The Power of Social Pensions: Evidence from China's New Rural Pension Scheme

Online Appendix

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A. Data Description

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

The 2010 round covered approximately 14,000 households in 25 provinces, in which 95 percent of China's population reside. The population is divided into six sub-population areas including five large provinces (Guangdong, Gansu, Liaoning, Henan, and Shanghai) and the remaining 20 provinces. The final sample is made to be representative of these 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 four of the large provinces and 32 township-level units in Shanghai and 80 counties from the other 20 provinces, with probabilities proportional to population size. In total, there were 144 counties and 32 township-level units. In the second stage, two or four administrative villages or resident committees were sampled proportional to population size in each county or town. Together there were 640 villages or resident committees. In the third stage, 28 to 42 households were sampled from each village or resident committee, and in all there were about 16,000 households.

The final nationally representative sample covers 14,960 households and 33,600 adults (age 16+ years). A follow-up survey of the CFPS was conducted in 2012, which covered 13,448 households and 35,729 adults; 12,724 households and 26,385 adults were originally covered in the baseline survey.

China Health and Retirement Longitudinal Studies (CHARLS) The 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 the CHARLS was

fielded in 2011. The individuals are followed up every two years. This study used the 2011 and 2013 waves. In the baseline survey, the sample was drawn in four stages. County-level units (counties or urban districts) were sampled directly. All county-level units in all the provinces except Tibet were stratified into eight regions, by whether they were urban districts or rural counties, and based on county gross domestic product. The units were sorted based on this stratification, and 150 were randomly chosen proportional to population size. The counties cover 28 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. The CHARLS sample used administrative villages in rural areas and neighborhoods, which comprise one or more formal resident committees, in urban areas as the primary sampling units (PSUs). The CHARLS then sampled three PSUs within each county-level unit, using proportional to population size sampling, for a total of 450 PSUs. In each PSU, the CHARLS team constructed the sampling frame using Google Earth-based maps. A computer assisted personal interview program was then used to sample the households and conduct the interviews using laptops. All age-eligible sample households with people who were willing to participate in the survey were interviewed: 10,257 households containing 18,245 respondents ages 45 years and over and their spouses were ultimately interviewed. The follow-up survey covered 10,979 households containing 19,666 respondents, with 16,159 (9,185) of 18,245 (10,257) individuals (households) in the baseline survey successfully re-interviewed and 3,507 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 at 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 the data in the longitudinal surveys with the research goal of determining which factors, among 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 conducted in 2000, 2002, 2005, 2008, 2011, and 2014 in a randomly selected half of the total number of counties and cities in 22 of the 31 provinces in mainland China. The survey areas covered 1.1 billion people, 85 percent of China's total population. An enumerator and a nurse, or a medical school student, conducted the interviews and performed a basic health examination at each interviewee's home. We use data from the longitudinal data sets staring from the 2005 wave. The 2005 wave interviewed 15,638 Chinese citizens, 25 of whom were younger than age 65 years, 4,955 who were ages 65-79 years, and 10,658 who were ages 80+ years (including 2,797 centenarians, 3,952 nonagenarians, and 3,909 octogenarians).

B. Other Results of the NRPS

This section shows other results of the NRPS mentioned in the main text.

Table B1 presents the results of the main model estimation in the pretreatment period using the first two waves of CLHLS data. Specifically, we estimate the main model on the health and income outcomes in this pretreatment period. The relevant outcomes include self-reported health fair or poor, health worse than previous year, depression, disabled, life quality fair or poor, and household income. These results suggest that the pre-trends of these outcomes are not significantly relevant to the timing of the NRPS implementation.

Table B2 presents the results for labor supply among rural people between ages 45 and 49. Table B3 presents the effects of the NRPS on living arrangement and cross-county migration. There is no evidence of any significant effects on cross-county migration or household size. Table B4 presents the effects of the NRPS on health care usage and health behaviors. There is no evidence of any significant effects. Table B5 presents the results weighted by represented population, and

Table B6 presents separately results from the CHARLS and CFPS samples. Table B7 shows the results on the correlation between attrition and timing of the NRPS coverage. Table B8 presents the results using individual fixed effects. The results show no material difference compared with those in the main text. Tables B9 and B10 present additional results for mortality in CLHLS.

Figures B1-B3 present the robustness of the results for different subsamples without missing observations for income, labor supply, health, and expenditure. There are five panels in each figure. Panel 1 reports the results using the original sample; panel 2 reports the results without missing values for income variables such as household income; panel 3 reports the results without missing values for labor supply; panel 4 reports the results without missing values for health; and panel 5 shows the results without missing values for expenditures such as household food expenditures. The results in Figures B1 to B3 show a consistent pattern for the estimates.

