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THE IMPACT OF CHINA'S NEW RURAL PENSION PROGRAM ON ELDERLY LABOR, GRANDCHILD CARE, AND OLD-AGE SUPPORT

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ABSTRACT

This study examines how a social pension program changes paid work patterns and expectations about the source of future financial support for the elderly in China. Using the 2011 and 2013 waves of the China Health and Retirement Longitudinal Study (CHARLS), the study finds that the New Rural Pension Program (NRPP) reduced the hours of farmwork and increased the hours of grandchild care among elderly rural men; and both elderly women and men reported less expected reliance on adult children for financial support when they become infirm. These differential effects probably occur because the size of the pension benefit is very small and because of previous gender differences in farmwork and grandchild care. Additionally, the study shows that adult children reduced out-migration and increased their hours spent in farming activities, indicating that the effect of the NRPP has spilled over to younger members of the household.

KEYWORDS

INTRODUCTION

In traditional societies such as rural China, where the family is the only source of old-age support, the elderly work for pay until they are no longer able, and the situation has remained virtually unchanged despite substantial income growth (Benjamin, Brandt, and Fan 2003).[1] A social pension has the potential to fundamentally change the position of the elderly in the family. For example, urban Chinese retire much earlier than their rural counterparts, and this pattern is mainly attributable to the generous social pension program available to urbanites (Zhao, Park et al. 2013).

With rapid urbanization, especially the out-migration of young people to urban areas, the traditional role of the family in supporting the elderly

and infirm has been challenged. As a result, many developing countries have instituted social pension programs (or expanded existing programs) to cover rural populations. Such programs have been found to reduce the labor supply of the elderly, and the effects have spilled over to the extended family as well (Bertrand, Mullainathan, and Miller 2003; Edmonds, Mammen, and Miller 2005; Ardington, Case, and Hosegood 2009).

The Chinese situation is of interest for two reasons. First, the pension is quite small, and thus the margin of the change may be different. Second, given the unusually strong emphasis on family ties in traditional Chinese society, it is worth exploring how family dynamics change as the government takes a greater role in providing support to the elderly population.

We study the impact of China's New Rural Pension Program (NRPP) from three perspectives: hours of farmwork and nonfarm paid work and grandchild care, expectations about the source of financial support when disabled, and adult children's employment. The previous international literature has treated labor supply as one category. However, the location and institution constraints are very different between farmwork and nonfarm paid work, which we expect will lead to different effects of pensions on farmwork and nonfarm paid work. As such, we treat them separately. Caring for grandchildren is an important nonmarket activity for elderly people that may provide a less physically demanding alternative to paid work and which also may be affected by rural pensions. A shift of hours from farmwork or nonfarm paid work to grandchild care may suggest an improvement in the welfare of the elderly. When subjects have been asked about the expected source of financial support in old age, the predominant answer has been their children. Thus, it is interesting to see what happens to their answers after a social pension program becomes available. A reduction in reliance on children may be an important signal of upcoming social changes. Finally, examining the effect of pensions on adult children can tell us whether there is a spillover effect and the direction of this effect.

In studying these effects, we pay special attention to gendered differences. A division of responsibilities exists between elderly men and women in China – men tend to spend more hours on farmwork and nonfarm paid work, whereas women spend more time caring for their grandchildren (Mao, Connelly, and Chen 2017). Likewise, elderly women have stronger emotional attachments to and are more likely to feel dependent on their children. Hence, with the introduction of the NRPP, we expect a larger reduction of labor efforts by elderly men, but a larger reduction of reliance on children for old-age support by women.

We use a unique type of dataset that has rarely been available in the literature. The China Health and Retirement Longitudinal Study

(CHARLS) belongs to the family of surveys harmonized with the Health and Retirement Study. Such surveys depart from traditional household surveys in that the measurement goes beyond the household and encompasses the entire family, whether co-resident or not. Because co-residence with adult children is a decision jointly made by elderly parents and their children (Connelly and Maurer-Fazio 2015), and interactions between parents and adult children in the form of grandchild care and farmwork are possible between parents and any adult child living nearby, not necessarily those in the same household, being able to measure grandchild care and the labor supply of non–co-resident adult children is crucial in the study of family interactions.

THE LITERATURE

Although there is a large literature on the impact of social security on the socioeconomic behavior of individuals in developed countries (Krueger and Pischke 1992; Gruber and Wise 2000; Chan and Stevens 2004), studies of the effects of social pension income in developing countries are scarce. The few studies we are aware of concern South Africa, India, Brazil, and Mexico. Many similarities exist between China and these developing countries. For example, eligibility for a pension is determined primarily by age, the program's target population lives mostly in rural low-income areas, and the pension money is appropriated by fiscal revenue. One difference between China and these countries, however, is that the pension benefit level in China is much lower than that of these other developing countries. In South Africa, for example, the average monthly pension was about US$100 for elderly black South Africans in 2010, which is about twice the median per capita income among African black households (Case and Deaton 1998; Ralston et al. 2016).

A few studies have examined the effect of pension benefits on the elderly's labor supply participation and other economic behaviors. The general conclusion has been that the elderly reduce their labor supply participation once entitled to pension benefits. Irineu Evangelista de Carvalho Filho (2008) estimates the impact of social security reform on the retirement decisions of rural workers in Brazil by comparing those recently made eligible by reform (ages 60–64) with the soon-to-be eligible (ages 55–59), and concludes that receiving old-age benefits increases the probability of not working in the labor market by about 38 percentage points and reduces total hours by 22.5 hours per week. Neeraj Kaushal (2014) studies the effect of the expansion of India's National Old Age Pension Scheme on elderly well-being and suggests that a Rs.100 (US$1.45) increase in public pension is associated with a 1–2 percentage point decline in the employment of men ages 55–70 with primary or less education, but has no

effect on the employment of women of the same age range and educational level.

In most developing countries, a typical household is multi-generational, so there is ample scope for pension money to be shared. Family economics offers different predictions of the extent to which children and grandchildren share pension income. One hypothesis is joint utility maximization, which suggests that other household members fully share the pension benefit. An alternative hypothesis, based on intrafamily bargaining hypothesis (Chiappori 1997), states that elderly people seek to improve their own interests when they obtain more economic resources of their own. Dora L. Costa (1997) studies the effect of American Civil War veterans' pensions on living alone and finds that the veterans tended to pursue independent living after receiving their pension. In most developing countries, however, the pension is usually not large enough to support independent living. Therefore, the way in which intrafamily resource reallocation takes place in the face of a noncontributory pension is particularly worth exploring.

