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# **Labor Force Participation Responses to New Rural Social Pension Insurance in China: A Regression Discontinuity Approach**

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## **Abstract**

Transitioning into retirement is an under-researched phenomenon in developing countries. Largely, this is linked to a predominance of contexts where – in particular – the rural population remains outside the coverage of any formal pension system. This paper studies the effect of the recently introduced New Rural Social Pension (NRSP) scheme on the labor force participation of the elderly in rural China. As pension benefit eligibility at the time of its implementation is conditional on age, a regression discontinuity design is applied to investigate the casual effect of the receipt of pension benefits on labor supply. Furthermore, as the NRSP is neither means-tested nor conditions on exiting the labor force, it induces a pure income effect on employment. Using data from the China Health and Retirement Longitudinal Study, a nationally representative data set, we find that the receipt of pension benefits increases the probability of exiting the labor force among the rural elderly by around 15%.

## **1. Introduction**

The determinants of individuals' decision to retire represents an under-studied phenomenon in many developing countries. This despite it being relevant to many crucial development issues, such as social support and poverty reduction. During recent decades, in order to reduce the incidence of poverty among the elderly, some developing countries therefore started to extend pension schemes to previously uncovered individuals. Consequently, a key question relates to how the receipt of pension benefits has affected the labor force participation in older ages in affected countries. Also, due to dissimilarities including institutional setting and policy focus, findings obtained from studies on the developed world might be of less relevance for developing context (Kaushal 2014). The Chinese rural elderly has since long been described as subjected to "ceaseless toil" (Benjamin, Brandt and Fan 2003; Davis 1991). More specifically, due to a lack of sufficient old age provision, the elderly frequently continue to work until they are physically incapable to continue doing so. Hence, the decision to exit from the labor force is determined by individual's health, and not influenced by public policy. The implementation of the New Rural Social Pension (NRSP) scheme, taking place between 2009 and 2012, thus represents an

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event of potentially fundamental importance for the rural Chinese. More specifically, the NRSP – today implemented across the country – for the first time in history comprehensively offers Chinese rural residents nationwide the possibility to enjoy pension benefits. By exploiting the nature of the implementation of the NRSP, this study analyzes how the labor force participation of the elderly was affected by the exogenously generated increase in income, though a regression discontinuity design.

Due to declining fertility, China has turned into a rapidly ageing society. Substantial rural-to-urban migration has furthermore transferred a significant share of the working-age population out of rural areas and thereby resulted in an even more pronounced ageing process in rural areas. In 2008, the old-age dependency ratio was 13.5% in rural areas, which is 5 percentage points higher than in the urban areas (Cai et al. 2012). Despite the higher fertility rate in rural China, this has not been able to offset the accelerating aging process caused by the out-migration of working-age population. Another consequence of this process has been the increased risk among the remaining elderly to fall into poverty (ibid). Until this day, the exploitation of land remains the main source of income for rural residents. The out-migration of the younger generation thus also implies that the rural elderly have fewer helpers to help carry out the highly labor intensive agricultural work.

Prior to the implementation of the NRSP, pension benefits were available to certain urban employees and a very small proportion of rural residents. Consequently, urban and rural areas are characterized by distinct differences in retirement patterns. In 2009, among individuals between 60-64, the employment rates for urban and rural men was 31% and 85%, respectively (Giles, Wang and Cai 2011). Generally, women have a lower labor force participation, but those over the age of 60 in rural areas are considerably more likely to remain active in the labor force than urban women. While around half of the urban elderly report pension as their main source of income, their rural counterparts mainly rely on their own labor income and the financial support of other family members. Between the age of 60 and 70, there is furthermore a shift in the primary source of income of rural residents from labor income to the receipt of financial support of other family members. In 2005, only 4,6 % of the rural elderly reported pension as their primary source of income (Cai et al. 2012). Due to the absence of any formal pension scheme for rural residents, aforementioned pension incomes were typically enjoyed by former civil servants and village cadres. Clearly, until recently, pension income has only played a very minor role for the economic wellbeing of the elderly in rural China.

There are only a few studies that focus on individuals' retirement decisions in rural China. Davis (1991) was first in describing Chinese rural residents as subjected to "ceaseless toil", attributing their extended working lives to an insufficient elderly support system. Benjamin et al. (2003) and Giles et al. (2011) confirm that, during the

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past 20 years, the rural elderly typically continue to work into their 60s and even into their 70s. Benjamin et al. (2003) further emphasize the role of health in the retirement decision. Their findings suggest that declining health explains around 50% of the reduction in labor force participation. Other studies have focused on other determinants of the retirement decisions. Generally, the rural elderly with a higher level of education, and with pension eligibility<sup>1</sup> are less likely to work after the age of 60 (Giles et al. 2011; Pang, De Brauw and Rozelle 2004).

These studies outline retirement patterns and identifies possibly related factors, but it remains difficult to assess the causal nature of the outlined relationships. In particular, income is usually considered as an endogenous variable in the analysis of labor supply. In terms of the analysis of pension income, receiving these benefits is usually not independent of the individual's previous labor market activities. While previous studies have suggested that the lack of sufficient financial resources may be linked to the extended character of the working life of the rural Chinese, the nature of how the individual's income shapes the retirement decision deserves additional examination.

The introduction of the NRSP provides a unique opportunity to disentangle the influence of income on the labor force participation of the Chinese rural elderly. The NRSP was first introduced in rural China in 2009, achieving country wide coverage by the end of 2012. Individuals, who are aged 60 and above are entitled to pension benefits which on average correspond to about 10% of an average annual income in rural China. In particular, participants who signed up for the NRSP when they were already over 60 could claim pension benefit without having previously contributed to any pension plan. This feature of the NRSP allows us to apply a regression discontinuity design. By comparing the labor force participation among individuals just above and below age 60, the aim is to identify the causal influence of pension incomes on the labor force participation of the rural elderly. This is done using the China Health and Retirement Longitudinal Study (CHARLS) 2011 survey.

