* (11), 1410–1424.

_ **and** _ , "Liquidity, economic activity, and mortality," *Review of Economics and Statistics*, 2012, *94* (2), 400–418.

French, Eric, "The effects of health, wealth, and wages on labour supply and retirement behaviour," *The Review of Economic Studies*, 2005, *72* (2), 395–427.

Frijters, Paul, John P Haisken-DeNew, and Michael A Shields, "The causal effect of income on health: Evidence from German reunification," *Journal of Health Economics*, 2005, *5* (24), 997–1017.

Gustman, Alan L and Thomas L Steinmeier, "Effects of social security policies on benefit claiming, retirement and saving," *Journal of Public Economics*, 2015, *129*, 51–62.

Hoynes, Hilary, Douglas L Miller, and Jessamyn Schaller, "Who Suffers During Recessions?," *The Journal of Economic Perspectives*, 2012, *26* (3), 27–47.

Jensen, Robert T, "Do private transfers displace the benefits of public transfers? Evidence from South Africa," *Journal of Public Economics*, 2004, *88* (1), 89–112.

_ **and Kaspar Richter**, "The health implications of social security failure: evidence from the Russian pension crisis," *Journal of Public Economics*, 2004, *88* (1), 209–236.

Leisering, Lutz, Sen Gong, and Athar Hussain, *People's Republic of China: Old-age Pensions for the Rural Areas: from Land Reform to Globalization*, Asian Development Bank, 2002.

Madrian, Brigitte C and Dennis F Shea, "The Power of Suggestion: Inertia in 401 (k) Participation and Savings Behavior*," *The Quarterly journal of economics*, 2001, *116* (4), 1149–1187.

Meyer, Bruce D and James X Sullivan, "Measuring the Well-Being of the Poor Using Income and Consumption.," *Journal of Human Resources*, 2003, *38* (4).

Moore, Jeffrey C and Edward J Welniak, "Income measurement error in surveys: A review," *Journal of Official Statistics*, 2000, *16* (4), 331.

Poterba, James, Steven Venti, and David A. Wise, "Health, Education, and the Postretirement Evolution of Household Assets," *Journal of Human Capital*, 2013, *7* (4), 297 – 339.

Ruhm, Christopher J, "Are Recessions Good for Your Health?," *The Quarterly Journal of Economics*, 2000, *115* (2), 617–650.

Shi, Shih-Jiunn, "Left to market and family–again? Ideas and the development of the rural pension policy in China," *Social Policy & Administration*, 2006, *40* (7), 791–806.

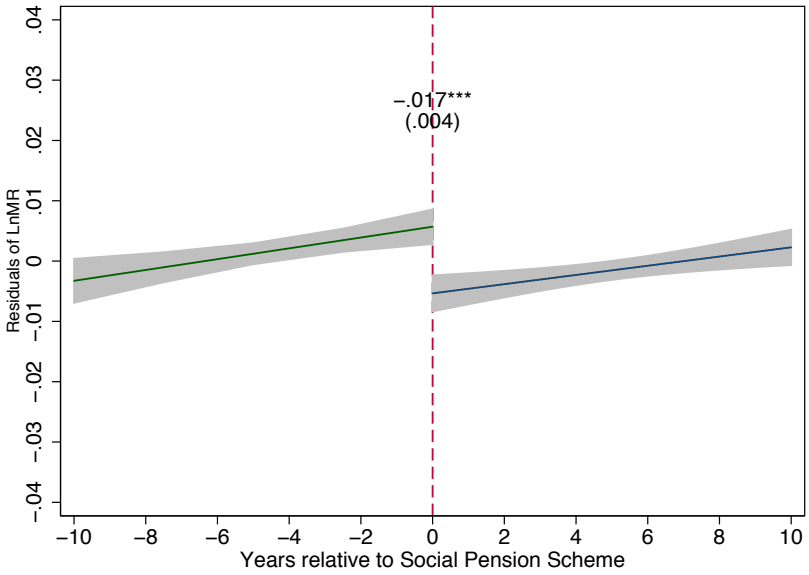
Snyder, Stephen E and William N Evans, "The effect of income on mortality: evidence from the social security notch," *The Review of Economics and Statistics*, 2006, *88* (3), 482–495.

Staubli, Stefan and Josef Zweimüller, "Does raising the early retirement age increase employment of older workers?," *Journal of public economics*, 2013, *108*, 17–32.