Existing studies of developing countries tend to agree that there is a certain degree of family sharing of extra nonlabor income from pensions. Eric V. Edmonds (2006) examines the response of children to household pension incomes in terms of school enrollment and labor supply by comparing children's labor activities in households that are eligible for the OAP (old-age income support program) with those in households that are nearly eligible in South Africa. The results indicate a large increase in school attendance and an enormous decline in total paid working hours of children when black South African families become eligible for an OAP. Esther Duflo (2003) evaluates the impact of a large cash transfer program in South Africa on children's nutritional condition. Her results suggest that pensions received by women have a larger impact on the anthropometric status of girls, but a smaller effect on that of boys.

Laura Juarez (2009) finds that a pension program in Mexico does not affect the labor supply of people who receive a pension or who are close to receiving it, but non-elderly adults living in a household with elderly members decrease their labor supply. Bertrand, Mullainathan, and Miller (2003) investigate South Africa and examine how the pension transfer affects the labor supply of prime-aged adults living with the elderly who are eligible for pensions, and find a sharp drop in the paid working hours of prime-aged adults. Interestingly, they also find that the drop in labor supply is greatest for the oldest male child, perhaps because of the lower opportunity cost associated with their jobs and their higher bargaining power within the household. Other studies have also confirmed that certain demographic groups share the benefits while others are pressured to increase their paid work efforts. Dorrit Posel, James A. Fairburn, and Frances Lund (2006) demonstrate that after the introduction of a social

pension program, young rural South African women were more likely to migrate, perhaps because the elderly women share more of their pension incomes with young men. Cally Ardington, Anne Case, and Victoria Hosegood (2009) conclude that large cash transfers to the elderly led to an increase of employment among prime-aged members of their households in South Africa. They ascribe the migration of prime-aged adults to the elderly's tendency to take care of grandchildren when they gain a large, unanticipated pension income.

In China, most elderly people live with their children or nearby (Lei et al. 2015) and thus have frequent interactions with them. They help with grandchild care and farm their children's land when those children migrate. How these interactions change as a result of government pensions is what we investigate in this study.

THE NRPP IN CHINA: BACKGROUND

The major economic reforms in China since the end of the 1970s have elevated the living standards of the population as a whole, but the elderly have not benefited as much as others. Consequently, elderly poverty has become an acute problem. According to the 2013 wave of the CHARLS, 21.5 percent of rural elderly over the age of 60 live in poverty.[2] The poverty rate of rural people ages 45–59 is 13.7 percent, but the corresponding rate for urban elderly ages 60 years old and people ages 45–59 are 5.8 percent and 5.2 percent, respectively (Zhao and Zhao 2017).

In November 2009, China launched the NRPP to provide social old-age support for rural residents.[3] This is essentially a defined contribution and funded pension program with a small public pillar. The basic pension, that is, the public pillar, is payable to people who have reached age 60. Those who have already reached age 60 at the start of the program are eligible to receive this basic pension (initially RMB55) even if they have never contributed. Those younger than 60 must make annual contributions (a minimum of RMB100) to be eligible for both the basic pension and their individual pension amount upon reaching age 60. The more someone chooses to pay into their individual account, the more he or she can receive upon reaching age 60. To encourage participation, the government pays a flat subsidy (RMB30 initially) toward contributions into individual accounts. Those who are younger than 45 must contribute for at least 15 years. Those between ages 45 and 60 can take their individual contributions back, thus losing the government subsidies as a lump sum and receiving only the basic pension or fulfilling the 15-year minimum requirement by paying extra in order to receive the annual pension. According to the CHARLS data, about 96 percent of rural villages had implemented this program by the summer of 2013, covering more than 400 million Chinese people.

Although the basic pension income, at RMB55, accounts for only 7 percent of the median per capita income of rural residents,[4] it is still significant for many rural poor elderly who do not otherwise have cash income. Existing studies have found that the pension program has large and statistically significant impacts on a variety of outcomes.[5]

DATA, SUMMARY STATISTICS, AND METHOD

Data

The primary data used in this study come from the 2011 and 2013 waves of the CHARLS, a national representative sample of residents ages 45 and older.[6] CHARLS followed a multi-stage stratified random probability proportional to size (PPS) sampling strategy. A total of 450 villages or resident committees (*juweihui*) were included, from 150 counties or city districts. There were 17,708 respondents in 2011 and 18,604 in 2013.[7]

Because our goal is to study the effects of the rural pension program, our analysis sample is restricted to the elderly who are rural residents (with rural *hukou*) and 60 years and older in 2011. Additionally, because we use village participation in the pension program as the key dependent variable, and the pension is paid out at the place of household registration (*hukou*), we exclude 358 people who left and did not live at their place of *hukou*. We also drop observations that are not traced in 2013 and form balanced panel data. After taking these restrictions into account, we are left with 4,688 people in 331 rural villages in each stage.

A little less than half of the sample (2,331 people, 49.7 percent) was men (Table 1). The mean age was 68 years. Men and women were roughly equal in average age. Because wives are, on average, a few years younger than husbands when they marry, the equality of age is a reflection of longer life expectancy among women. Men and women had very different educational backgrounds, however, a relic of China's history of discrimination against girls. In 2011, about 63.5 percent of women were illiterate, but only 23.8 percent of men were. Only 17.8 percent of women completed primary school or higher, while 49.8 percent of men did. Another interesting difference between genders is marital status. In 2011, 28.3 percent of women were single, and only 14.9 percent of men were; two years later, more become single: 32.6 percent of women and 16.5 percent of men. The difference between women and men is mainly due to the longer life expectancy of women. We also report some household characteristics in Table 1 because they may be related to labor supply and grandchild care. The mean household size was 3.47 in 2011, the mean number of grandchildren under age 16 was 1.6, and 73.8 percent of households had one grandchild under age 16 in 2011. The probability of someone age 80 or older living in the household was very small (1.4 percent). On average,