This study offers several contributions to existing literature. Firstly, as the introduction of NRSP represents quasi-natural experiment, the receipt of pension benefits provides a source of exogenous variation in income. Using a regression discontinuity design, we are therefore able to investigate the casual effect of income on the labor force participation of the Chinese rural elderly. Secondly, pension benefits from the NRSP generate a pure income effect. Theoretically, pension incomes may influence retirement behaviors through two main mechanisms; income effects and substitution effects. Pension benefits represent additional incomes and thus facilitate retirement (income effects). Pension programs may, however, also

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<sup>1</sup> Most of them are former civil servants.

<sup>2</sup> *Hukou* system is a mandatory household registration system in China. It officially identifies the area

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encourage retirement by effectively imposing a tax on work (substitution effects). This is especially so when the receipt of pension benefits is conditional on an earnings-test, meaning that only individuals with earnings below a given threshold are eligible. Individuals may thereby choose to work less in order to keep the household income low. Another scenario is represented by when pension eligibility requires the individual to withdraw from the labor market, thereby providing an incentive to retire. With the existence of substitution effects, individuals will compare their wages and their potential pension benefits and choose the optimal strategy. If pension benefits exceed their expected earnings, they will choose to retire. Since individuals in rural China who are eligible for pension benefits through the NRSP are neither subjected to an earnings test nor required to retire as a result of pension benefit receipt, the NRSP does not contain any such incentives to leave the labor force.

Thirdly, this paper is one of the first to investigate the behavioral responses of individuals as a result of exposure to the NRSP. Zhang, Giles and Zhao (2014) examines several outcomes besides labor supply, also choosing a different age in defining the discontinuity beyond which individuals are considered as treated. Furthermore, this study extends on their findings by examining differences in the labor supply response to the NRSP among certain key groups. Thereby, we are able to hypothesize further about the mechanisms through which the comparatively modest income increase, as represented by NRSP pension benefits – affects the labor supply of the rural elderly. Thus, this study further contributes to the evaluation of the pension program.

The paper is structured as followed: section two summarizes previous findings in the literature, from China and elsewhere, and section three provides an overview of the pension system in China in general as well as outlining the details of the NRSP. The subsequent section discusses the data and methods, whereas section five presents the results of the empirical analysis. Section six presents a series of robustness checks, with the discussion and conclusion being provided in section seven.

## **2. Previous research**

A substantial literature has studied the effects of various social benefits on labor force participation in developed countries. Social benefits are seen as an unearned income, with one of the largest empirical challenges being to obtain a measurement of such incomes that may be considered as exogenous to the individual. Typically, means-based social benefits are not randomly assigned, and hence not to be considered as exogenous determinants of labor supply. Other variables of interest, such as previously earned income may be correlated with both the receipt of social benefits and the retirement decision, and thus lead to biased estimates. The use of panel data could mitigate these problems, but it remains difficult to distinguish the

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casual effects of social benefits from a range of potentially confounding factors (Krueger and Pischke 1992).

Several studies have exploited the influence of various policy changes affecting different types of benefits on a range of individual decisions. The 1977 amendment of the Social Security act reduced the average social benefits by around 20% for the 1920 birth cohort in the U.S. Krueger and Pischke (1992) show that these social benefit cuts did not lead to any reduction in labor supply. A similar study using German data finds that the lowering of pension benefits by between 8 and 16 percent in the 1990s did not have any significant effects on the labor supply of older low-skill workers (Puhani and Tabbert 2011). Costa (1995) examines the income effects of the major pension in the U.S which covered union army veterans. She documents a large negative effect on male labor force participation rate in the early twentieth century. Other empirical research has focused on other types of social benefits and their influence on labor supply. Lemieux and Milligan (2008) show that more generous social assistance benefits lower the male beneficiaries' employment rates during the 1980s and 1990s in Quebec.

Despite these findings, the conclusions from analyses of developed countries may have relatively limited relevance for developing countries due to substantial differences in terms of institutional setting, resource access and policy focus (Kaushal 2014). Many recent social security reforms in developed countries have aimed to mitigate the social burden created by the ongoing and future process of population aging. As an example, the cutting of pension benefits in many countries since the mid-1990s has created incentives for later retirement, and thereby typically also extended the working life. In contrast, many old age support programs in the developing world have poverty reduction as a primary aim and attempt to offer the elderly poor the possibility to retire. Moreover, the elderly in developed countries may to a greater extent rely on the financial market or own savings to support themselves. While this may be becoming increasingly common in urban China, the residents in the country's rural areas are growing old in a poor environment, also being subjected to substantial credit constraints. Most are not able to accumulate enough wealth to being able to support themselves in their old ages. If people anticipate that they will receive some benefits in the future, they may rely on borrowing and saving and retire before they could claim pensions. With access to functioning financial markets, people near the retirement age in developed countries could borrow money and take the smoothing strategy to retire earlier. In that case, the impact of pension reform may be underestimated as the impact of pension eligibility occurs even before they actual claim the benefits. However, provided the credit constraint in rural China, the rural residents have limited options to smoothing the labor supply. Therefore, the response of labor force participation would only exist when the elderly actual receive pension

benefits.

The impact of pension provision on individuals' labor supply has been comparatively less examined in developing countries. Analyzing the expansion of South Africa's pension program to also include the black population during the early 1990s, Ranchhod (2006) finds a significant decrease in employment among the beneficiaries. The exceptional generosity of the program for the newly covered population, with benefits being roughly twice the average income, the pension extension was also found to have benefits for other family members living in the multi-generational household. Ardington, Case and Hosegood (2009) find that the pension scheme facilitates the employment of prime-aged adults. The pension benefits allowed the elderly to retire earlier and be more involved in childcare, also lifting credit constraints and allowing for the provision of financial help for the job seekers to moving out. Hence, pension to the elderly also have family effects. Examining the Indian context, Kaushal (2014) documents that the old age pension scheme has a modest but negative impact on the employment of male elderly. While the pension programs in South Africa and India both target the older poor, they are also characterized by being earnings-tested. Consequently, the estimates contain both income and substitution effects.