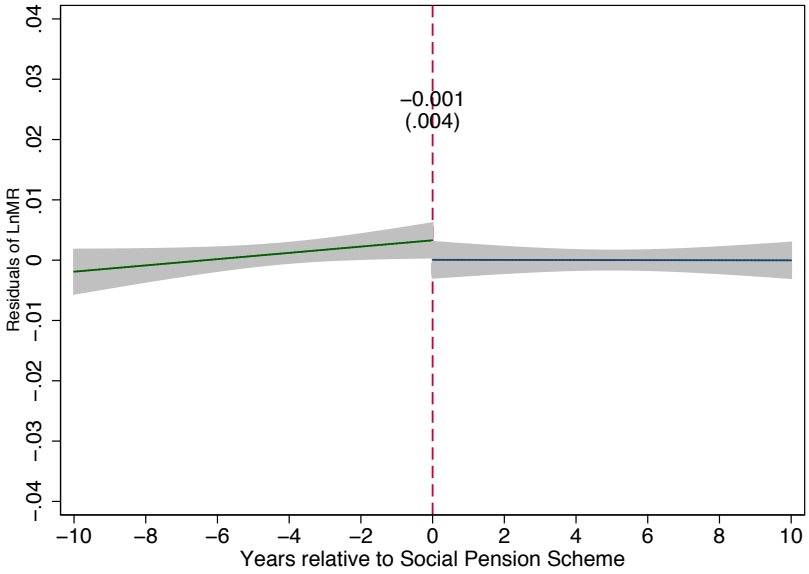
Wang, Dewen, "China's Urban and Rural Old Age Security System: Challenges and Options," *China & World Economy*, 2006, *14* (1), 102–116.

Figure 1: Regression Discontinuity Estimation for the Effects of Social Pension Introduction on Mortality

(a) Age-eligible group



(b) Age-ineligible group

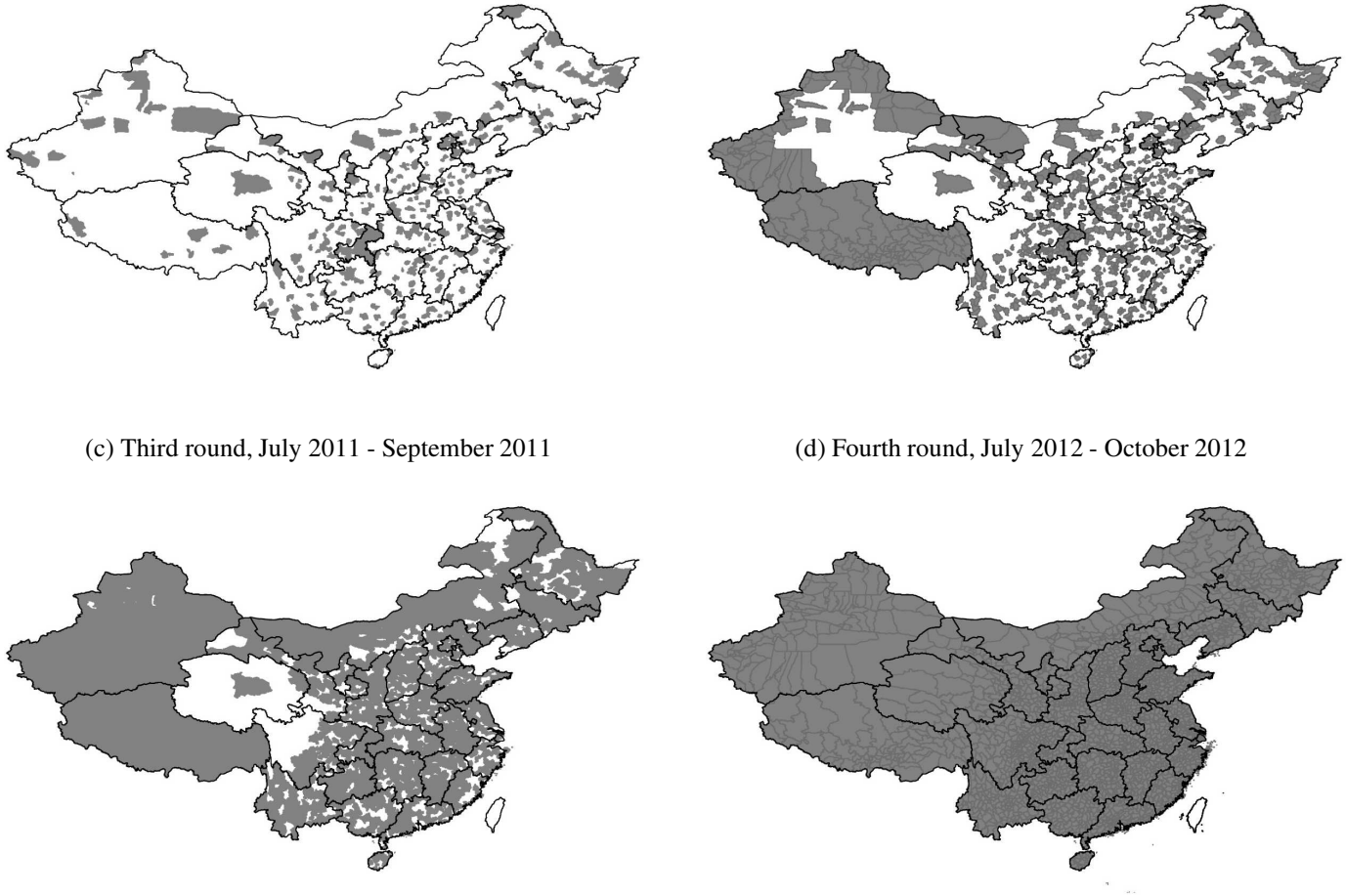


Notes: The mortality data are from human mortality database (HMD) and the data about timing of pension are from Cutler and Johnson (2004) and Pension-Watch website (http://www.pension-watch.net/about-social-pensions). For each country-gender-age cell, we conduct the regression as shown in equation 1, then keep and pool the residuals of all the groups, and plot the linearly fit lines and confidential intervals (CI) over the relative year.