Table 1 Sample description

Variable	2011		2013	
	Women	Men	Women	Men
Individual characteristics				
Age	68.15	67.77	70.11	69.73
Illiterate (=1)	0.635	0.238	0.635	0.238
Literate but did not finish primary school (=1)	0.187	0.264	0.187	0.264
Primary school and above (=1)	0.178	0.498	0.178	0.498
Men (=1)				
Single or widowed (=1)	0.283	0.149	0.326	0.165
Household and community characteristics				
Household size	3.43	3.51	3.47	3.55
No. grandchildren under age 16	1.59	1.60	2.86	2.91
Having grandchildren under age 16	0.736	0.741	0.854	0.857
Having elderly age 80 and older in household	0.013	0.015	0.001	0.002
Household land size (mu)	5.06	5.56	4.96	5.11
Net housing value (ten thousand RMB)	6.97	6.65	7.01	9.37
Having childcare centers in village	0.423	0.417	0.443	0.439
Total household yearly income (ten thousand RMB)	2.30	2.34	1.90	1.94
N	2,357	2,331	2,357	2,331

Source: CHARLS waves 2011 and 2013. Sample restriction: elderly age 60 and older in 2011 with rural *hukou*.

each household had 5.3 mu (0.87 acres) of land, and net housing value was approximately RMB68,000 in 2011. Because we are interested in studying grandchild care, we also report the probability of having a childcare center in the village, which was 42 percent.

NRPP participation

The key variable of interest is whether the village implemented the NRPP. We define participation in NRPP at the village rather than the individual level to minimize individual selection bias. This choice also implies that our estimation should be interpreted as the effect of intention-to-treat.

We mainly obtained village participation status from the CHARLS village questionnaire. In a small number of cases where this information was missing, we imputed the village participation status from individual

Table 2 Descriptive statistics for NRPP enrollment

	2011	*2013*
No. villages	331	331
No. households	3,378	3,378
No. elders in 2011	4,688	4,688
No. villages participating in NRPP	121	319
% villages participating in NRPP	36.56	96.37
No. elders participating in NRPP	1,076	3,248
% elders participating in NRPP	22.95	69.28

Source: CHARLS waves 2011 and 2013, balanced panel. Sample restriction: elderly age 60 and older in 2011 with rural *hukou*.

questionnaires. Because individuals are prone to misreporting participation, we assign village participation status when a large number of people in the village report participation, with participation defined as either contributing or receiving benefits. Specifically, if the number of individuals who reported enrollment in the NRPP exceeded twenty; if the number was between ten and twenty, but the enrollment rate was above 50 percent; or if the number was between five and ten but the enrollment rate was above 80 percent, we assign participation in NRPP to the village.[8]

As reported in Table 2, 121 out of 331 villages participated in the NRPP in 2011, accounting for 36.56 percent of all villages. In 2013, NRPP coverage expanded greatly to 319 villages, accounting for 96.37 percent of all villages. In this study, we exploit this stepwise rollout of the rural pension program.

Labor allocation by elderly parents

Our first set of dependent variables is farm and nonfarm labor input and hours spent on grandchild care by elderly people. Thus, we construct the following indicators:

Hours in farm labor and nonfarm labor: CHARLS records the number of hours in each type of paid work activity. Both agricultural work and nonfarm employment are reported for the past year. Respondents are instructed to include all farm activities when reporting their participation and hours in farming, including cropping, forestry, livestock, and fishery. We use nonfarm paid work information, including employed and self-employed work, to count nonfarm labor hours.

Hours caring for grandchildren: CHARLS records, for each adult child, how much time the elderly parents spent caring for his or her children under age 16.[9] Because it is possible that the elderly looked after more than one grandchild at the same time, we use the maximum childcare time to calculate the childcare time. We top censor the number of hours at 5,824 hours per year.[10]

Table 3 presents descriptions of the indicators defined above for both elderly men and women in 2011 and 2013. Elderly men were more likely to engage in farmwork (58.4 percent of men versus 43.6 percent of women in 2011), and the rates were more or less constant between 2011 and 2013. Elderly men also spent more time in farming than women (837 hours among men versus 582 hours among women). The number of hours in farmwork declined from 2011 to 2013 for both men and women, but elderly men saw a larger decline than women (a reduction of 103 hours among men and 19 hours among women). Only 12.4 percent of elderly men and 5.2 percent of elderly women participated in nonagricultural paid work in 2011. The rates declined slightly to 11.4 percent for elderly men and 4.2 percent for elderly women in 2013. The average number of hours spent in nonagricultural paid work for elderly men was 248 in 2011, much larger than that of elderly women. The hours declined somewhat for both elderly men and women between 2011 and 2013.

In 2011, about 25.8 percent of the elderly participated in grandchild care; the rate went up to 33.1 percent in 2013. The rate of grandchild care shows no statistically significant difference between men and women in either year, but there is a large difference in the number of hours spent in grandchild care between men and women. In 2011, women spent, on average, 586 hours, while men spent 522 hours in grandchild care. In 2013, the number of hours went up to 755 hours among women and 693 hours among men.

The high rates of farmwork participation and grandchild care reflect the massive out-migration of adult children from rural to urban areas. This shift partially offset the reduced need for labor input in agriculture from mechanization. The increased need for grandchild care is the result of migrants leaving their young children behind, due to the lack of childcare and schooling opportunities for migrant children in cities.