Instead, other developing countries have offered opportunities to isolate the income effect from social benefit reform on retirement behavior. Juarez (2010) estimates the impact of an old age benefit program targeting individuals over the age of 70, providing a compensation level amounting to around 30% of an average income. The findings suggest a negligible labor supply response, linked to the already quite low employment rate among individuals in the target group already before the reform. de Carvalho Filho (2008) exploits a pension reform in Brazil in 1991 that reduced minimum age for the payment of benefits and increased benefits. In terms of employment among the elderly, the findings indicate a large negative response as a result of the policy intervention. The largest effects are found among rural men, where those who receive pension benefits are observed with a 38% increased risk of retirement. Danzer (2010) studies a generous pension reform that induces a threefold increase in pension benefits in Ukraine, showing a 30-47 percent increase in retirement probability.

### ***Retirement behaviors in China***

Existing studies on retirement behavior in China are predominantly of a descriptive nature. To our knowledge, there is little evidence addressing the casual relationship between the receipt of pension benefits and elderly employment. Furthermore, the rural and urban Chinese have starkly different sources of old-age support which may lead to various retirement behaviors. In 2005, 45% of the urban elderly considered

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pension benefits as their primary source of financial support, while the corresponding share among the rural elderly over 60 only amounted to about five percent (Giles, Wang and Zhao 2010). Instead, 54% of the rural elderly population considered support from their family members as the main income source and 38% mainly lived off their own labor income. Unsurprisingly, labor income is comparatively more important for the younger elderly (age 60-70), with family support being more important for those above the age of 70. Consistently, relying on family support is further more important for the female elderly.

A general pattern of retirement behaviors in China has been outlined by Giles et al. (2011). Given the differences in pension coverage and mandatory retirement provisions, urban and rural elderly have very different retirement behaviors. Generally speaking, urban residents retire at a younger age and receive a comparatively substantial pension. The retirement decision for urban residents is therefore more similar to those observed in developed countries. Women also typically retire earlier than men. Giles et al. (2011) also highlight the interdependency of spouses' retirement decisions. Men tend to work when their spouses work, and spouses' working status has greater a impact for women.

In contrast, rural residents tend to have a considerably more extended working life. Using the China Health and Nutrition Survey (CHNS) collected during the 1990s, Benjamin et al. (2003) confirmed that the concept of "ceaseless toil" still remains an accurate description for the conditions experienced by the rural elderly. Despite generally increasing incomes during the 1990s, the elderly could still not afford to retire from labor-related activities any earlier. Instead, a deteriorating health emerges as the main reason for a reduction in men's working hours. For women, this effect was considerably less pronounced; with women instead tending to work more when their husbands' health fails. Household wealth also plays a role, with men in richer families retiring earlier, further strengthening the argument suggesting that financial constraints represent a core factor preventing the rural elderly from retiring from the labor force.

More recent studies reveal that the employment rates among the Chinese rural elderly gradually has been increasing during 1990s and early 2000s. Based on the 2009 CHNS survey and the 2008 CHARLS survey, Giles et al. (2011) show that 86% of the men and 57% of the women aged 60-64 are still working. Even at the age of 70, over 65% of men and 40% of women still continue to work. In general, education appears to be a facilitator for the elderly to retire, with the exception being women with high school degree. This is explained by this group being disproportionately found to be working in village administration or running small enterprises, both of which are not very physically demanding. In line with Benjamin et al. (2003), they also find that pension income depresses the labor supply of older farmers. Cai et al

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(2012) outlines a complex picture when it comes to the role of the presence of children on the labor force participation of the elderly. The migration of adult children frequently results in remittances to the elderly and thus reduces the incentive of work. Meanwhile, it increases the work burden among the elderly parents who do remain working. This is particularly so in some areas where non-productive land will be reallocated by the village administrative unit. The elderly may thus have to work in the farm in order to keep the land. The net result is one where having migrant children increases the likelihood to work among older farmers (Cai et al 2012).

As regards the effects of the implementation of the NRSP, only few studies are known to the authors. Eggleston, Sun and Zhan (2014) apply a regression discontinuity design to survey data fielded in the Shandong province in July 2012, finding that the children of pension recipients are more likely to out-migrate. Zhang et al. (2014) examine a range of outcomes, also applying a regression discontinuity design. Their findings indicate that receiving pension increases the probability of retirement by 25%. Differing from their work, we consider the influences of household characteristics in addition to individual demographics, which help us to better understand the mechanisms. Particularly, the number of adult children and coresiting with young grandchildren could impact the elderly's labor force participation. Moreover, we also study the impact of NRSP by gender and social economic status. By doing that we can identify the heterogeneous influence of the pension. In their study, age 60.75 is used as the discontinuity point where the proportion of receiving pension benefit has the strongest jump. The elderly age 60.25 and 60.5 are excluded. On contrast, we use the age 60 as the discontinuity point, since the NRSP participants have the possibility to receive pension benefit once they reach age 60. Meanwhile, the regression discontinuity estimates rely heavily on the observations near the threshold. Eliminating observation right above the cutting point may bias the results. Hence, it is crucial to take all the elderly above age 60 into account.

### **3. Background: Pension scheme in China**

#### ***The development of pension system***

Until 2009, existing comprehensive pension systems in China exclusively covered urban employees. The pension system in urban China was initially rolled out in 1950, from the beginning only benefiting workers in state-owned firms, but gradually extended to also include urban workers in other types of company ownership. In 1991 the pension program for state-owned and collective-owned companies were unified under the name "Urban Employee Pension Program". In 2005 the urban employee pension program was extended to private firms and foreign-owned firms. It is worth noting that civil servants and institutional staffs are covered by another different



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pension scheme. They enjoy higher pension benefits compared to staff working in firms. Generally, the retirement age is 60 for men and 55 for women in urban China.

Despite the extension of the urban employee pension program, workers employed under flexible contracts, migrant workers and peasants without land were still largely ignored. Theoretically, all urban workers have the right to participate in social security system regardless of their *hukou* status<sup>2</sup>. For urban employee pension program, both employers and employees should contribute the premiums. However, in practice the high premium (over 40% of wages) lowers the incentive for the many non state-owned firms and their workers to do so (Chen and Wang 2010). The difficulties in transferring the social security from one county to another also prevent the flexible workers and migrant workers from joining the social security system. Most of migrant workers do not enroll in the urban employee pension scheme. They are vulnerable to risks and have to resort to their origin rural village when they meet problems or getting old (ibid).