Table B1: Placebo Tests - Main Model Estimation in Pre-Period in CLHLS 2005 and 2008

Variables	(1) Health fair or poor (yes = 1)	(2) Health worse than last year (yes = 1)	(3) Depressed (yes = 1)	(4) Disabled (yes = 1)	(5) Life fair or poor (yes = 1)	(6) Work (yes = 1)	(7) Log(HH income)
Panel A: Suppose policy started in 2007 (two years earlier)							
Placebo NRPS	-0.071*	-0.042	0.001	-0.037	-0.010	0.004	0.115
	(0.040)	(0.046)	(0.046)	(0.032)	(0.044)	(0.020)	(0.122)
Observations	8,526	8,526	8,526	8,526	8,526	8,526	8,526
R-squared	0.142	0.153	0.236	0.391	0.153	0.299	0.481
Panel B: Suppose policy started in 2006 (three years earlier)							
Placebo NRPS	-0.052	0.006	-0.002	-0.044	-0.012	0.022	0.079
	(0.035)	(0.040)	(0.038)	(0.028)	(0.035)	(0.021)	(0.103)
Observations	8,526	8,526	8,526	8,526	8,526	8,526	8,526
R-squared	0.142	0.153	0.236	0.391	0.154	0.299	0.481
Panel C: Suppose policy started in 2005 (four years earlier)							
Placebo NRPS	0.012	-0.032	0.013	-0.016	0.035	-0.010	-0.134
	(0.032)	(0.042)	(0.034)	(0.027)	(0.032)	(0.017)	(0.108)
Observations	8,526	8,526	8,526	8,526	8,526	8,526	8,526
R-squared	0.142	0.153	0.236	0.391	0.154	0.299	0.482

Note: Data are from the CLHLS 2005 an 2008. We assume that the NRPS was implemented 2, 3, and 4 years before the actual implementation in each county for panels A, B, and C, respectively. The covariates in the regressions in each column are the same as those in Table 1. Robust standard errors clustered at the county level are reported in parentheses.
**** p<0.01, ** p<0.05, * p<0.1.*

Table B2: Effects of the NRPS on Labor Supply, Ages 45-49 and Rural *Hukou*

Variables	(1) Working now (yes = 1)	(2) Farm work (yes = 1)	(3) Non-farm work (yes =1)
Mean of Y	0.761	0.534	0.228
$NRPS_{ct}$	0.003	-0.043	0.045*
	(0.027)	(0.029)	(0.023)
Observations	10,568	10,549	10,549
R-squared	0.238	0.231	0.245

Note: The data are from CFPS and CHARLS for those ages 45 to 49 years. The covariates in the regressions in each column are the same as those in Table 1.
**** p<0.01, ** p<0.05, * p<0.1.*

Table B3: Effects of the NRPS on Living Arrangements and Migration

VARIABLES	(1) Log(Household size)	(2) Cross-county migrants (yes =1)
Panel A: Age-eligible group (60+)		
$NRPS_{ct}$	0.001	-0.021
	(0.014)	(0.018)
Observations	20,870	11,518
R-squared	0.265	0.133
Panel B: Age-ineligible group (45-59)		
$NRPS_{ct}$	-0.001	-0.007
	(0.011)	(0.011)
Observations	28,240	16,445
R-squared	0.290	0.145

Note: The data are from the CHARLS and CFPS for those ages 45 years and older. 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 the county level.

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

Table B4: Effects of the NRPS on Health Care Usage and Health Behaviors

Sample	(1)	(2) Rural *Hukou*	(3)	(4)	(5) Urban *Hukou*	(36)
Variables	Outpatient care (yes = 1)	Inpatient care (yes = 1)	Smoke currently (yes =1)	Outpatient care (yes = 1)	Inpatient care (yes = 1)	Smoke currently (yes =1)
Panel A: Age-eligible group (60+)						
Mean of Y	*0.258*	*0.167*	*0.243*	0.191	0.227	0.207
$NRPS_{ct}$	-0.017	0.004	0.018	0.019	0.011	-0.034
	(0.018)	(0.012)	(0.020)	(0.022)	(0.017)	(0.021)
Observations	17,295	17,336	17,336	6,585	6,596	6,047
R-squared	0.078	0.204	0.270	0.088	0.262	0.240
Panel B: Age-ineligible group (45-59)						
Mean of Y	0.222	0.111	0.265	0.180	0.116	0.289
$NRPS_{ct}$	-0.016	-0.013	0.026	-0.007	0.008	-0.002
	(0.017)	(0.009)	(0.019)	(0.023)	(0.014)	(0.021)
Observations	22,217	22,318	22,318	7,012	7,012	7,012
R-squared	0.067	0.246	0.349	0.083	0.312	0.316

Note: The data are from the CHARLS and CFPS and are restricted to a sample of Chinese citizens ages 45 years and older. 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 the county level.
**** p<0.01, ** p<0.05, * p<0.1.*

Table B5: Effects of the NRPS on the Eligible Group, Weighted by the Represented Population Size in Each Data Set

Dependent variables	(1) HH receiving pension (yes = 1)	(2) Log (HH income)	(3) Log(HH expenditure)	(4) Log(Food expenditure)	(5) Working (yes = 1)	(6) Farm work (yes = 1)	(7) Non-farm work (yes = 1)
Mean of Y	0.43	9.67	9.478	8.551	0.477	0.424	0.054
$NRPS_{ct}$	0.254***	0.178**	0.031	0.092	-0.029*	-0.035**	0.006
	(0.039)	(0.070)	(0.043)	(0.057)	(0.017)	(0.017)	(0.006)
Observations	21,434	20,584	16,220	15,906	21,290	21,264	21,264
R-squared	0.435	0.221	0.189	0.262	0.284	0.245	0.093

	(8) Unhealthiness score	(9) Reported fair/poor health (yes =1)	(10) Reported disable (yes = 1)	(11) Underweight (yes =1)
Mean of Y	0.312	0.740	0.304	0.153
$NRPS_{ct}$	-0.126***	-0.015	-0.049**	-0.017*
	(0.048)	(0.019)	(0.020)	(0.009)
Observations	17,723	21,175	21,164	17,726
R-squared	0.165	0.071	0.194	0.119