Expected sources of old-age support

In the CHARLS questionnaire, each respondent is presented with the following question on the source of living expenses if they become too ill to work in the labor market: "When you are old and unable to work, what do you expect to rely on for old-age support?" Possible answers are: (1) children, (2) savings, (3) social pension, (4) commercial insurance, and (5) other. In our sample, 4,410 people answered the question. The second panel of Table 3 reports the answers. In 2011, roughly 82.2 percent of elderly people reported that they expected to depend on children, and 8.3 percent reported expecting to depend on social pensions. However, in 2013 the rate of respondents who reported expecting to depend on children declined to 77.0 percent, and those who reported expecting to depend on social pensions went up to 15.9 percent. It is also clear that

Table 3 Descriptive statistics of labor supply and expected source of old-age support

	2011		2013	
	Women	*Men*	*Women*	*Men*
Elderly person's labor supply				
Farmwork (= 1)	0.436	0.584	0.449	0.569
Farmwork (hours)	582.2	837.3	562.9	734.1
Non-farmwork (= 1)	0.052	0.124	0.042	0.114
Non-farmwork (hours)	89.1	248.2	77.4	227.0
Caring for grandchildren (= 1), for elderly with grandchildren	0.266	0.249	0.329	0.332
Caring for grandchildren (hours), for elderly with grandchildren	585.7	521.8	755.3	693.2
N	2,357	2,331	2,357	2,331
Expectations of old-age support				
Rely on children (= 1)	0.842	0.801	0.801	0.738
Rely on savings (= 1)	0.026	0.030	0.021	0.031
Rely on social pension (= 1)	0.071	0.095	0.137	0.182
Rely on commercial pension (= 1)	0.001	0.004	0.001	0.003
Other (= 1)	0.061	0.069	0.040	0.045
N	2,233	2,177	2,233	2,177
Adult children's labor supply	All		All	
Farmwork (= 1)	0.414		0.289	
N	1,990		1,990	
Work outside (= 1)	0.491		0.277	
N	1,998		1,998	

Source: CHARLS waves 2011 and 2013, balanced panel. Sample restriction: elderly age 60 and older in 2011 with rural *hukou*. The children's sample is restricted to people ages 16–50 with rural *hukou*.

elderly women more often than men expect to depend on their children. In 2011, 84.2 percent of women reported that they expected to rely on their children for old-age support; the rate was 80.1 percent for men. The reported expectation of dependence on children declined at roughly the same magnitude for men and women in 2013.

Out-migration and farm input of adult children

The adult children's information is reported by their parents and is thus less detailed. Instead of asking the number of hours spent on each activity,

only participation is recorded. The physical location of the child and the place of household registration (*hukou*) is known, and thus we are able to determine the migration status of each child. We limit our attention to adult children (ages 16–50) who are out of school and whose *hukou* registration is in the same village as their parents because the behavior of adult children who have permanently moved out is likely different. We construct the following indicators for children:

Farmwork: If an adult child whose *hukou* is in the same village is reported as doing agricultural work in the past year and also lived in the same village as parents, then he or she is identified as participating in agricultural labor.

Migration: If an adult child lived and worked for pay outside the village for at least three months in the past year, then he or she is defined as a migrant worker.[11]

The third panel of Table 3 reports adult children's variables in both years. In 2011, about 41.4 percent of adult children engaged in farmwork; in 2013, this number dropped to 28.9 percent. About 49.1 percent of adult children migrated to the city in 2011; this rate declined to 27.7 percent in 2013.

EMPIRICAL SPECIFICATION AND ESTIMATION RESULTS

Model specification

Our decision to use village-level NRPP participation as opposed to individual participation mitigates the possible bias arising from individual selection. As an example of such bias, an industrious elderly person might be enthusiastic about joining the NRPP and simultaneously spend more time working for pay or caring for grandchildren. When the participation variable is defined at the village level, this bias is avoided, but another may arise: villages that participate or do not participate may be systematically different. For example, a village consisting of more industrious villagers may join the NRPP earlier, and thus differences observed across villagers may reflect unobserved village characteristics. To further overcome this bias, we adopt an individual fixed-effect model by utilizing two waves of data, taking advantage of the fact that the NRPP was implemented in some villages first then expanded to the rest of the villages. This model effectively controls for all unobserved differences across individuals and villages.

One drawback of this model is that villages that rolled out the program at different stages might display different trends in outcome variables; thus, we might be capturing these differences instead of true program effects. Unfortunately, we are not able to eradicate this problem with only two waves of data. However, we can mitigate this problem by adding time-variant village controls.

The final model is specified as follows:

$$L_{ijt} = \alpha \cdot E_{it} + X_{ijt}\beta + Y_{ijt}\delta + Z_{it}\pi + u_j + t + \varepsilon_{ijt} \tag{1}$$

where L_{ijt} is a host of outcome variables for person j in village i in year t. When the person j is an elderly parent, outcome variables are hours of agricultural and nonagricultural labor, hours of grandchild care, and expected source of old-age support. When the person j is an adult child, outcome variables are participation in farmwork and out-migration. E_{it} is our key variable of interest, a dummy variable indicating the village's implementation of the NRPP. X_{ijt} is a characteristic vector of person j, including time-invariant ones such as gender and education, and time-variant characteristics of age and marital status. Y_{ijt} is a set of control variables reflecting household characteristics, including total household yearly income, household size, land size, number of grandchildren under age 16, and having elderly age 80 and older in household. Z_{it} is the attribute vector representing community characteristics. We use having childcare centers in village. u_j captures individual fixed effect. t is a dummy variable for the year; if the year is 2013, then the variable is equal to 1, and otherwise it is equal to 0. ε_{ijt} is the error term. With this specification, the coefficient α measures the effect of the NRPP on the outcome variable.

When choosing an estimation method for equations of hours of paid work and grandchild care, we encounter the technical problem of data censoring. Because many elderly people either do not have young grandchildren or do not take care of their grandchildren even if they have them, there are a large number of 0 values in the dependent variable. As is reported in Table 3, 41.6 percent of elderly men and 56.4 percent of elderly women in 2011 spent 0 hours engaged in farmwork and nonfarm paid work. Similar problems exist for hours of childcare work. In cross-section data, such an issue is solved by Tobit regression, and marginal effects can be estimated. However, because the Tobit fixed-effect model is estimated using a semi-parametric method for disturbance, although coefficients and statistical significance are correctly reported, marginal effects cannot be estimated (Honoré 1992). For this reason, we keep this model for the purpose of showing the sign and statistical significance of the effect, but estimate a linear fixed-effect model ignoring the censoring nature of the data using the STATA command XTREG. When discussing our results, we use the linear fixed-effect model to discuss the magnitude, but we use the Tobit fixed-effect model for statistical significance.

Effects of the NRPP on farm and nonfarm paid work and grandchild care

Table 4 presents estimates of the effect of the NRPP on the elderly's farm labor hours using two methods. Results from the Tobit fixed-effect model and regular fixed-effect model both indicate that elderly men reduce their time spent in agricultural labor once their village participates in the NRPP.