Rural residents in China remained uncovered by any pension program until very recently. Although some pilot programs had been introduced previously, they were never fully implemented. One rural pension program was initiated during the early 1990s, and - after a series of various pilots - the basic schemes were established in 1995. The pension should be mainly financed by individuals' contributions and supplemented by the collectives. The state should provide assistance when needed. In principle the rural pensions were organized at county level. The rural pension system was a fund-accumulated pension scheme with individual accounts. As a result of policy encouragement, the rural pension expanded quickly after 1995, reaching its peak in 1998. However, the rural pension schemes had several limitations. As it was pooled at county level, the poor areas had limited ability to finance it. Meanwhile, the high inflation during late 1990s made it difficult to maintain the value of funds. With concerns about its sustainability and effectiveness, the central government realized that China had not been ready for universal rural pensions and terminated the rural pension plan in 1999 (Chen and Wang 2010).

### ***Introduction of the New Rural Social Pension Insurance (NRSP)***

The New Rural Social Pension Insurance (NRSP) was launched in late 2009. As is indicated by its name, a previous attempt at providing pension to the rural was already introduced during the 1990s. In 2010, 650 million residents live in rural China, which

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<sup>2</sup> *Hukou* system is a mandatory household registration system in China. It officially identifies the area a person resides and basic demographics such as name, birthdate, sex, marital status and education level. There are two type of *hukou* status: agriculture and non-agriculture.

constitute 50,3% of the total population<sup>3</sup>. When the NRSP was first introduced in 2009, it only covered about ten percent of counties throughout the whole country, expanding rapidly during the following years. By the end of 2010, 24% of counties were covered and 143 million persons had signed up, with Beijing, Tianjin, Zhejiang, Jiangsu, Ningxia, Qinghai, Hainan and Xizang being fully covered (Ministry of Labour and Social Security 2012). One year later, NRSP had been implemented in 60% of the counties, covering 359 million rural Chinese. By the end of 2012, NRSP had achieved full geographic coverage (Ministry of Labour and Social Security 2013).

There are two types of NRSP pilots. Besides national pilots that are selected and monitored by the central government, local government can initiate NRSP pilot program themselves. The first 320 pilot counties are diversified in terms of economic development and population size. The implementation of NRSP also emphasizes poverty reduction<sup>4</sup>. Minority and poor regions were prioritized in 2010 and 2011.

The structure of the NRSP is one consisting of social pooling based pension (basic pension) and individual accounts. The social pooling basic pension is paid by the government while the individual account is financed by both individual premiums and government subsidies. Rural residents who are aged 16 and above and not covered by an urban employee pension program are eligible for signing up. The insurance premium displays a certain geographic variation, typically ranging from 100 to 500 yuan per year<sup>5</sup>. The subsidies to the individual accounts, provided by the government, are correlated with the premium level paid by the individual. Despite these incentives to participate, the NRSP remains a voluntary pension program, where rural residents both choose whether to enroll as well as the payment level of the premiums. The latter naturally being linked to the pension benefits received once having retired.

The age of eligibility for the receipt of pension benefits is 60<sup>6</sup>. The rules of the NRSP stipulate that those who sign up when they are under 45 have to pay the premiums continuously for at least 15 years before they can claim any pension benefits. Instead, residents who are age 45 and above are only required to pay the premiums continuously until they reach the age of 60. Participants who contribute with pension premiums before they retire receive both the basic pension and benefits they have accumulated from their individual account. Participants who were already past the age of 60 when the NRSP was introduced in their region of residence are immediately entitled to basic pension benefits without paying a premium. In most

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<sup>3</sup> [http://www.stats.gov.cn/tjsj/tjgb/rkpcgb/qgrkpcgb/201104/t20110428\\_30327.html](http://www.stats.gov.cn/tjsj/tjgb/rkpcgb/qgrkpcgb/201104/t20110428_30327.html)

<sup>4</sup> [http://www.mohrss.gov.cn/neshbxs/NCSHBXSGongzuodongtai/201305/t20130531\\_104217.htm](http://www.mohrss.gov.cn/neshbxs/NCSHBXSGongzuodongtai/201305/t20130531_104217.htm)

<sup>5</sup> In some richer provinces the categories of premium could be up to 1000 yuan per year.

<sup>6</sup> The only exception is Beijing where the eligible age of pension benefit is 55 for women and 60 for men. In some counties in Jiangsu province women above 55 are eligible until 2011.

provinces, receiving benefits is, however, conditional on the enrollment of eligible children.

In less developed regions, the central government fully finances the basic pension benefits, whereas the local government will finance up to 50% percent in China's more developed provinces. The lower bound of the benefits obtained through the basic pension has been set by the central government to 55 yuan (9 USD) per month. The local governments can adjust the compensation level upwards. But in general, the basic pension is between 55 and 60 yuan per month. Some more developed provinces have a substantially higher basic pension level, amounting for example to 280 yuan per month in Beijing. Differences in the compensation level are also reflected in average incomes across rural China. Overall, the average income per person in 2011 was roughly 7,000 yuan in rural China (NBS 2012). In provinces such as Beijing, Jiangsu and Zhejiang, the rural annual average income per capita is above 12,000 yuan, to be compared with less than 5000 yuan in comparatively more backwards parts of western China. Having considered these aspects, the basic pension provided through the NRSP on average translates to a compensation level amounting to around ten percent of an average annual income.

#### **4. Methods**

##### ***Data***

We analyze the 2011/2012 wave of the CHARLS survey, created through interviews with a sample of 17,500 individuals, clustered within 10,250 households and residing in 28 of China's 33 provinces. CHARLS is managed by the Institute of Social Science Survey (iSSS) at Peking University, and it aims to cover a nationally representative sample of Chinese residents ages 45 and older, in to serve the needs of scientific research on the elderly. CHARLS includes information on demographic, socioeconomic and health characteristics of the elderly, as well as information on living arrangements and intergenerational transfers. The interviews for the wave of the CHARLS analyzed in this paper typically took place between May 2011 and March 2012, and responses pertain to individual and household behavior during the preceding twelve months. The data provides the year and month of the interview, with the precise date arbitrarily set by the authors to be the 15<sup>th</sup> day of the month, thus defining the twelve-month observation period. Besides providing information on the household and the individual level, a community survey is also provided. This is of importance for this study, as it contains information on the timing of the implementation of the NRSP.