Note: The data are from the CHARLS and CFPS for those ages 45 years and older. All the regressions are weighted by the represented population of the data sets. 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 the county level.
**** p<0.01, ** p<0.05, * p<0.1.*

Table B6: Effects of the NRPS on the Eligible Group, by Data Set

Dependent variables	(1) HH receiving pension (yes = 1)	(2) Log (HH income)	(3) Log(HH expenditure)	(4) Log(Food expenditure)	(5) Working (yes = 1)	(6) Farm work (yes = 1)	(7) Non-farm work (yes = 1)
Panel A: CHARLS							
$NRPS_{ct}$	0.429***	0.206	0.007	-0.018	-0.011	-0.018	0.007
	(0.046)	(0.133)	(0.064)	(0.082)	(0.016)	(0.018)	(0.009)
Panel B: CFPS							
$NRPS_{ct}$	0.111**	0.154**	0.045	0.149*	-0.044	-0.050*	0.005
	(0.044)	(0.067)	(0.059)	(0.077)	(0.029)	(0.028)	(0.008)

	(8) Unhealthiness score	(9) Reported fair/poor health (yes =1)	(10) Reported disabled (yes = 1)	(11) Underweight (yes =1)
Panel A: CHARLS				
$NRPS_{ct}$	-0.169**	-0.005	-0.095***	-0.014
	(0.075)	(0.016)	(0.032)	(0.010)
Panel B: CFPS				
$NRPS_{ct}$	-0.099	-0.022	-0.012	-0.020
	(0.062)	(0.032)	(0.023)	(0.014)

Note: The data are from the CHARLS and CFPS for those ages 45 years and older. Only people with rural hukou are kept. 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 the county level.

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

Table B7: Correlations between Attrition and Timing of the NRPS Coverage

	(1)	(2)	(3)
Sample	Rural	Rural & Age >= 60	Rural & Age < 60
VARIABLES	Attrition (yes = 1)		
Mean of Y	0.12	0.13	0.11
Reference group: Starting year = 2009			
Starting year = 2010	-0.018	-0.033*	-0.008
	(0.012)	(0.017)	(0.014)
Starting year = 2011	-0.012	-0.021	-0.005
	(0.010)	(0.014)	(0.011)
Starting year = 2012	0.014	-0.000	0.025*
	(0.014)	(0.018)	(0.015)
Observations	24,966	10,272	14,694
R-squared	0.060	0.098	0.036
F-Statistic	1.988	1.753	1.779
p-value	0.116	0.156	0.151

Note: Data are from the CHARLS and CFPS and are restricted to the individuals who were interviewed in in the first round. Covariates include dummies for gender, education level, survey year, and province. All the standard errors are clustered at the county level. The F-statistics and p-values at the bottom test the joint significance of the different starting year dummies of the NRPS.
**** p<0.01, ** p<0.05, * p<0.1.*

Table B8: Effects of the NRPS on the Eligible Group, Individual Fixed Effects Controlled

Dependent variables	(1) HH receiving pension (yes = 1)	(2) Log (HH income)	(3) Log(HH expenditure)	(4) Log(Food expenditure)	(5) Working (yes = 1)	(6) Farm work (yes = 1)	(7) Non-farm work (yes = 1)
Mean of Y	0.43	9.67	9.45	8.55	0.48	0.43	0.054
$NRPS_{ct}$	0.270***	0.183**	0.026	0.074	-0.031	-0.040**	0.009
	(0.040)	(0.075)	(0.046)	(0.063)	(0.019)	(0.019)	(0.006)
Observations	17,302	15,964	10,204	9,852	17,136	17,086	17,086
R-squared	0.709	0.693	0.723	0.672	0.742	0.736	0.644

	(8) Unhealthiness score	(9) Reported fair/poor health (yes =1)	(10) Reported disabled (yes = 1)	(11) Underweight (yes =1)
Mean of Y	0.331	0.740	0.304	0.153
$NRPS_{ct}$	-0.160***	-0.009	-0.045**	-0.030***
	(0.051)	(0.022)	(0.020)	(0.011)
Observations	11,674	15,788	16,258	11,830
R-squared	0.678	0.500	0.677	0.768

Note: The data are from the CHARLS and CFPS for those ages 45 years and older. The covariates in the regressions in each column include age and its square, survey year and individual fixed effects. All the standard errors are clustered at the county level.
**** p<0.01, ** p<0.05, * p<0.1.*

Table B9: Effects of the NRPS on Mortality in the CLHLS, Event Study

	(1)	(2)	(3)
Sample	Rural sample	Rural sample w/o lost individuals	Urban sample
Variables		One-year mortality	
Years relative to NRPS			
One year before NRPS (reference)			
Three years before NRPS	0.00803	0.00844	-0.0193
	(0.0130)	(0.0137)	(0.0173)
Two years before NRPS	0.000184	0.000576	0.000872
	(0.00912)	(0.00950)	(0.0146)
The year when NRPS started	-0.0106	-0.0114	-0.00116
	(0.0108)	(0.0111)	(0.0147)
One year after NRPS	-0.0302**	-0.0317**	-0.00808
	(0.0134)	(0.0139)	(0.0183)
Two years after NRPS	-0.0395**	-0.0418**	0.0208
	(0.0192)	(0.0200)	(0.0215)
Three years after NRPS	-0.0526**	-0.0562**	0.0143
	(0.0246)	(0.0257)	(0.0328)
Observations	29,853	28,441	9,017
R-squared	0.136	0.134	0.173