Figure 2: New Rural Pension Scheme (NRPS) Coverage over Time

(a) First round, November 2009

(b) Second round, July 2010 - October 2010)



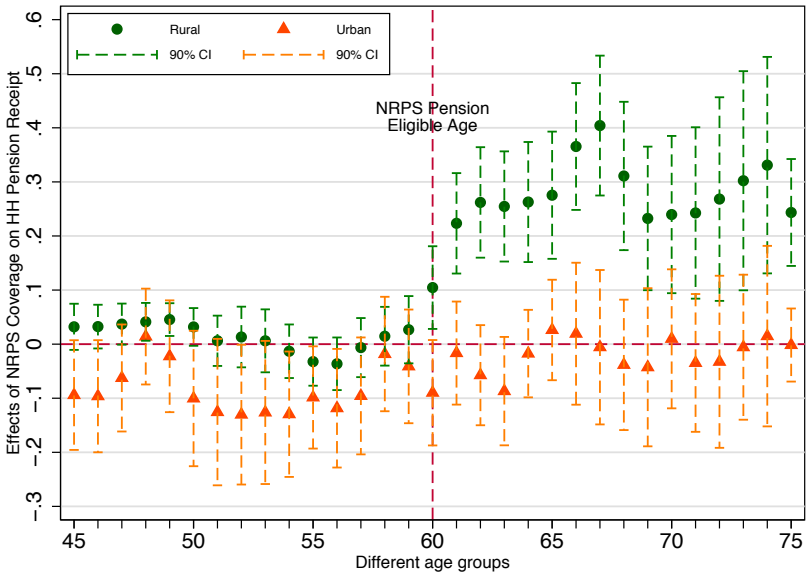
(c) Third round, July 2011 - September 2011

(d) Fourth round, July 2012 - October 2012

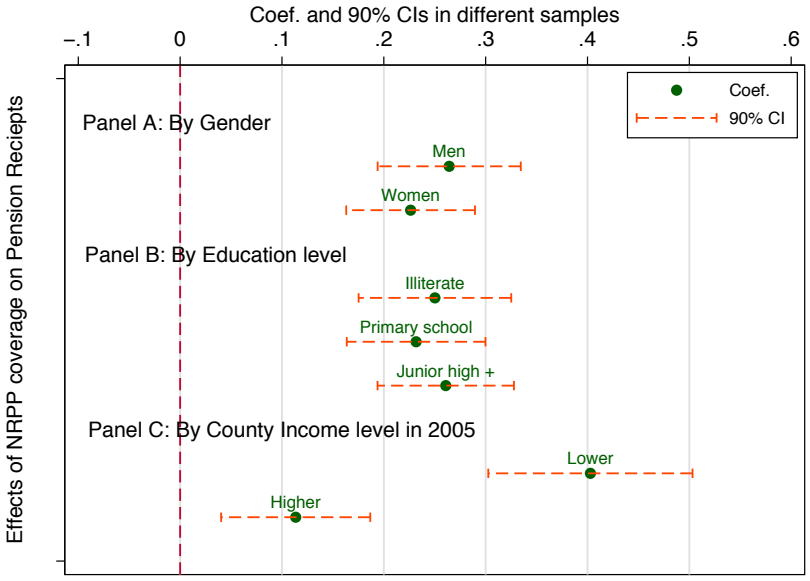
Notes: The data for county level NRPS coverage are from State Council Leading Group Office of Poverty Alleviation and Development. The data are not public and the researchers need to apply for the data directly from the office.

Figure 3: Effects of NRPS introduction on Pension Receipt

(a) By type of *hukou* and age



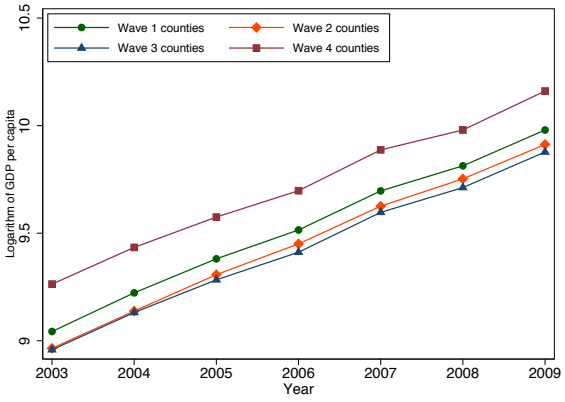
(b) By gender, education and initial income level



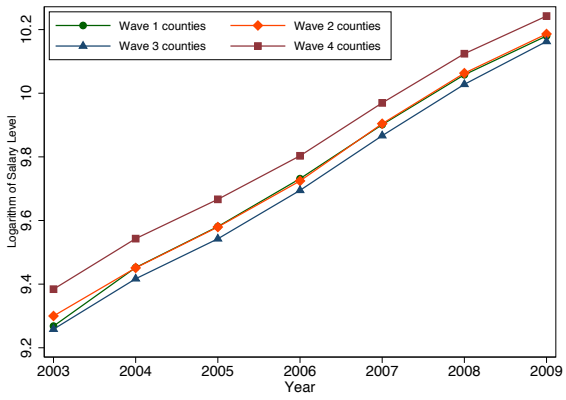
Notes: The data are from CFPS and CHARLS. Figure a above divides the sample by type of *hukou* and age in years. Figure b only uses the pension-eligible sample and divide it by gender (panel a), education level (panel b), and county income level (panel c), respectively. Each point and corresponding 90 percent confidential interval are based a separate regression of equation 3. The confidential intervals are calculated based on standard errors clustered at county level.