Comparing results across the Tobit fixed-effect models and linear fixed-effect models, we can see that the direction and significance are quite

Table 4 Fixed effect regressions of farm labor supply of elderly people

Variables	Linear fixed effect		Tobit fixed effect (coefficient)	
	Women	Men	Women	Men
	[1]	[2]	[3]	[4]
NRPP in the village	−52.87	−113.69*	−111.05	−203.07**
	(48.97)	(62.41)	(102.90)	(89.51)
Year = 2013	25.77	−2.04	51.13	3.46
	(38.01)	(53.10)	(89.50)	(79.63)
Single or widowed (Base: Married with spouse present)	49.00	−220.85*	123.16	−628.66***
	(72.14)	(113.75)	(263.47)	(237.80)
Number of grandchildren under age 16 living in same village	−10.23	−19.15	−24.02	−35.68
	(10.25)	(17.11)	(31.29)	(25.85)
Having elderly age 80 and older in household	−9.54	233.45	−16.32	312.60
	(231.20)	(198.92)	(503.92)	(287.12)
Household size	−14.55	28.86	−32.80	48.73
	(23.82)	(22.65)	(60.76)	(42.69)
Household land size	5.60***	3.40	18.01	6.62**
	(1.66)	(2.68)	(17.69)	(2.70)
Net housing value	0.515	−0.099	0.588	−0.266
	(0.740)	(0.163)	(0.878)	(0.200)
Having childcare centers in village	−22.35	4.42	−63.67	−4.91
	(50.57)	(53.49)	(101.99)	(86.11)
Total household yearly income	−0.000	−0.001**	−0.000	−0.002**
	(0.000)	(0.000)	(0.001)	(0.001)
Constant	632.30***	837.34***		
	(98.83)	(92.17)		
Observations	4,714	4,662	4,714	4,662
R^2	0.006	0.017		
Number of individuals	2,357	2,331		

Source: CHARLS waves 2011 and 2013, balanced panel. Sample restriction: elderly age 60 and older in 2011 with local rural *hukou*.
Notes: Standard errors are in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are clustered at the community level.

similar. This gives us confidence in using the linear fixed-effect model to interpret magnitudes and the Tobit fixed-effect model for statistical significance.

Judging from the regular fixed-effect model in column 2, elderly men's farm labor hours were statistically significantly reduced by 113 hours, a reduction of 13.5 percent (113/837) over the average hours by men spent on farmwork in 2011. Column 1 suggests that women's farm labor input was

reduced by 53 hours, which represents a 9.1 percent (53/582) reduction over the mean hours that women spent on farmwork in 2011. One possible explanation of why elderly men reduced their farm labor, but elderly women did not is that because elderly men already spend far more time in farmwork than elderly women, there were more opportunities for elderly men to reduce their agricultural labor time. We also estimate the effect of the NRPP on nonfarm labor supply of the elderly. Tobit fixed-effect models suggest that village participation in the NRPP has no statistically significant effect on either men or women's nonfarm labor time.[12] There is a small fraction of the elderly who participate in nonfarm employment, and their choices may be more related to the supply of jobs or the presence of a family business.

Table 5 presents results from two models for estimating the effect of the NRPP on elderly care hours. Because having grandchildren near but not caring for them is different from not having any grandchildren at all, Table 5 is estimated based on a subset of the elderly who have grandchildren age 16 or younger.[13] The first two columns are estimated using a linear fixed-effect model, and the last two columns are based on Tobit fixed-effect models.

As revealed by the Tobit fixed-effect model results in Table 5, village participation in the NRPP has a positive and statistically significant effect on elderly men's time spent in caring for grandchildren, but has an insignificant effect for elderly women. From the linear fixed-effect model, we find that the effect on elderly men's time caring for grandchildren was 192 hours per year. Considering that elderly men on average spent 522 hours taking care of grandchildren in 2011, an increase of 192 hours represents a 36.8 percent (192/522) growth. One possible explanation of why elderly men increased the amount of time spent caring for grandchildren but elderly women did not is that because elderly women already spend far more time caring for grandchildren than elderly men, there is not much room to further increase time spent on care, whereas among men such opportunities still exist.

There are two reasons why elderly men might reduce their agricultural labor supply and correspondingly increase their childcare time when they have an external source of income. First, the marginal utility of childcare is greater than that of agricultural labor at the original choice, and the elderly also have a comparative advantage in caring for children. Second, when households have pension benefits to spend, the elderly can purchase agricultural machinery to increase labor efficiency.

In summary, the NRPP reduces the number of hours that elderly men put into farmwork. Correspondingly, we see positive effects on the number of hours devoted to the care of grandchildren among elderly men. This finding seems to indicate a shift away from onerous farm labor to lighter tasks such as grandchild care. Men are better able to make the

Table 5 Fixed effect regressions of hours of grandchild care of elderly people

Variables	Linear fixed effect		Tobit fixed effect (coefficient)	
	Women	Men	Women	Men
	[1]	[2]	[3]	[4]
NRPP in the village	55.30	192.56*	422.43	959.42***
	(104.83)	(104.67)	(340.34)	(346.06)
Year = 2013	162.77*	111.23	442.37	477.10*
	(90.85)	(86.13)	(280.66)	(279.33)
Single or widowed (Base:	478.85**	73.80	2,506.24***	583.69
Married with spouse present)	(193.86)	(139.75)	(911.97)	(583.85)
Number of grandchildren	2.17	−29.71	−30.27	−200.11*
under age 16 living in same	(25.85)	(22.25)	(81.21)	(103.37)
village				
Having elderly age 80 and older	−502.03	116.02	−1,801.21	582.37
in household	(497.68)	(361.30)	(1,498.38)	(798.60)
Household size	43.73	155.98***	66.14	499.49***
	(60.74)	(59.63)	(145.76)	(178.50)
Household land size	−2.62	0.18	−32.04	5.79
	(3.87)	(2.31)	(40.14)	(58.94)
Net housing value	0.217	−0.058	9.72	9.04
	(0.349)	(0.137)	(10.31)	(12.81)
Having childcare centers in	37.83	88.33	182.50	295.80
village	(117.16)	(116.07)	(313.97)	(339.15)
Total household yearly income	0.003***	0.001	0.007	0.002
	(0.001)	(0.001)	(0.010)	(0.002)
Constant	246.87	−105.59		
	(224.92)	(226.64)		
Observations	3,248	3,244	3,248	3,244
R^2	0.028	0.027		
Number of individuals	1,624	1,622		

Source: CHARLS waves 2011 and 2013, balanced panel. Sample restriction: elderly age 60 and older in 2011 with local rural *hukou* and caring for at least one grandchild.
Notes: Standard errors are in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are clustered at the community level.

substitution because they are traditionally responsible for working the land (Benjamin, Brandt, and Fan 2003), while women were already entrusted with the task of grandchild care. This substitution between paid work and grandchild care is especially notable because it suggests possible changes in intergenerational relationships. It also may be that the elderly have more bargaining power in the household with the introduction of pension programs in rural China.