Note: The data are from the CLHLS for Chinese citizens ages 45 years and older. 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 the county level.
**** p<0.01, ** p<0.05, * p<0.1.*

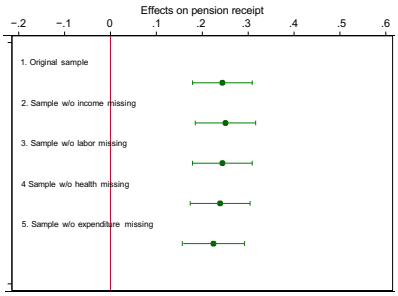
Table B10: Effects of the NRPS on Mortality in the CLHLS

Sample	(1)	(2) Full sample	(3)	(4) Sample without lost individuals
Variables	One-year mortality	Died due to severe disease (yes =1)	Died without severe disease (yes =1)	One-year mortality
Panel A: Living in rural area and having no retirement scheme				
Mean of Y	0.150	0.0541	0.0962	0.157
$NRPS_{ct}$	-0.0217**	-0.00426	-0.0174**	-0.0226**
	(0.00952)	(0.00638)	(0.00793)	(0.00983)
Observations	29,871	29,871	29,871	28,461
R-squared	0.139	0.060	0.122	0.137
Panel B: Living in urban area and having retirement scheme				
Mean of Y	0.102	0.0568	0.0456	0.102
$NRPS_{ct}$	-0.00678	-0.00195	-0.00483	-0.00779
	(0.0136)	(0.0107)	(0.00939)	(0.0155)
Observations	9,047	9,047	9,047	7,457
R-squared	0.196	0.125	0.179	0.202
F-statistic	0.86	0.04	1.03	–
p-value	0.35	0.84	0.31	–

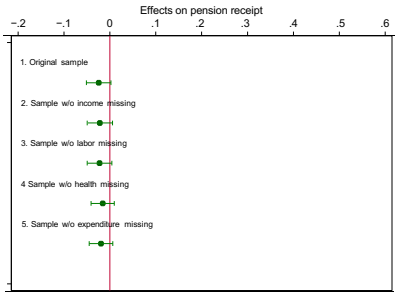
Note: The data are from the CLHLS for Chinese citizens ages 45 years and older. The last column dropped lost respondents in the data. The covariates in the regressions in each column include age and its square, and dummies for gender, education level, calendar year, county, and whether the individual was lost in the years. All the standard errors are clustered at the county level. The F-statistics at the bottom of each panel test whether the differences with those for rural residents age 60 years and older are statistically significant.
**** p<0.01, ** p<0.05, * p<0.1.*