Figure 4: Pre-trends Examination in counties, by Starting Year of NRPS

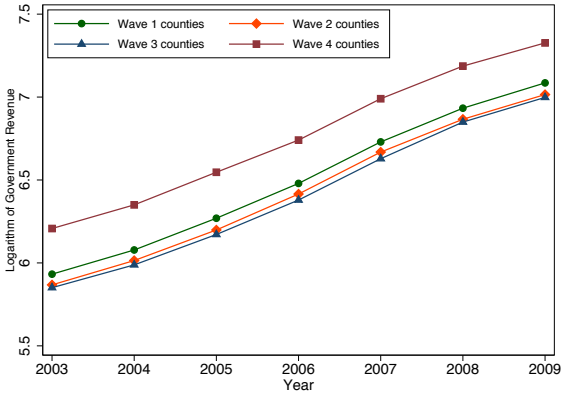
(a) Log(GDP per capita)



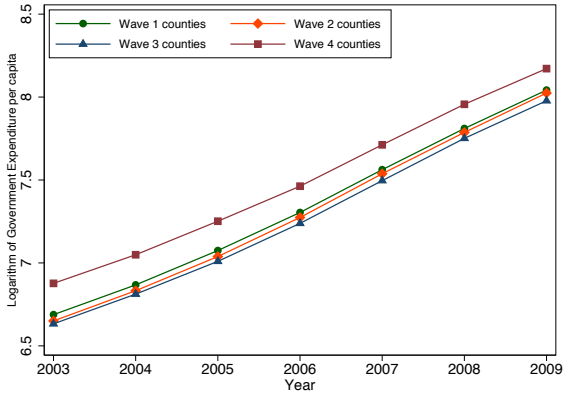
(b) Log(Salary)



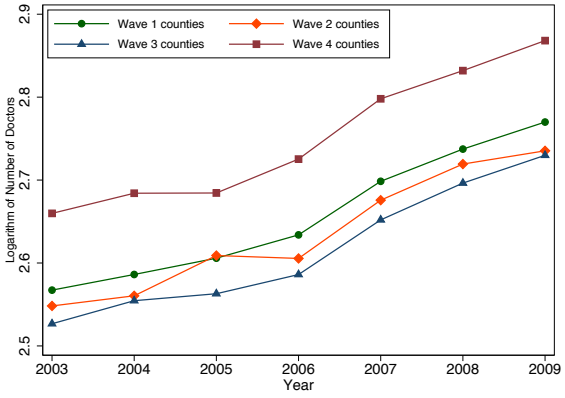
(c) Log(Government Revenue)



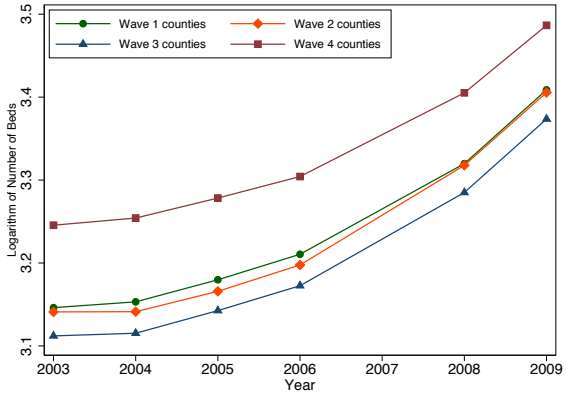
(d) Log(Government Expenditure)



(e) Log(Number of Doctors)