Table 6 Fixed effect estimations of expecting to depend on children for old-age support

Variables	Women [1]	Men [2]	Women [3]	Men [4]
NRPP in the village	−0.035*	−0.032	−0.041*	−0.028
	(0.020)	(0.020)	(0.021)	(0.021)
Year = 2013	−0.056***	−0.063***	−0.057***	−0.061***
	(0.018)	(0.020)	(0.018)	(0.020)
Single or widowed (Base: Married with spouse present)	0.135***	0.051	0.121***	0.070
	(0.042)	(0.054)	(0.047)	(0.060)
NRPP* single or widowed			0.019	−0.026
			(0.027)	(0.034)
Number of grandchildren under age 16 living in same village	−0.000	0.007	−0.000	0.007
	(0.006)	(0.006)	(0.006)	(0.006)
Having elderly age 80 and older in household	−0.108	0.035	−0.109	0.036
	(0.080)	(0.076)	(0.080)	(0.076)
Household size	0.019***	0.011*	0.020***	0.011
	(0.006)	(0.006)	(0.006)	(0.007)
Household land size	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Net housing value/100	−0.004	−0.002	−0.004	−0.002
	(0.018)	(0.014)	(0.018)	(0.014)
Having childcare centers in village	0.027	−0.025	0.027	−0.025
	(0.021)	(0.021)	(0.021)	(0.021)
Total household yearly income	−0.004**	−0.000	−0.004**	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.779***	0.787***	0.782***	0.785***
	(0.022)	(0.020)	(0.023)	(0.020)
Observations	4,466	4,354	4,466	4,354
R^2	0.021	0.024	0.021	0.024
Number of individuals	2,233	2,177	2,233	2,177

Source: CHARLS waves 2011 and 2013, balanced panel. Sample restriction: elderly age 60 and older in 2011 with rural *hukou*.

Notes: Standard errors are in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. The models are estimated by fixed linear probability model. Standard errors are clustered at the community level.

Expected source of old-age support

In Table 6, we further look at expected sources of old-age support when the elderly lose the ability to work for pay. The dependent variable is an indicator of whether an elderly person expects to depend on children for old-age support. We use a linear probability fixed-effect model.

Estimation results in columns 1 and 2 suggest that NRPP coverage tends to reduce the probability of the elderly expecting to depend on children if the elderly lose the ability to work for pay. But the effects are statistically significant only for women, whose expected dependence on children declines by 3.5 percentage points. The coefficient for elderly men is 3.2 percentage points, but is not statistically significant.

Other results of the regression are also interesting. Between 2011 and 2013, the expectations of both elderly men and women that they will depend on children for support after losing the ability to work for pay declined, by 5.6 percentage points among women and 6.3 percentage points among men. This finding may capture attitude changes caused by other factors not in the regression. When an elderly woman was widowed, her expectation of relying on her children increased by 13.5 percentage points, but when a man lost his wife, his expectation was not affected. These results signify that rural elderly woman have a stronger dependence on their adult children than elderly men, likely because women have substantially fewer income sources and less economic control of their households. We also find that in rural areas, when elderly women have husbands, they can cooperate with their husbands to cultivate land, but once they are widowed or single, the chance that they will cultivate land independently drops sharply. Consequently, in the absence of income sources, elderly women will be forced to depend on their adult children. In order to check whether the NRPP reduces the dependence of widowed or single elderly on children, in columns 3 and 4, we further add the interaction of NRPP in the village and elderly marriage status. The coefficient of the interaction is not statistically significant either for men or for women, which shows that NRPP did not reduce the dependence of the elderly on adult children when they became single or widowed. The possible explanation may be the scarcity of pension benefits. Household size is associated with expectations of support from adult children as well. When fewer people live in the same household, both elderly men and women have reduced expectations of relying on their children.

Effects of the NRPP on adult children's labor supply

Our last set of analyses concerns adult children's behavioral change in response to rural pensions given to their parents. The international literature has found a spillover effect (for the case of South Africa, see Bertrand, Mullainathan, and Miller [2003]; Posel, Fairburn, and Lund [2006]; Ardington, Case, and Hosegood [2009]). We are interested in finding out whether the same occurs in rural China. We focus on children's out-migration and participation in farmwork because these are the only outcomes available in the data.

Table 7 presents linear probability model estimates of the effect of NRPP on adult children's migration behaviors (column 1) and farm participation (column 2).[14] As shown in column 1, NRPP coverage statistically significantly reduces the probability of an adult child's out-migration by 6.3 percentage points. Considering that the mean probability of out-migration among children is 49.1 percent, this finding represents a 12.8 percent reduction in the probability of migration. This finding echoes the literature, which has found that when rural pensions are given to elderly parents, their children's migration is reduced (Bertrand, Mullainathan, and Miller 2003). This phenomenon has been interpreted as adult children sharing the parents' pension benefits. The same seems to be true in China.

Because adult children are less likely to out-migrate, they have more time to farm the family land. Column 2 of Table 7 confirms that adult children indeed increase their farm participation rate by 4.7 percentage points (11.35 percent over the 2011 level) once the village implements the NRPP. In recent decades, China has seen an aging of the agricultural workforce, and the elderly labor force participation rate has stayed very high (Benjamin, Brandt, and Fan 2003). It appears that the social pension has had the unintended consequence of alleviating the paid work burden of elderly parents by reengaging adult children in farm production against a time trend of reduced participation in farming.