Figure B1: Effects of the NRPS on Income and Expenditure Outcomes, by Subsample

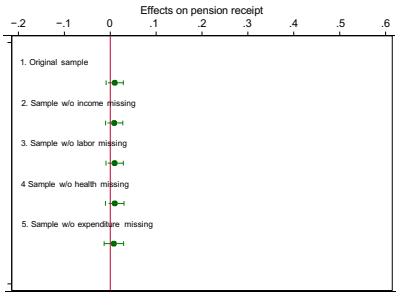
A. Pension receipt



(a) Rural, Age >= 60

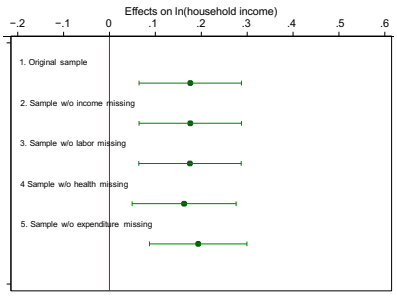


(b) Urban, Age >= 60

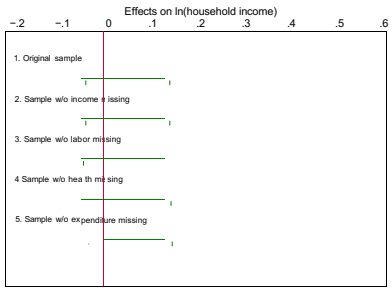


(c) Rural, Age < 60

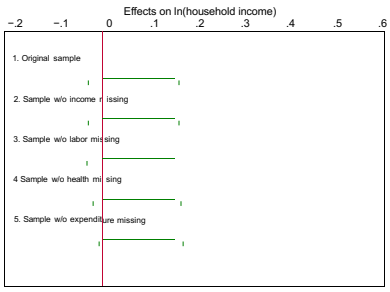
B. Household income



(d) Rural, Age >= 60

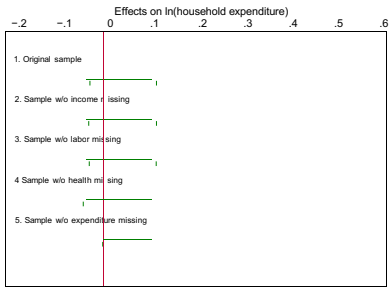


(e) Urban, Age >= 60

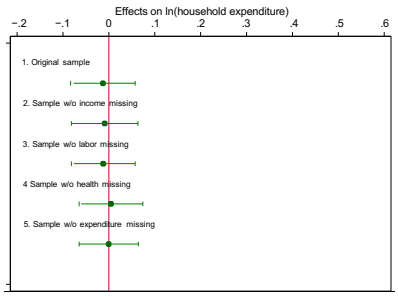


(f) Rural, Age < 60

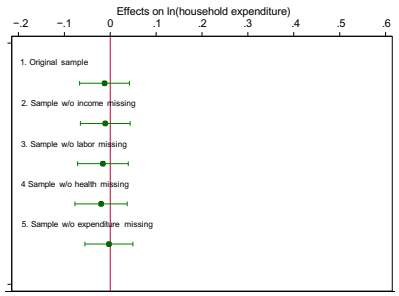
C. Household expenditure



(g) Rural, Age >= 60

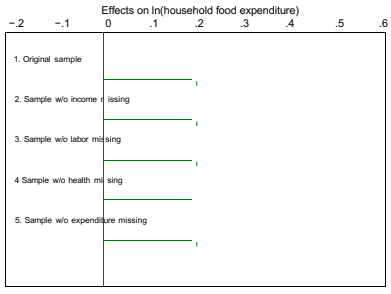


(h) Urban, Age >= 60

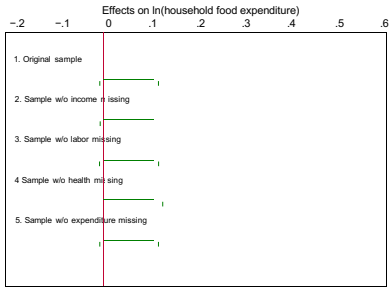


(i) Rural, Age < 60

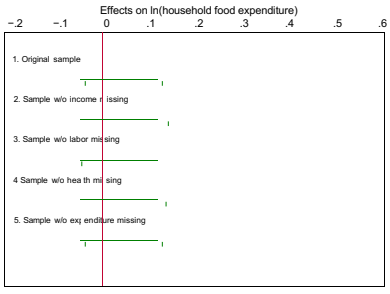
D. Food expenditure



(j) Rural, Age >= 60



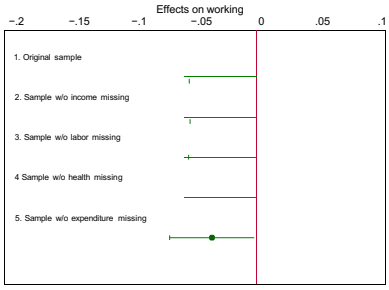
(k) Urban, Age >= 60



(l) Rural, Age < 60

Figure B2: Effects of the NRPS on Labor Supply

A. Labor supply

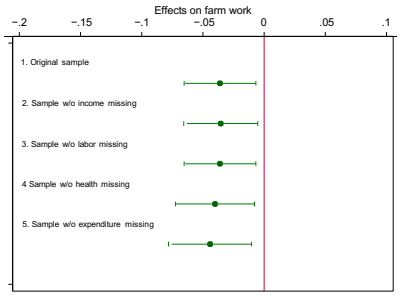


(a) Rural, Age >= 60

(b) Urban, Age >= 60

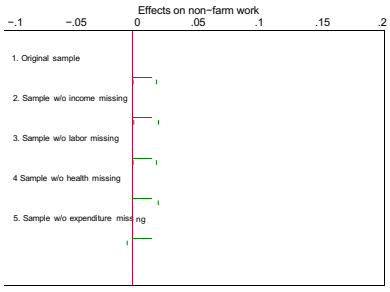
(c) Rural, Age < 60

B. Farm work and non-farm work

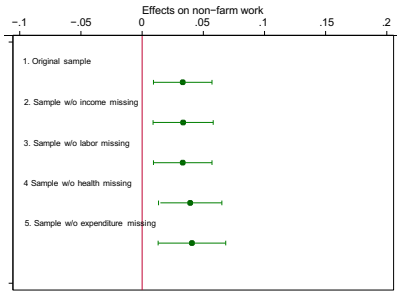


(d) Rural, Age >= 60

(e) Rural, Age < 60



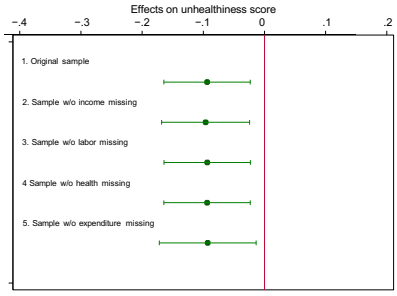
(f) Rural, Age >= 60



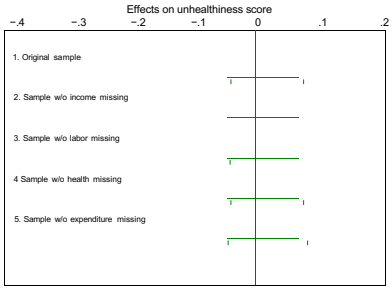
(g) Rural, Age < 60

Figure B3: Effects of the NRPS on Health Status

A. Unhealthiness score



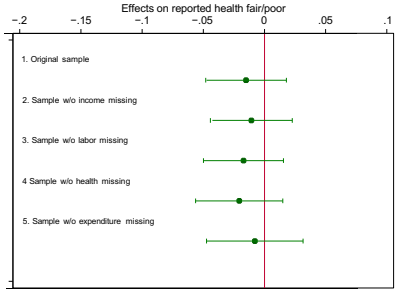
(a) Rural, Age >= 60



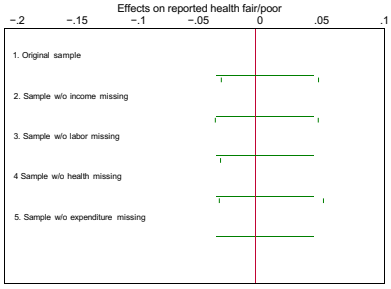
(b) Urban, Age >= 60

(c) Rural, Age < 60

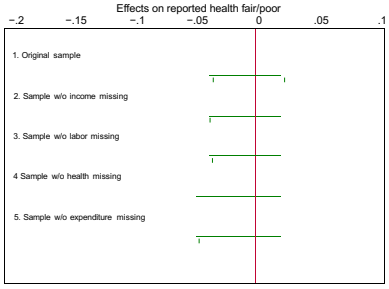
B. Self-reported poor/fair health



(d) Rural, Age >= 60

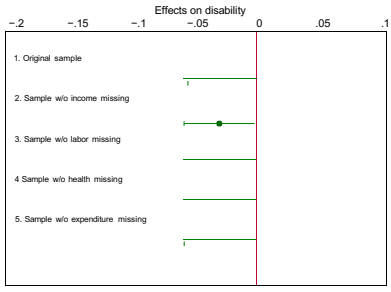


(e) Urban, Age >= 60

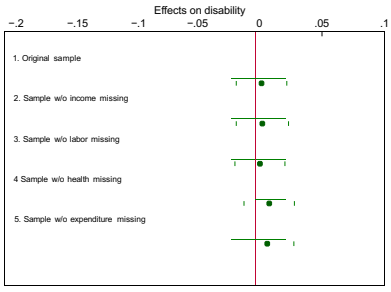


(f) Rural, Age < 60

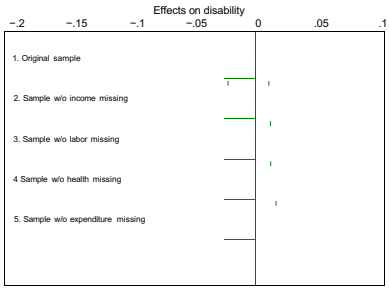
C. Reported disabled



(g) Rural, Age >= 60

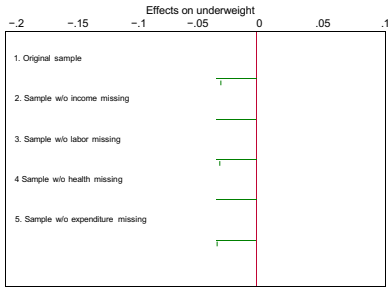


(h) Urban, Age >= 60

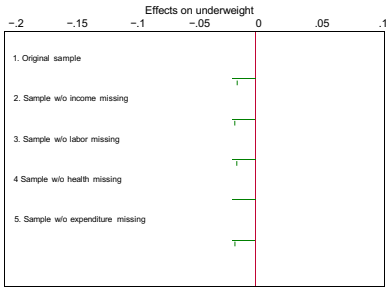


(i) Rural, Age < 60

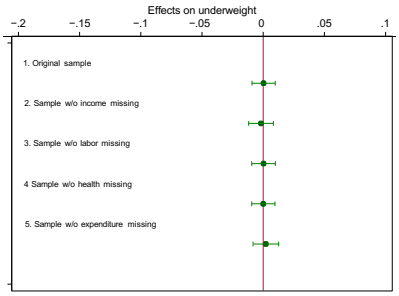
D. Underweight



(j) Rural, Age >= 60



(k) Urban, Age >= 60



(l) Rural, Age < 60

C. Cross-Country Evidence from Cohort Data

In this section, we use cross-country, aggregate-level data to investigate whether the introduction of social pensions has led to reduced mortality. Mortality data are from the Human Mortality Database (HMD).[1] The country-specific timing of the introduction of social pensions is from Cutler and Johnson (2004) and the Pension-Watch website.