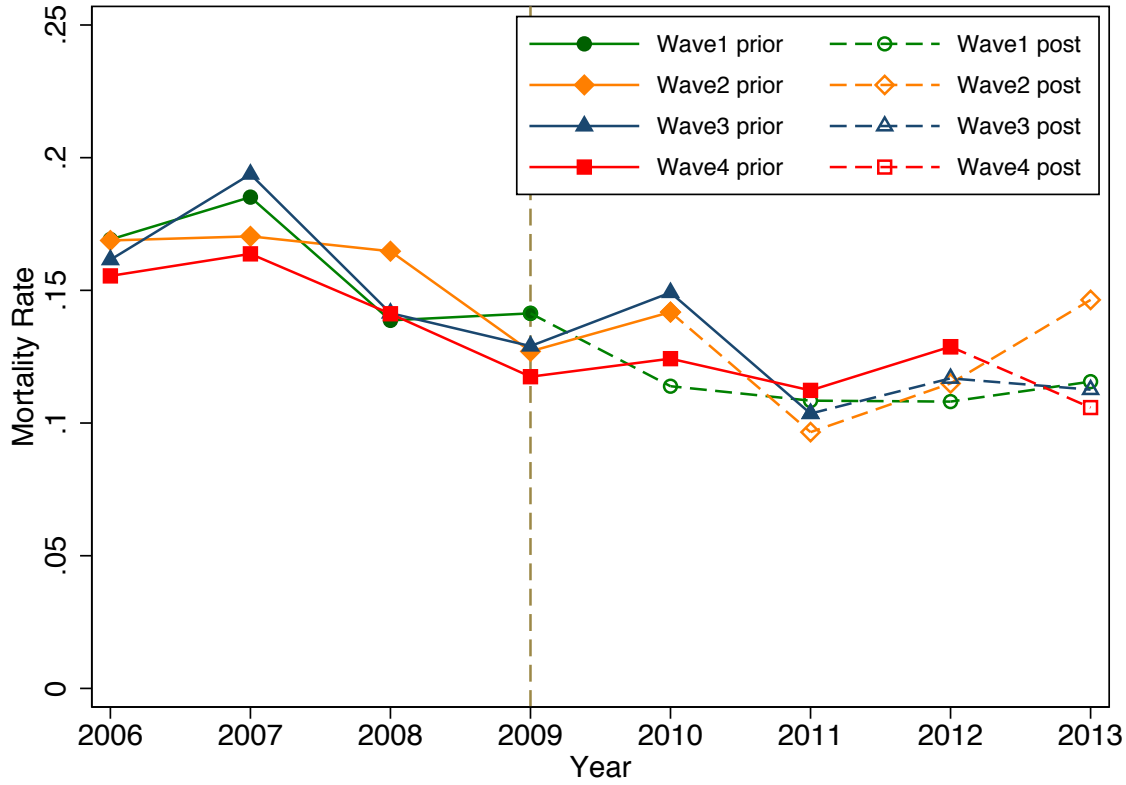


(f) Log(Number of Beds in Hospitals)



Notes: The economic indexes from different prefectures are from China City Statistics Yearbook 2004-2010. The prefectures are grouped by the different starting years of the NRPS. Each figure plots the mean values of the logarithm of economic indexes over the calendar years from 2003 to 2009.

Figure 5: Mortality Time Trends in Counties, by NRPS Starting Year



Notes: The mortality data are from CLHLS 2005-2014. The sample are divided by the different starting years of the NRPS. For each subsample, we plot the mean of mortality against the calendar year, with the solid lines for the period prior to the NRPS while dash lines for the period after the NRPS.

Table 1: Social Pension Scheme in 10 countries

Country	Year introduced	Age of eligibility
Belgium	1924	65
Canada	1927	65
Denmark	1891	65
Finland	1937	65
France	1956	65
Italy	1969	65 and 3 months
Norway	1936	67
Sweden	1913	65
Switzerland	1948	65 (men) 60 (women)
United States	1937	65

Notes: Data are from Cutler and Johnson (2004) and Pension-Watch website (http://www.pension-watch.net/about-social-pensions).

Table 2: Regression Discontinuity Results for Effects of Introduction of Social Pension

	(1)	(2)	(3)
Variables	Logarithm of Mortality Rate		
Bandwidth	5 years	6 years	7 years
Panel A: Age eligible group (pension age threshold and above)			
$Post_{ct}$	-0.022***	-0.018***	-0.017***
	(0.004)	(0.004)	(0.004)
Observations	3,445	4,019	4,561
R-squared	0.993	0.993	0.993
Panel B: Age ineligible group (45 - pension age threshold)			
$Post_{ct}$	-0.004	-0.001	0.002
	(0.004)	(0.004)	(0.004)
Observations	3,251	3,793	4,305
R-squared	0.993	0.993	0.992
F-statistics	10.81	9.73	11.9
P-value	0.00	0.00	0.00

Notes: Data are from Human Mortality Database, Table 2 of Cutler and Johnson (2004) and Pension-Watch website. All the regressions are weighted by the square root of population size. All the standard errors are clustered at country-gender-age level. The F-statistics in the bottom of the table test whether the coefficients difference between Panel A and Panel B.
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Effects of NRPS on Pension Receipts and Household Income, by Type of hukou and Age-eligibility

Sample	(1) Rural *hukou*	(2) Rural *hukou*	(3) Urban *hukou*	(4) Urban *hukou*
Variables	Household receiving pension (Yes = 1)	Log (Household income)	Household receiving pension (Yes = 1)	Log (Household income)
Panel A: Age-eligible group (60+)				
Mean	0.43	9.67	0.63	10.64
$NRPS_{ct}$	0.245***	0.176***	-0.023	0.041
	(0.039)	(0.068)	(0.016)	(0.055)
Observations	21,434	20,584	8,601	8,298
R-squared	0.448	0.219	0.644	0.303
F-statistics	–	–	86.6	15.8
P-value	–	–	0.00	0.00
Panel B: Age-ineligible group (45-59)				
Mean of Y	0.07	10.12	0.28	10.71
$NRPS_{ct}$	0.012	0.058	0.013	0.005
	(0.011)	(0.060)	(0.011)	(0.044)
Observations	28,795	27,575	10,145	9,822
R-squared	0.091	0.195	0.335	0.274
F-statistics	42.1	4.87	–	–
P-value	0.00	0.03	–	–

Notes: The data are from those ages 45 and above in CHARLS and CFPS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, survey year and county. All the standard errors are clustered at county level. The F-statistics in the bottom of each panel test whether differences with those for the rural people with ages 60 and over are significant or not.