SUMMARY AND CONCLUSION

For the great majority of rural Chinese, a reliance on family for old-age support means a lack of economic freedom and constant work, either on the farm or in the home. This situation is exacerbated by the massive out-migration of adult children, leaving their elderly parents to take care of the land and the grandchildren. Our data from the CHARLS confirm that both elderly men and women spend a considerable number of hours farming the land and taking care of grandchildren simultaneously, and both ranked their adult children as the most important source of financial support if they were to become infirm in the future. Due to the introduction of a new rural social pension program, this situation seems to be changing. Using the first two waves of CHARLS, which capture the initial expansion of the program, we find that both elderly men and women have been affected by the new pension program, but the patterns of change are different. Men shifted from farming to grandchild care, and women reduced their expected reliance on children.

Specifically, we find that the NRPP reduced hours of farmwork among elderly rural men by 113 hours, a reduction of 13.5 percent from the previous level, and increased hours of grandchild care by 192 hours, representing a 36.9 percent increase. The pension program did not have a statistically significant effect on elderly women's farm and nonfarm paid

Table 7 Fixed effect estimations of adult children's migration and participation in farmwork

	Migration	Farmwork
	[1]	[2]
NRPP in village	− 0.063**	0.047*
	(0.025)	(0.027)
Year = 2013	− 0.103***	− 0.070***
	(0.010)	(0.010)
Single (Base: Married with spouse present)	0.048*	− 0.006
	(0.027)	(0.029)
Never married	− 0.385**	0.366*
	(0.194)	(0.206)
Household size	− 0.088***	0.029***
	(0.010)	(0.011)
Having elderly age 80 and older in household	0.024	− 0.001
	(0.066)	(0.070)
Household land size	− 0.002	0.002
	(0.001)	(0.001)
Net housing value	− 0.173*	0.036
	(0.089)	(0.095)
Total household yearly income	− 0.001	0.002
	(0.002)	(0.002)
Having childcare centers in village	0.005	0.033
	(0.030)	(0.032)
Constant	207.98***	141.75***
	(19.22)	(20.50)
Observations	3,996	3,980
R^2	0.169	0.054
Number of individuals	1,998	1,990

Source: CHARLS waves 2011 and 2013. Sample restriction: children of the elderly between 16 and 50 years old with rural *hukou*.
Notes: Standard errors are in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively. The models are estimated by fixed linear probability model. Standard errors are clustered at the community level.

working hours. Conversely, we find that elderly women's expected reliance on children for financial support was reduced by 3.5 percentage points (4.2 percent), but the effect was statistically insignificant for men.

The differences in responses between men and women can be explained by the initial gender patterns in paid work and expected reliance on children. While both men and women have very high rates of participation and intensity in farmwork and grandchild care, men spend much time farming while women spend more time looking after grandchildren. This gender difference translates to a difference in responses when they are

asked whom they will rely on for financial support in old age: women are more likely than men to state "children," although both men and women have a high stated dependence on children. Therefore, when presented with a small pension income, the first order reaction for men seems to reduce the number of hours they spend farming and shift to less physically demanding childcare. For women, although pension benefits are not large enough to lead to a reduction in farming or childcare labor, their margin of change is psychological. This change is important, however, given the higher rates of depression among elderly women (Lei et al. 2014).

It is worth noting that our results are based on a relatively small pension benefit – only RMB55 (US$8) a month. It may be expected that as pension benefits increase in the future, both men and women may withdraw from not only farming, but other nonmarket activities as well. This may be the beginning of the end of the rural elderly's ceaseless toil.

We further examine how the NRPP affects other family members, and we find that the new pension program statistically significantly reduced adult children's out-migration and increased their hours in farming activities. These findings indicate that the effect of the rural social pension program has spilled over to younger members of the household, making out-migration a less desirable option. In addition, the return of adult children alleviates the burden of farmwork on elderly parents, allowing the parents, especially elderly men, to reduce their farming intensity. These results signal that the elderly may have more bargaining power when they interact with adult children, which will in turn enhance their welfare in old age.

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NOTES

[1] In the case of rural China, the lack of assets belonging to the elderly is partly due to collective land ownership, in which the land is not passed down from parents to children, but allocated by collectives according to membership.

[2] The poverty rate is calculated according to the official national poverty line, which is RMB 2,300 per year in 2011 (US$ 1.8 a day using PPP exchange rate) and 2,674 in 2013.

[3] Basic eligibility criteria are rural registration status (*hukou*) and not being covered by the social insurance system for urban paid workers.

[4] Per capita incomes are available at National Bureau of Statistics (n.d.).

[5] Wei Huang and Chuanchuan Zhang (2016) pooled data from several data sources including CHARLS and found that the pension program had a statistically significant impact on many outcomes, including health, health insurance participation, consumption, and labor supply. However, they did not study men and women separately. Using panel data from Guizhou province, Xi Chen (2016) found a large but positive impact of the rural pension on adult sons' out-migration.

[6] CHARLS is conducted by the National School of Development, Peking University. See Yaohui Zhao, John Strauss et al. (2013) for a complete discussion.

[7] CHARLS had more respondents in 2013 because many individuals who were in the sample but did not respond in 2011 were successfully interviewed in 2013, and some new subjects who just turned age 45 were included as well.

[8] Our results are robust to different threshold points in the selection.

[9] In the CHARLS questionnaire, the question is: "Approximately how many weeks and how many hours per week did you and your spouse spend last year taking care of this child's children?"

[10] This is 16 hours every day.

[11] We do not know if the adult children participate in off-farm local employment.

[12] The estimated results regarding the effect of the NRPP on the elderly non-farmwork are not reported. Readers can contact us by e-mail.

[13] The results are not sensitive to the inclusion or exclusion of elderly people who do not have young grandchildren.

[14] We choose a linear probability model instead of a logit model because the latter model may encounter the incidental parameter problem under fixed effects estimation, which leads to biased estimators (Wooldridge 2005).

REFERENCES

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

Benjamin, Dwayne, Loren Brandt, and Jia-Zhueng Fan. 2003. "Ceaseless Toil? Health and Labor Supply of the Elderly in Rural China." Working Paper 579, William Davidson Institute.