We match the HMD information with the available country data as of the introduction of each country's social pension scheme. This matching is restricted to countries with mortality information before and after the introduction of the social pension program. These criteria result in a sample of 10 countries: Belgium, Canada, Denmark, Finland, France, Italy, Norway, Sweden, Switzerland, and the United States. Among these countries, the earliest to introduce a social pension was Denmark (1891) and the most recent was Italy (1969). Table C1 presents the introductory year of each country's social pension program.[2]

Table C1: Social Pension Programs 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

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

[1] 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 and women in a particular year in a particular country at a certain age, ranging from 0 to 110. The HMD provides the mortality tables for various years across 38 countries or regions. The country list and available years can be found at: http://www.mortality.org/.

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

Because the level and trends in mortality vary greatly over time, we use the regression discontinuity design to identify the effects of social pension programs on mortality. We restrict the sample to persons older than age 45 years, because this group of older people is generally the target population for social pensions. We drop data on people older than age 90 due to possible misreporting issues and large measurement errors. We define t as the relative year; it is the number of years between when a country introduced social pensions and the data year. For example, t equals -1 if the data year is the year immediately preceding the introduction of the social pensions; it equals 1 if the data year is one year after that.

To control for invariant factors such as country, gender, and age, which may influence mortality, we keep the sample with a 10-year bandwidth (i.e., $| t |$ 10). We divide this sample into 900 groups (s) based on country (10), gender (2), and age (45). Within each group s, we detrend the logarithm of the mortality rate over the relative year by regressing the logarithm of the mortality rate on the relative year and its square. We then pool the residuals from all the groups. In this analysis, we follow Ruhm (2000) and weight the residuals by the square root of the represented population size.