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Effects of NRPS on Labor Supply

	(1)	(2)	(3)	(4)
		Rural *hukou*		Urban *hukou*
VARIABLES	Working now (Yes = 1)	Doing any farm work (Yes = 1)	Non-farm work (Yes = 1)	Working now (Yes = 1)
Panel A: Age-eligible group (60+)				
Mean of Y	0.477	0.424	0.054	0.121
$NRPS_{ct}$	-0.030*	-0.036**	0.006	0.017
	(0.018)	(0.018)	(0.006)	(0.011)
Observations	21,290	21,264	21,264	8,484
R-squared	0.284	0.246	0.092	0.267
F-statistics	–	–	–	6.69
P-value	–	–	–	0.01
Panel B: Age-ineligible group (45-59)				
Mean of Y	0.727	0.544	0.184	0.453
$NRPS_{ct}$	-0.026	-0.058**	0.033**	0.003
	(0.022)	(0.024)	(0.015)	(0.020)
Observations	28,376	28,334	28,334	9,797
R-squared	0.225	0.208	0.209	0.315
F-statistics	0.06	1.42	3.80	–
P-value	0.80	0.23	0.05	–

Notes: The data are from those ages 45 and above in CHARLS and CFPS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, survey year and county. All the standard errors are clustered at county level. The F-statistics in the bottom of each panel test whether differences with those for the rural people with ages 60 and over are significant or not.

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Effects of NRPS on Received Private Transfer and Household Expenditure

VARIABLES	(1) Received private transfer (Yes = 1)	(2) Log(Received private transfer)	(3) Log(HH total expenditure)	(4) Log(HH food expenditure)
Panel A: Age-eligible group (60+)				
Mean of Y	0.38	6.67	9.48	8.55
$NRPS_{ct}$	0.001	0.129	0.032	0.096*
	(0.028)	(0.101)	(0.044)	(0.058)
Observations	21,300	8,099	16,220	15,906
R-squared	0.148	0.196	0.189	0.262
Panel B: Age-ineligible group (45-59)				
Mean of Y	0.45	7.05	9.86	8.76
$NRPS_{ct}$	-0.015	-0.039	-0.012	0.036
	(0.025)	(0.093)	(0.033)	(0.051)
Observations	28,447	12,871	23,024	22,702
R-squared	0.264	0.240	0.196	0.284

Notes: The data are from those ages 45 and above in CHARLS and CFPS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, survey year and county. All the standard errors are clustered at county level. The F-statistics in the bottom of each panel test whether differences with those for the rural people with ages 60 and over are significant or not.

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Effects of NRPS on Health Outcomes

	(1)	(2)	(3)	(4)	(5)
	Rural *hukou*				Urban *hukou*
Variables	Unhealthiness score	Reported fair or poor health (Yes =1)	Reported disability (Yes = 1)	Underweight (Yes =1)	Unhealthiness score
Panel A: Age-eligible group (60+)					
Mean of Y	0.312	0.740	0.280	0.153	-0.00106
$NRPS_{ct}$	-0.117***	-0.015	-0.032*	-0.017*	0.030
	(0.045)	(0.020)	(0.017)	(0.010)	(0.041)
Observations	17,723	21,175	21,493	17,861	7,139
R-squared	0.167	0.071	0.197	0.120	0.160
F-statistics	–	–	–	–	13.9
P-value	–	–	–	–	0.00
Panel B: Age-ineligible group (45-59)					
Mean	*-0.139*	*0.713*	*0.108*	*0.0588*	-0.293
$NRPS_{ct}$	-0.042	-0.009	-0.010	0.000	-0.023
	(0.036)	(0.018)	(0.010)	(0.006)	(0.034)
Observations	24,568	28,647	28,899	24,611	8,316
R-squared	0.112	0.062	0.125	0.054	0.086
F-statistics	3.74	0.11	2.79	3.23	–
P-value	0.05	0.74	0.09	0.07	–

Notes: The data are from those ages 45 and above in CHARLS and CFPS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, survey year and county. All the standard errors are clustered at county level. The F-statistics in the bottom of each panel test whether differences with those for the rural people with ages 60 and over are significant or not.