##### ***Identification strategy***

We use a regression discontinuity approach (RD) to exploit a discontinuity in the

probability of treatment receiving (NRSP benefits) occurring as the individual turns 60. Regression discontinuity design was pioneered by Thistlethwaite and Campbell (1960) as a non-experimental approach to estimate treatment effects when the treatment status is determined by whether the value of a rating variable falls above a known threshold (cutoff point). Lee (2008) formally illustrates that the RD design is as creditable as randomized experiments as long as candidates have imprecise control over the rating variable near the threshold. Therefore, the direction and magnitude of the change in the outcome near the cutoff point is considered as the causal effect of treatment.

The analysis is restricted to regions that had introduced the NRSP at the start of the observation period, thus twelve months prior to the interview date. Compliance is not complete, as i) the NRSP is voluntary and ii) younger family members<sup>7</sup> also need to sign up. Consequently, the probability of treatment does not go from zero to one as the individual crosses the age-eligibility threshold. As a result, the change in the relationship between the outcome and treatment can no longer be interpreted as an average treatment effect. An instrumental variable (IV) approach can, however, be used to recover the full treatment effect. More specifically, the exogenous assignment to treatment eligibility (through age) can be used to instrument individuals' actual participation in the NRSP. We apply a fuzzy RD approach, where models are estimated by means of two stage least squares regression (2SLS).

$$\begin{aligned} (1) T_i &= \alpha + \gamma_0 D_i + f(\text{age}_i) + \theta X_i + \varepsilon_i \\ (2) Y_i &= \alpha + \beta_0 \hat{T}_i + f(\text{age}_i) + \theta X_i + \varepsilon_i \end{aligned}$$

The first stage equation (1) estimates actual treatment (NRSP receipt,  $T_i$ ) as a function of treatment eligibility ( $D_i$ ). Individuals younger than 60 (older than 60) at the time of the survey are observed with a treatment eligibility of zero (one). In order to interpret the intercept of estimates, the rating variable age is centered at the cut-off point 60. Hence,

$$D_i = \begin{cases} 1 & \text{if centered age}_i \geq 0 \\ 0 & \text{otherwise.} \end{cases}$$

The first stage also controls for age (centered at age 60), as well as a vector of controls,  $X_i$ . The second stage equation (2) predicts the outcome as a function of NRSP receipt, instrumented through  $\hat{T}_i$ , obtained from the first stage. Otherwise analogous to the first stage, the equation controls for the function of age, a vector of

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<sup>7</sup> Family members here refer to those who have *hukou* within the same household.

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individual characteristics as well as an error term. The vector of control variables is included to generate more robust results, but it is not required for achieving an unbiased RD design (Jacob et al. 2012). Hence, adding control variables should not alter the results greatly.

### ***Sample***

In generating the study population, the first step consisted of selecting rural communities that had introduced the NRSP at the start of the observation period. The communities in which NRSP was introduced during the duration of the observation period are excluded, as there is likely to be a time lag between implementation and those eligible actually signing up and starting to receive benefits<sup>8</sup>. As the community survey only provides the year of NRSP introduction, we rely on the information from the individual survey to construct the launch month of NRSP. Hence, communities which claim to have introduced the NRSP but without any observed pension benefit recipients are excluded (N=16). The earliest enrollment date in each community is considered as the introduction date of NRSP. At the start of the observation period, NRSP has been launched in 118 communities from 24 provinces out of 450 communities covered in CHARLS.

Since rural residents could only join the NRSP in their *hukou* location, we excluded the respondents without local *hukou*. Also, respondents who are enrolled in other pension programs are dropped. We further restrict the sample to respondents who are between 50 and 70 years of age at the time of the survey. After aforementioned sample selection criteria have been applied, 2,919 individuals remain.

### ***Variables***

Table 1 presents a descriptive summary of variables. The dependent variable is a rough but comprehensive indicator of the individual's participation in the labor force during the preceding twelve months. In constructing the variable, we consider both paid agricultural work (household agricultural work and being employed as a farm laborer) and off-farm work (earning a wage, running own business and conducting unpaid family business work, etc.). If a person engages in agricultural work for more than ten days in the past year or works at least one hour during the last week, they are considered as still being in the labor force. This is also the case if an individual has a job but is temporarily not working. According to this definition, out of the 2,919 respondents in the sample, 2,316 are characterized as actively participating in the

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<sup>8</sup> Sensitivity analyses have been performed also including such regions. As expected the estimated parameters for the effect of pension benefit receipt and labor supply are consistently smaller in magnitude, but without changing the conclusions.

labor force. In the control group (age<60), the share of individuals still in the labor force amounts to 84 percent, whereas the corresponding figure for the treated group amounts to 73 percent.

Also displayed in the table are the individual demographic characteristics that are controlled for, including gender, marital status, health status and educational level. Marital status is defined as married or non-married, where non-married includes separated, divorced, widowed and never married. Health status is measured as whether respondents have any functional limitations. Individuals who have difficulties in conducting activities of daily living (ADLs) and instrumental activities of daily living (iADLs) are considered as functionally limited<sup>9</sup>. Clearly correlated with age, it is expected that poor health reduces the propensity to work. Education is defined as the highest level of education the respondent has attained, overall indicating an on average relatively low level of schooling, consistent with the rural Chinese context. The variable distinguishes between the illiterate, those with primary schooling or below, as well as middle school and above. As expected, people in the younger cohort have higher education. In the treated group, 35% of the individuals are illiterate, and 53% only attained primary school. As education is a measure of long term earnings and wealth accumulation ability, it is expected to be negatively related to labor force participation<sup>10</sup>.