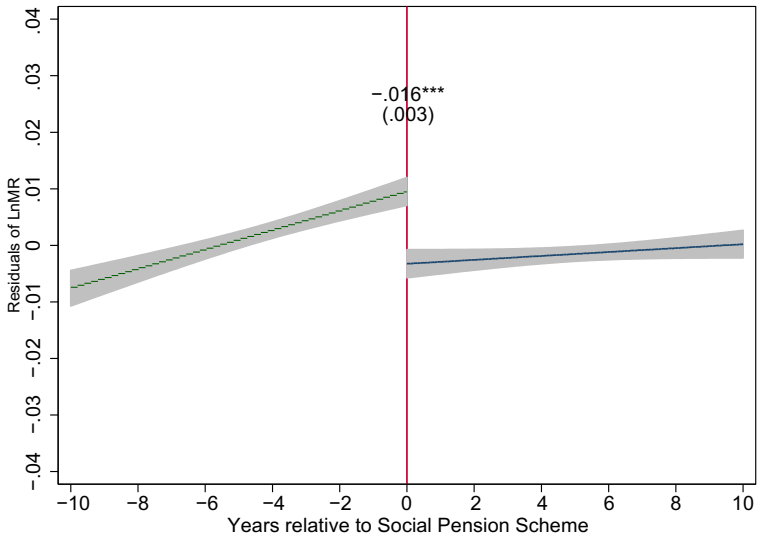
Figures C1, panels a and b, plots the linearly fit lines and confidence intervals over the relative year for the age-eligible (i.e., those at and older than the pension-eligible age) and the age-ineligible (i.e., those younger than the pension-eligible age), respectively. Figure C1, panel a, shows that, among the age-eligible people, the introduction of social pensions significantly reduces the mortality rate by 1.7 percent. In contrast, the reduction in mortality rates after the introduction of the social pension is much smaller (0.3 percent) and statistically insignificant for the age-ineligible people (Figure C1, panel b).

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

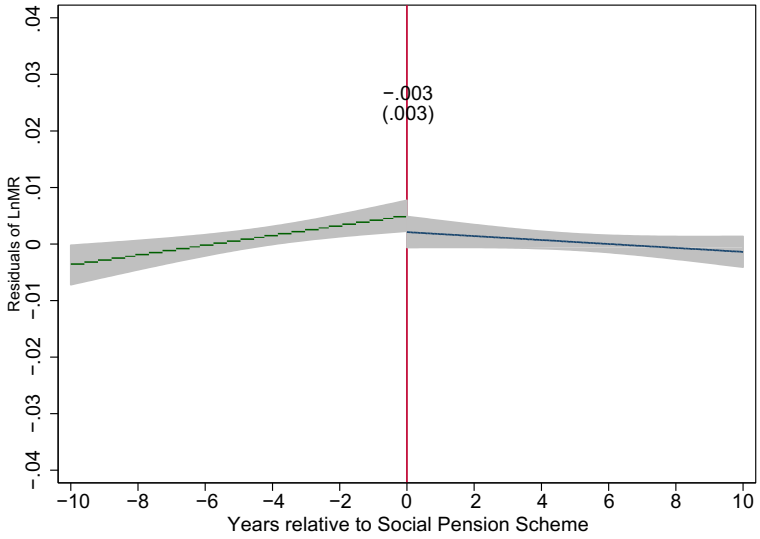
$$lnMR_{gact} = \alpha\, Post_{ct} + \delta_{gac} + t_{gac} + t_{gac}^2 + \varepsilon_{cagt} \tag{1}$$

The dependent variable, $lnMR_{cagt}$, is the logarithm of the mortality rate of people of age a, gender g, in country c in the relative year t. $Post_{ct}$ is an indicator variable that equals one if country c had a social pension program in place in year t, and zero if not. The coefficient, α, captures the

Figure C1: Regression Discontinuity Estimation for the Effects of Social Pensions on Mortality



(a) Age-eligible group



(b) Age-ineligible group

Note: The mortality data are from the Human Mortality Database and the data on the timing of pensions are from Cutler and Johnson (2004) and the Pension-Watch website. For each country-gender-age cell, we regress the logarithm of mortality on the relative year and its square. We then keep and pool the residuals of all of the groups, and plot the linearly fit lines and confidence intervals over the relative year.

effects of the introduction of the social pension program on mortality in our sample. To control for potential unobserved confounding factors, we include the fixed effects of gender, age, country, and all three combined (δ_{gac}) in the regressions. And, for each combination of gender (g), age (a), and country (c), we also control for the linear and square trends in the relative year, t_{gac} and t^2_{gac}. For example, for Belgium, for men who were age 70 years, we have linear and square trends, and we have another two trends for women of the same age.

Following the graphic analysis, we report the regression discontinuity results for the age-eligible group and age-ineligible group in Table C2, panels A and B, respectively. The results in different columns are for different bandwidths: five, six, and seven years.[3] The estimates in panel A consistently show that the introduction of social pensions significantly reduces mortality among age-eligible people by 1.6 to 2.2 percent. In contrast, the comparable effects among age-ineligible people are much smaller and statistically insignificant. The differences in the coefficients between the age-eligible and age-ineligible groups are statistically significant. The last column, following Card et al. (2008, 2009), controls for specific linear trends in each relative year before and after the introduction of the social pension programs, which also yields consistent results.