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Effects of NRPS on Healthcare Usage and Health Behaviors

Sample	(1)	(2)	(3)	(4)	(5)
	Rural Hukou				Urban Hukou
Variables	Health Insurance Participation (Yes = 1)	Outpatient care (Yes = 1)	Inpatient care (Yes = 1)	Smoke currently (Yes =1)	Health Insurance Participation (Yes = 1)
Panel A: Age-eligible group (60+)					
Mean of Y	*0.915*	*0.258*	*0.167*	*0.282*	0.869
$NRPS_{ct}$	-0.043*	-0.012	0.004	-0.004	0.018
	(0.022)	(0.015)	(0.012)	(0.009)	(0.030)
Observations	21,310	21,457	17,336	19,887	8,672
R-squared	0.101	0.072	0.204	0.321	0.182
F-statistics	–	–	–	–	3.15
P-value	–	–	–	–	0.08
Panel B: Age-ineligible group (45-59)					
Mean of Y	*0.923*	*0.221*	*0.111*	*0.302*	0.817
$NRPS_{ct}$	-0.035**	-0.010	-0.013	-0.004	-0.020
	(0.016)	(0.012)	(0.009)	(0.007)	(0.022)
Observations	28,615	28,796	22,318	27,314	10,214
R-squared	0.119	0.057	0.246	0.432	0.203
F-statistics	0.28	0.01	1.64	0.00	–
P-value	0.60	0.91	0.20	1.00	–

Notes: The data are from those ages 45 and above in CHARLS and CFPS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, survey year and county. All the standard errors are clustered at county level. The F-statistics in the bottom of each panel test whether differences with those for the rural people with ages 60 and over are significant or not.

*** p<0.01, ** p<0.05, * p<0.1

Table 8: Effects of NRPS on Mortality, CLHLS

Variables	(1) Died in this year (Yes =1)	(2) Died due to severe disease (Yes =1)	(3) Died but have no severe disease (Yes =1)
Panel A: Living in rural area and having no retirement scheme			
Mean of Y	0.150	0.0541	0.0962
$NRPS_{ct}$	-0.0217**	-0.00426	-0.0174**
	(0.00952)	(0.00638)	(0.00793)
Observations	29,871	29,871	29,871
R-squared	0.139	0.060	0.122
Panel B: Living in urban area and having retirement scheme			
Mean of Y	0.102	0.0568	0.0456
$NRPS_{ct}$	-0.00678	-0.00195	-0.00483
	(0.0136)	(0.0107)	(0.00939)
Observations	9,047	9,047	9,047
R-squared	0.196	0.125	0.179
F-statistics (Diff with treated group)	0.86	0.04	1.03
P-values	0.35	0.84	0.31

Notes: The data are from those ages 65 and above in CLHLS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, calendar year, county and whether the individual was lost in the years. All the standard errors are clustered at county level. The F-statistics in the bottom of each panel test whether differences with those for the rural people with ages 60 and over are significant or not.

*** p<0.01, ** p<0.05, * p<0.1

Data Appendix

China Family Panel Studies (CFPS) CFPS is a biennial survey and is designed to be complementary to the Panel Study of Income Dynamics (PSID) in the United States. The first national wave was conducted under the collaboration of the Institute of Social Science Survey at Peking University and the Survey Research Center at the University of Michigan from April 2010 to August 2010. The five main parts of the questionnaire include communities, households, household members, adults and children data.

The 2010 round covered approximately 14,000 households in 25 provinces, in which 95% of the Chinese population reside. The population is divided into six subpopulation, i.e. five large provinces (Guangdong, Gansu, Liaoning, Henan, and Shanghai) and the other 20 provinces. The final sample is made to be representative of 25 provinces through careful weighting.

The survey sample was obtained by three-stage cluster sampling with unequal probabilities. In the first stage, 16 counties were sampled from each of the four large provinces and 32 township-level units from Shanghai, and 80 counties from 20 other provinces, with probability proportional to population size (PPS). In total there were 144 counties and 32 township-level units. In the second stage, 2 or 4 administrative villages or resident committees were sampled with PPS in each county or town. Together there were 640 villages or resident committees. In the third stage, 28-42 households were sampled from each village or resident committee, and in all there were about 16,000 households.

The national representative final sample covers 14,960 households and 33,600 adults (age 16+). The follow-up survey of CFPS was conducted in 2012, covers 13,448 households and 35729 adults, 12,724 households and 26,385 adults out of which originally covered in the baseline survey.

China Health and Retirement Longitudinal Studies (CHARLS) The China Health and Retirement Longitudinal Study (CHARLS) aims to collect a high quality nationally representative sample of Chinese residents ages 45 and older to serve the needs of scientific research on the elderly. The baseline national wave of CHARLS is being fielded in 2011. The individuals will

be followed up every two years. This study used the 2011 and 2013 two waves. In the base line survey, the sample was drawn in four stages. County-level units (counties or urban districts) were sampled directly. All county-level units in all provinces except for Tibet were stratified by 8 regions, by whether they were urban districts or rural counties, and by county GDP. They were sorted based on this stratification and 150 were randomly chosen proportional to population size. These counties cover 28 out of 30 provinces, other than Tibet. After the county units were chosen, the National Bureau of Statistics helped the CHARLS team to sample villages and communities within county units using recently updated village level population data. CHARLS sample used administrative villages in rural areas and neighborhoods, which comprise one or more formal resident committees, in urban areas as primary sampling units (PSUs). CHARLS then sampled three PSUs within each county-level unit, using PPS sampling, for a total of 450 PSUs. In each PSU, the CHARLS team constructed sampling frame using Google Earth base maps and a CAPI (computer assisted personal interview) program was then used to sample households and to conduct the interviews using laptops. All age-eligible sample households who were willing to participate in the survey were interviewed, with 10,257 households containing 18,245 respondents aged 45 and over and their spouses ultimately interviewed. The follow-up survey covers 10,979 households containing 19,666 respondent, with 16,159 (9,185) out of 18,245 (10,257) individuals (households) in the baseline survey successfully re-interviewed and 3507 individuals in 2,053 households newly interviewed. The main questionnaire includes information on basic demographics, family, health status, health care and health insurance, work, retirement and pension, and household economy (income, consumption and wealth).