The data also allows for controlling for several relevant household characteristics. Having adult children indicates potential access to support for the elderly and may thus reduce the probability of working. While the majority of the younger elderly (aged 50-60) have two or three adult children, over 50% of the elderly in their 60s have three or more adult kids. On the other hand, having young children potentially implies increased expenses, as the children are net consumers, and may thereby increase the probability of working<sup>11</sup>. Only very few of respondents have children under age 16 in both groups. Those elderly who have *grandchildren* under the age of 16 may be likely to have retired from the labor force. By taking a greater responsibility in raising the young generation, the intermediate generation may

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<sup>9</sup> See Lawton and Brody (1969) for the definition and measurements in ADL and iADL.

<sup>10</sup> Due to data limitations, wealth is not controlled in the model. One possible indicator of wealth is saving. As over 70% of respondents report no saving, it does not provide much information. Housing wealth could be seen as an important part of household wealth. However, current data from CHARLS does not allow us to construct this variable.

<sup>11</sup> The cut-off point of young children is set to be age 16. The 9-year compulsory education (primary and secondary school) has become free since 2007, which has increased the enrollment rate of secondary school in rural China. Rural children normally start schooling at age 6 or 7. They are unlikely to contribute much in the household agriculture work while receiving education. Rural youth normally start to work after finishing secondary school. Thus, we set the age 16 or above as adult children.

maximize their own labor supply, resulting in an optimization of overall productivity. The data also reveal a considerable degree of multigenerational living arrangements, where 31 percent of the respondents in the control group live with pre-school grandchildren, compared to 22 percent among the older cohort.

Table 1: Descriptive summary of variables

Variable	Treated (Age 60-69) Percentage (mean)	Control Group (Age 50-59) Percentage (mean)
<b>Labor force participation</b>	73%	84%
<b>Receiving pension benefits</b>	48%	0%
<b>Age (distance to age 60)</b>	4.46	-4.56
<b>Gender</b>		
Male	49%	49.54%
Female	51.10%	50.46%
<b>Married</b>	87%	93%
<b>Functional limitation</b>	17.77%	13.60%
<b>Education</b>		
Illiterate	34.98%	30.84%
Elementary school or under	52.99%	40.50%
Secondary school and above	11.95%	28.60%
<b>Having children under 16</b>	0.31%	2.61%
<b>Number of adult children</b>		
0	2.59%	3.89%
1	8.33%	16.15%
2	22.80%	43.72%
3	26.73%	25.02%
4	23.43%	8.38%
5 or more	16.12%	2.85%
<b>Number of grandchildren under 16</b>		
0	9.98%	18.34%
1	15.72%	25.93%
2	20.75%	22.89%
3	17.30%	12.69%
4 or more	36.24%	20.16%
<b>Coresit with children</b>	45%	59%
<b>Coresit with grandchildren under 6</b>	22%	31%
<b>Observations</b>	1272	1647

## 5. Results

Initially, we attempt to establish the existence of a discontinuity in treatment probability at the expected cut-off point, essential for the validity of the empirical design of this study. Figure 1 shows that receiving NRSP benefits is highly correlated with age, and with a substantial upward shift at the age of 60. This, combined with the less than perfect compliance as evidenced by the take-up rate not exceeding sixty percent, supports the appropriateness of a fuzzy regression discontinuity design. Also note the comparatively low proportion of individuals receiving pension benefits at age

60, something that could be expected, as individuals who turned 60 shortly before the interview date may have not started to claim pension benefits. From the age of 61 and onwards, the share of the sample receiving NRSP benefits constantly hovers at around 50 percent.