[3] According to Calonico et al. (2014), the "optimal" bandwidth is six years.

Table C2: Regression Discontinuity Results for the Effects of the Introduction of the Social Pension Program

	(1)	(2)	(3)	(4)
Variables	Logarithm of Mortality Rate			
Bandwidth	5 years	6 years	7 years	6 years
Trend terms	Relative year and its square			Relative year linear trends before and after pension
Panel A: Age-eligible group (pension age threshold and older)				
$Post_{ct}$	-0.022***	-0.017***	-0.016***	-0.022***
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	5,605	6,539	7,421	6,539
R-squared	0.996	0.995	0.995	0.996
Panel B: Age-ineligible group (45 - pension age threshold)				
$Post_{ct}$	-0.002	0.003	0.005	-0.001
	(0.003)	(0.003)	(0.003)	(0.004)
Observations	4,331	5,053	5,735	5,053
R-squared	0.994	0.994	0.994	0.994
F-statistic	17.68	19.10	20.48	19.45
P-value	0.00	0.00	0.00	0.00

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

D. Effects of the NRPS among Children

The above analysis shows that the NRPS has a significant effect on labor and health outcomes for the elderly, indicating a direct and substantial improvement in their well-being. It could also impact other household members, given the intra-household resource allocations. Previous studies such as Duflo (2002, 2003) have shown that expanding the social pension improves children's health. Inspired by this literature, in this section we examine whether the NRPS program has had similar effects on the outcomes of children in China.

The CFPS data include a separate section for children from birth to age 15 years that collects

information on their demographics, education, health, and living conditions. We confine our analysis to rural children and choose four outcomes: receiving pocket money, health status, care status, and in-school rate.[4]

We now conduct regressions to investigate whether and how the NRPS influenced these outcomes. Specifically, we estimate

$$Y_{ict} = \theta_0 + \theta_1 NRPS_{ct} + \delta_c + \delta_t + \delta_{ag} + e_{ict} \tag{2}$$

The dependent variable, Y_{ict}, now represents child outcomes. All the other covariates are the same as those in equation (1). Considering the non-linearity in age patterns for children, we include the gender-age dummies, δ_{ag}, in the regressions. All the standard errors are clustered at the county level.

Table D1 presents the results. Column 1 shows that the NRPS increases the likelihood of children in this group having pocket money by 7-8 percentage points (10 percent) for boys and girls. However, we are unable to verify whether the pocket money is provided by their grandparents (i.e., pensioners), as the CFPS does not contain information on the sources of the pocket money. Column 2 presents the results of the health status of children ages 10 to 15 years. It shows that the NRPS significantly increases the likelihood of excellent health being reported by 10.6 percentage points (19 percent) for boys, but that it has no statistically significant impact on the health status of girls. Columns 3 and 4 report the results for care status. We separate the children into two groups: preschool children and those ages 7 to 15 years. We find a significant effect of the NRPS on care status among preschool age boys. More specifically, the NRPS increases the likelihood of boys being taken care of by their grandparents by 7.8 percentage points (22 percent). We find no significant effects for older boys or for girls in either age group.

The last three columns in Table D1 show the results for staying in school, for three age groups. The three age groups are: 7-10, 11-13 and 14-15, which cover primary in-school age, junior middle

[4] The CFPS survey collected information on the general health status of children over age 10 years and whether they had received any pocket money. The survey also collected information from heads of households about who was taking care of these children and whether they were in school.

school age (or graduation age from primary school), and junior middle school graduation age, respectively. We find that the NRPS increases the in-school or attendance rates for girls ages 7-10 years and 14-15 years. This suggests that the NRPS reduces the proportion of girls who are delayed in attending school at earlier ages and the dropout rate for older girls. Based on these results, we conclude that the NRPS increases female human capital accumulation.

Table D1: Impact of the NRPS on Child Outcomes

Dependent variable	(1) Having pocket money (yes = 1)	(2) Excellent health (yes = 1)	(3) Being looked after by grandparents (yes = 1)	(4)	(5)	(6) Currently in school (yes = 1)	(7)
Sample	Ages 10-15	Ages 10-15	Ages 0-6	Ages 7-15	Ages 7-10	Ages 11-13	Ages 14-15
Panel A: Results for Boys							
$NRPS_{ct}$	0.073*	0.106***	0.078**	-0.020	-0.035	0.010	-0.004
	(0.040)	(0.040)	(0.036)	(0.028)	(0.022)	(0.028)	(0.050)
Observations	2,450	2,447	3,158	3,691	1,767	1,299	860
R-squared	0.164	0.315	0.142	0.131	0.190	0.201	0.184
Mean of dep. var.	0.781	0.546	0.359	0.216	0.961	0.976	0.891
Panel B: Results for Girls							
$NRPS_{ct}$	0.083**	0.019	-0.024	0.018	0.030*	-0.023	0.086*
	(0.041)	(0.047)	(0.036)	(0.032)	(0.018)	(0.018)	(0.045)
Observations	2,318	2,315	2,737	3,380	1,563	1,157	864
R-squared	0.163	0.291	0.140	0.131	0.298	0.220	0.250
Mean of dep. var.	0.808	0.552	0.355	0.223	0.957	0.978	0.900

Note: The data are from the CFPS (2010-2012) for children from birth to age 15 years. The covariates in the regressions in each column include dummies for gender, age, survey year and county. All the standard errors are clustered at the county level.
**** p<0.01, ** p<0.05, * p<0.1.*

References

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