Bertrand, Marianne, Sendhil Mullainathan, and Douglas Miller. 2003. "Public Policy and Extended Families: Evidence from Pensions in South Africa." *World Bank Economic Review* 17(1): 27–50.

Case, Anne and Angus Deaton. 1998. "Large Cash Transfers to the Elderly in South Africa." *Economic Journal* 108(450): 1330–61.

Chan, Sewin and Ann Huff Stevens. 2004. "Do Changes in Pension Incentives Affect Retirement? A Longitudinal Study of Subjective Retirement Expectations." *Journal of Public Economics* 88(7/8): 1307–33.

Chen, Xi. 2016. "Old-Age Pension and Extended Families: How is Adult Children's Internal Migration Affected?" *Contemporary Economic Policy* 34(4): 646–59.

Chiappori, Pierre-André. 1997. "Introducing Household Production in Collective Models of Labor Supply." *Journal of Political Economy* 105(1): 191–209.

Connelly, Rachel and Margaret Maurer-Fazio. 2015. "Cultural and Ethnic Differences in the Transitions from Work to 'Retirement' of Rural Elders in China's Minority Regions." IZA Discussion Paper 9343, Institute for the Study of Labor (IZA).

Costa, Dora L. 1997. "Displacing the Family: Union Army Pensions and Elderly Living Arrangements." *Journal of Political Economy* 105(6): 1269–92.

de Carvalho Filho, Irineu Evangelista. 2008. "Old-Age Benefits and Retirement Decisions of Rural Elderly in Brazil." *Journal of Development Economics* 86(1): 129–46.

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

Edmonds, Eric V. 2006. "Child Labor and Schooling Responses to Anticipated Income in South Africa." *Journal of Development Economics* 81(2): 386–414.

Edmonds, Eric V., Kristin Mammen, and Douglas L. Miller. 2005. "Rearranging the Family? Income Support and Elderly Living Arrangements in a Low-Income Country." *Journal of Human Resources* 40(1): 186–207.

Gruber, Jonathan and David Wise. 2000. "Social Security Programs and Retirement around the World." *Research in Labor Economics* 18: 1–40.

Honoré, Bo E. 1992. "Trimmed LAD and Least Squares Estimation of Truncated and Censored Regression Models with Fixed Effects." *Econometrica* 60(3): 533–65.

Huang, Wei and Chuanchuan Zhang. 2016. "The Power of Social Pensions." IZA Discussion Paper 10425, Institute of Labor Economics (IZA).

Juarez, Laura. 2009. "Crowding out of Private Support to the Elderly: Evidence from a Demogrant in Mexico." *Journal of Public Economics* 93(3/4): 454–63.

Kaushal, Neeraj. 2014. "How Public Pension Affects Elderly Labor Supply and Well-Being: Evidence from India." *World Development* 56: 214–25.

Krueger, Alan B. and Jörn-Steffen Pischke. 1992. "The Effect of Social Security on Labor Supply: A Cohort Analysis of the Notch Generation." *Journal of Labor Economics* 10(4): 412–37.

Lei, Xiaoyan, John Strauss, Meng Tian, and Yaohui Zhao. 2015. "Living Arrangements of the Elderly in China: Evidence from the CHARLS National Baseline." *China Economic Journal* 8(3): 191–214.

Lei, Xiaoyan, Xiaoting Sun, John Strauss, Peng Zhang, and Yaohui Zhao. 2014. "Depressive Symptoms and SES Among the Mid-Aged and Elderly in China: Evidence from the China Health and Retirement Longitudinal Study National Baseline." *Social Science and Medicine* 120: 224–32.

Mao, Shangyi, Rachel Connelly, and Xinxin Chen. 2017. "Stuck in the Middle: Off-Farm Employment and Caregiving Among Middle-Aged Rural Chinese." *Feminist Economics*. doi:10.1080/13545701.2017.1387670.

National Bureau of Statistics. n.d. "National Bureau of Statistics." Accessed December 2017. http://www.stats.gov.cn/tjsj/ndsj/.

Posel, Dorrit, James A. Fairburn, and Frances Lund. 2006. "Labour Migration and Households: A Reconsideration of the Effects of the Social Pension on Labour Supply in South Africa." *Economic Modelling* 23(5): 836–53.

Ralston, Margaret, Enid Schatz, Jane Menken, Francesc Xavier Gómez-Olivé, and Stephen Tollman. 2016. "Who Benefits – or Does Not – From South Africa's Old Age Pension? Evidence from Characteristics of Rural Pensioners and Non-Pensioners." *International Journal of Environmental Research and Public Health* 13(1): 85.

Wooldridge, Jeffrey M. 2005. "Simple Solutions to the Initial Conditions Problem in Dynamic, Nonlinear Panel Data Models with Unobserved Heterogeneity." *Journal of Applied Econometrics* 20(1): 39–54.

Zhao, Rui and Yaohui Zhao. 2018. "The Gender Pension Gap in China." *Feminist Economics*. doi:10.1080/13545701.2017.1411601.

Zhao, Yaohui, Albert Park, John Strauss, John Giles, Shangyi Mao, Eileen Crimmins, Peifeng Hu, Yisong Hu, Xiaoyan Lei, Yan Shen, Xinzheng Shi, James P. Smith, Yafeng Wang, Xiaoyu Wu, Gonghuan Yang, and Xiangjun Yin. 2013. "Challenges of Population Aging in China: Evidence from the National Baseline Survey of the China Health and Retirement Longitudinal Study (CHARLS)." National School of Development, Peking University, Beijing. http://charls.pku.edu.cn/uploads/document/public_documents/application/Challenges-of-Population-Aging-in-China-final.pdf.

Zhao, Yaohui, John Strauss, Gonghuan Yang, John Giles, Peifeng (Perry) Hu, Yisong Hu, Xiaoyan Lei, Man Liu, Albert Park, James P. Smith, and Yafeng Wang. 2013. "China Health and Retirement Longitudinal Study: 2011-2012 National Baseline Users' Guide." http://charls.pku.edu.cn/uploads/document/2011-charls-wave1/application/CHARLS_nationalbaseline_users_guide.pdf.