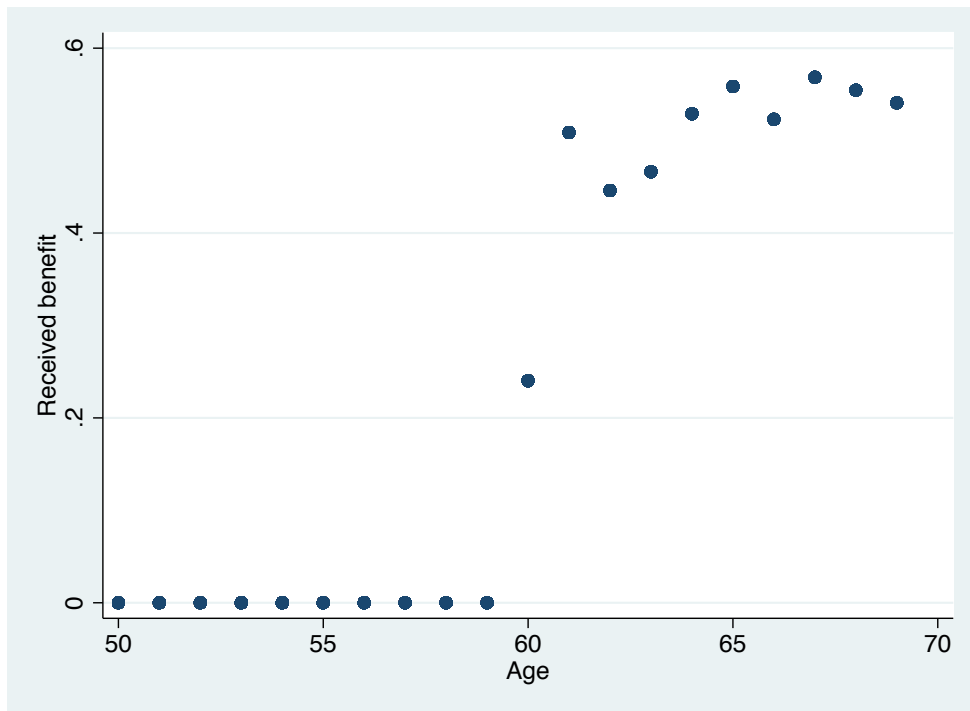


Figure 1: Probability of receiving pension benefits over age

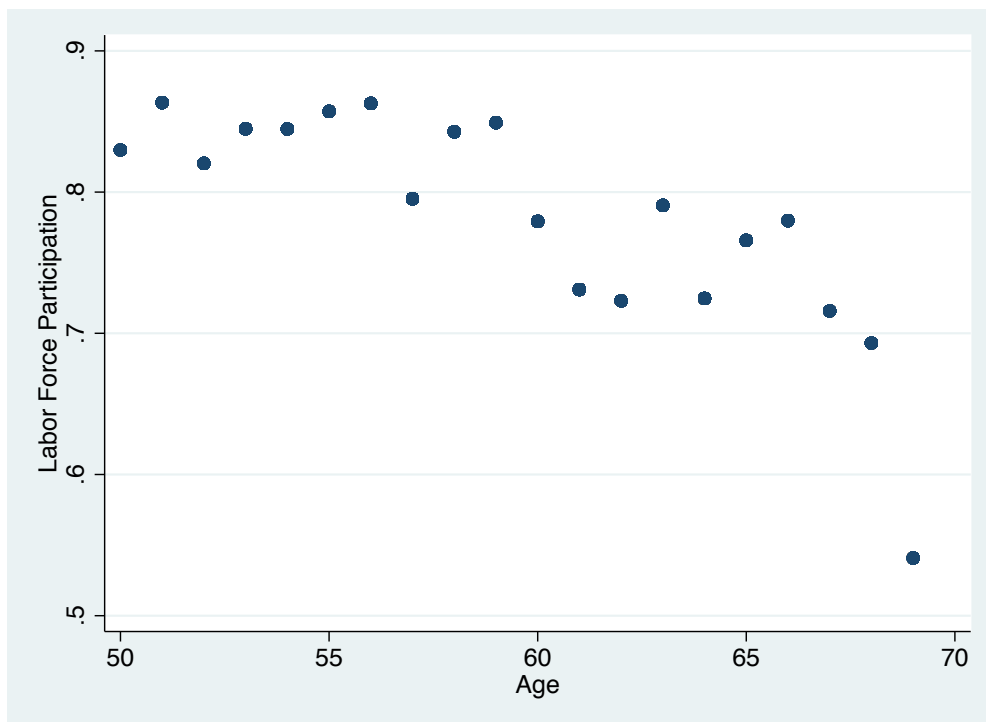


Figure 2: Labor force participation over age



Equally important for the validity of the RD-design, Figure 2 illustrates the proportion of individuals who remain in the labor force according to the definition used in this paper, by age. In line with the hypothesis that the implementation of the NRSP generated an exogenous income increase, the discontinuity in the labor force participation that can be observed at age 60 tentatively confirms the existence of a second stage. For people aged 51-59, the employment rates are stable at around 85 percent, dropping by around 10 percentage points at the age-threshold, remaining fairly constant thereafter. The one exception being the proportion still working at age 70, the sensitivity to which the analysis thoroughly examines.

Table 2 presents the estimates from the regression discontinuity models. Besides the treatment variable, Model 1 only contains the centered age variable, estimated as a linear function. Model 2 is extended to control for individual demographic and socioeconomic characteristics. The last model adds controls for family characteristics, as well as county specific characteristics, through a set of dummy variables. While we remain convinced that the best model fit is obtained using a linear specification of age, a number of additional specifications are presented in a subsequent robustness analysis.

Table 2: Two Stage Least Square Regression estimates

	Model 1		Model 2		Model 3	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
<i>First stage</i>						
Dependent variable: receiving pension benefits						
Older than age 60	0.379 ***	0.024	0.378 ***	0.024	0.374 ***	0.024
<i>2SLS regression discontinuity estimates</i>						
Dependent variable: work status						
<b>Receiving pension benefits</b>	-0.152 **	0.076	-0.135 *	0.072	-0.159 **	0.070
<b>Age(centered)</b>	-0.004	0.004	-0.004	0.003	-0.004	0.004
<b>Female</b>			-0.141 ***	0.016	-0.135 ***	0.015
<b>Married</b>			0.159 ***	0.028	0.142 ***	0.028
<b>Limited function</b>			-0.257 ***	0.025	-0.246 ***	0.024
<b>Education</b>						
Illiterate (reference)			-	-	-	-
Elementary school or under			-0.010	0.018	0.012	0.018
Secondary school and above			-0.061 ***	0.022	-0.053 **	0.022
<b>Having children under 16</b>					0.162 ***	0.038
<b>Number of adult children</b>						
0					-0.087 *	0.050
1					0.046 **	0.023
2 (reference)					-	-
3					0.043	0.018
4					-0.043 *	0.025
5 or more					-0.069 **	0.034
<b>Number of grandchildren under 16</b>						
0					0.030	0.026
1					0.013	0.022
2 (reference)					-	-
3					-0.009	0.024
4 or more					0.040 *	0.023
<b>Coresit with children</b>					-0.012	0.016
<b>Coresit with grandchildren under 6</b>					-0.015	0.017
<b>Province dummy</b>	No		No		Yes	
Observations	2919		2919		2919	

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Notes: The estimates of control variables in the first stages are omitted.

\*\*\* Indicate statistical significant at the 1% level; \*\* for the 5% level; \* for 10% level

As expected, the effect of crossing the age-threshold and thus becoming eligible for NRSP benefits has a positive and significant influence on actual benefit receipt, as estimated in the first stage. Furthermore, the point estimate remains stable across all model specifications. Turning to the effect of receiving NRSP benefits on labor supply, instrumented by being at least 60 years of age, the basic Model 1 suggests a 15.2% decrease in labor force participation, being statistically significant at the 5% level. This influence becomes slightly attenuated in more extended Models 2 and 3, but remains statistically significant and with a point estimate ranging from 13.5% to 15.9%. The consistent direction and magnitude across the different model specifications thus suggest a significant treatment effect. More specifically, the income effect generated by receiving pension benefits significantly reduces the probability of remaining in the labor force by about 15%. An interpretation of this could be related to the restrained credit situation which rural elderly in China typically face, something that might explain their high labor force participation. In the sample, the average annual income amounts to 3605 yuan, however characterized by a quite large standard deviation. In this occasion, the pension benefit from NRSP constitute around 20% of the annual income. If we consider the median, amounting to 760 yuan, the average annual pension benefit of 720 yuan emerges as all the more important as a means to retire without having too large an effect on the individual's standards of living. The average annual income in our sample is much lower than the national average rural income. The main reason is that the rural elderly has lower income compared to the prime-age population. It is in line with the fact that the rural elderly are more likely to fall into poverty. Moreover, as the implementation of NRSP prioritized poor regions, the elderly in our sample may have lower income than their counterparts other areas. Our result is in accordance with other studies on developing countries, having found that the receipt of pension benefits significantly reduces elderly labor supply. The magnitudes of the effects are, however, less than those obtained from Brazil and Ukraine, something which could be linked to the pension programs in these two countries being more generous the NRSP.