Chinese Longitudinal Healthy Longevity Survey (CLHLS) The CLHLS is a longitudinal survey conducted by the Center for Healthy Aging and Family Studies in Peking University, sponsored and supported by the National Institute on Aging, United Nations, Duke University and Max Planck Institute for Demographic Research. Demographic and statistical methods are used to analyze data in the longitudinal surveys with the research goal of determining which factors, out of a

large set of social, behavioral, biological, and environmental risk factors play an important role in healthy longevity.

The baseline survey was conducted in 1998, with follow-up surveys with replacements for deceased elders were conducted in 2000, 2002, 2005, 2008, 2011 and 2014 in a randomly selected half of the total number of counties and cities in the 22 out of 31 provinces in mainland China. The survey areas covered 1.1 billion people, 85 percent of the total population in China. An enumerator and a nurse or a medical school student conducted the interview and performed a basic health examination at each interviewee's home. We use data from the longitudinal datasets staring from the 2005 wave. The 2005 wave interviewed 15,638 individuals, with 4,955 young elderly aged 65-79 and 10,658 oldest-old aged 80+ (including 2,797 centenarians, 3,952 nonagenarians and 3,909 octogenarians), and another 25 elders who are younger than age 65.

Table A1: Effects of NRPS on living arrangement and migration

VARIABLES	(1) Log(Household size)	(2) Cross-county migrants (Yes =1)
Panel A: Age-eligible group		
$NRPS_{ct}$	0.001	-0.021
	(0.014)	(0.018)
Observations	20,870	11,518
R-squared	0.265	0.133
Panel B: Age-ineligible group		
$NRPS_{ct}$	-0.001	-0.007
	(0.011)	(0.011)
Observations	28,240	16,445
R-squared	0.290	0.145

Notes: The data are from those ages 45 and above in CHARLS and CFPS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, survey year and county. All the standard errors are clustered at county level. *** p<0.01, ** p<0.05, * p<0.1

Table A2: Effects of the NRPS in eligible group, weighted by represented population size in each dataset

Dependent variables	(1) HH receiving pension (Yes = 1)	(2) Log (HH income)	(3) Received private transfer (Yes = 1)	(4) Log(private transfer)	(5) Log(HH expenditure)	(6) Log(Food expenditure)
Mean of Y	0.43	9.67	0.380	6.667	9.478	8.551
$NRPS_{ct}$	0.254***	0.178**	-0.000	0.127	0.032	0.096*
	(0.039)	(0.070)	(0.027)	(0.100)	(0.044)	(0.058)
Observations	21,434	20,584	21,300	8,099	16,220	15,906
R-squared	0.435	0.221	0.151	0.193	0.189	0.262

	(7) Working now (Yes = 1)	(8) Unhealthiness score	(9) Reported fair/poor health (Yes =1)	(10) Reported disable (Yes = 1)	(11) Underweight (Yes =1)	(12) Health Insurance participation (Yes = 1)
Mean of Y	0.477	0.312	0.740	0.304	0.153	0.882
$NRPS_{ct}$	-0.047***	-0.126***	-0.020	-0.044**	-0.017*	-0.050**
	(0.018)	(0.048)	(0.054)	(0.020)	(0.009)	(0.021)
Observations	21,357	17,723	21,175	21,164	17,726	21,508
R-squared	0.223	0.165	0.195	0.191	0.120	0.134

Notes: The data are from those ages 45 and above in CHARLS and CFPS. All the regressions are weighted by the represented population of the datasets. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, survey year and county. All the standard errors are clustered at county level.
*** p<0.01, ** p<0.05, * p<0.1

Table A3: Effects of NRPS on Mortality in CLHLS, without those without mortality information

Variables	(1) Died in this year (Yes =1)	(2) Died due to severe disease (Yes =1)	(3) Died but have no severe disease (Yes =1)
Panel A: Living in rural area and having no retirement scheme			
Mean of Y	0.157	0.0565	0.101
$NRPS_{ct}$	-0.0223**	-0.00417	-0.0181**
	(0.00981)	(0.00657)	(0.00817)
Observations	28,407	28,407	28,407
R-squared	0.137	0.060	0.124
Panel B: Living in urban area and having retirement scheme			
Mean of Y	0.124	0.0565	0.0690
$NRPS_{ct}$	-0.00798	-0.00359	-0.00438
	(0.0155)	(0.0122)	(0.0107)
Observations	7,456	7,456	7,456
R-squared	0.201	0.131	0.190

Notes: The data are from those ages 65 and above in CLHLS. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, calendar year and county. All the standard errors are clustered at county level. The F-statistics in the bottom of each panel test whether differences with those for the rural people with ages 60 and over are significant or not.

*** p<0.01, ** p<0.05, * p<0.1