Model 2 adds a full set of individual demographic characteristics. As expected, women are less likely to be in the labor force than men, and married individuals are observed with a 15.9% higher probability to participate in the labor force. Respondents with functional limitations are 25.7% less likely to work, consistent with previous findings suggesting that declining health increases the probability of retirement. Compared to the illiterate elderly, respondents who have attained at least secondary schooling are 6.1% less likely to work. The impact of education is

non-linear, which is in accordance with Giles et al. (2011). This could be indicative of educated individuals having higher earnings potential and thereby being able to accumulate wealth over the life cycle, allowing them to exit the labor force earlier.

When family characteristics and regional dummies are included in Model 3, the coefficients of individual demographics remain largely similar. As expected, having children under the age of 16 increases the probability of working. The number of grandchildren under age 16 only matters when they exceed four. Compared to the elderly who have two grandchildren, those who have having more than four grandchildren have a 4.0% higher likelihood to work. Consequently, an (increased) presence of younger children and grandchildren decreases the probability to retire. The effect of adult children is non-monotonic. Compared to those who have two adult children, elderly without adult children are 8.7% less likely to work while those with one adult child have a 4.6% higher probability of being working. Having more than four adult children lowers the likelihood of working. Coresidence with children and young pre-school grandchildren do not have significant impacts on the respondents' labor force participation.

In order to examine if there exist heterogeneous effects regarding the influence of receiving pension benefits, we run separate models by gender and educational attainment. Table 3 presents the second stage estimation, from models that are otherwise analogous to the main specification in Model 3. Whereas the coefficient of NRSP benefits is negative for both genders, only the estimate obtained for females is statistically significant. Furthermore the point estimate is substantially larger, suggesting that pension benefits reduced the female respondents' labor force participation by 19.6%, compared to 10.9% for males. Thus, it would appear that women primarily drive the reduction in the labor supply resulting from the introduction of the NRSP. There are several possible explanations to this pattern. In general, women have lower incomes than men, implying that the earnings loss from their labor force exit is less. Moreover, traditional gender norms largely persist in rural China, where women's domestic responsibility is emphasized. With a lower return from work and comparatively heavier burden of household work, the pension benefits may provide stronger incentives for women to stop working.

Turning to educational level, the sample is divided into two groups: people with at least secondary school attainment and those less. The result suggests no major differences between the groups, with identical point estimates.

Table 3: Estimates by gender and education

	Gender				Education			
	Male		Female		Elementary school or under		Middle school	
<i>2SLS estimates</i>	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Observations	-0.109	0.086	-0.196*	0.104	-0.143*	0.081	-0.165	0.142
	1438		1481		2296		623	

Notes: The estimates of control variables are omitted.

\*\*\* Indicate statistical significant at the 1% level; \*\* for the 5% level; \* for 10% level

## 6. Robustness checks

While the main specifications previously presented indicate a consistent and significant influence of NRSP benefits on the probability of retiring, it remains a possibility that the results are driven by an incorrect specification of the forcing age variable. Thus, a range of models with different specifications of age are run and presented in Table 4, again otherwise analogous as the main Model 3. The reported parameter is again the coefficient of interest obtained from the second stage estimation, the effect of the instrumented NRSP benefit receipt on the individual's labor supply. The first column includes models estimated on the identical sample as having been discussed to this point. The first two models includes different functional forms of age, but constrain the slope of the relationship between age and labor force participation to being identical at both sides of the age-threshold at age 60. The last two models in the column include interactions between age and treatment, in order to allow the slope to vary at respective sides of the cutoff point. More specifically, the age-effect after the age of 60 may be different for individuals depending on whether they receive NRSP benefits. This is particularly important when observations from very far away from the threshold are included. All the estimates are negative and statistically significant. Receiving pension lowers the likelihood of being working by 15.5% to 37.2%. The consistent effects with a magnitude of 15% from different specifications shows the robustness of our results. The linear interaction model yields similar magnitude compared to the linear model. All the coefficients of interaction terms are insignificant (not shown in the table), which indicates that the slope of the regression line is not significant different on either side of the cut-point. Moving from the linear model to the quadratic interaction model, the complexity of the regression increases while the power of the analysis decreases. Due to the limited sample, we prefer the simplest model.

Table 4: Different specifications of age

Specification of age	Age 50-70(±10)		Age 52-68 (±8)		Age 55-65 (±5)		Age 57-63 (±3)	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
<i>2SLS regression discontinuity estimates</i>								
Linear	-0.159 **	0.070	-0.223***	0.081	-0.213*	0.114	-0.238	0.201
Quadratic	-0.157**	0.071	-0.234***	0.084	-0.219*	0.117	-0.215	0.221
Linear interaction	-0.155**	0.071	-0.238***	0.085	-0.212*	0.118	-0.198	0.226
Quadratic interaction	-0.372**	0.150	-0.294*	0.172	-0.352	0.305	-1.808	2.301
Observations	2919		2487		1664		1020	

Notes: The estimates of control variables are omitted.

\*\*\* Indicate statistical significant at the 1% level; \*\* for the 5% level; \* for 10% level

Another way to investigate the robustness of the results is by narrowing the observation window, thus examining a time period which is increasingly restricted to immediately before and after the exposure to the treatment. Here, the observation window is gradually reduced to contain 8/5/3 years before and after the age threshold at age 60. Again, the results are shown in columns 2-4 in Table 4. Overall, the results are quite robust the age window used. The direction of effects is consistently negative, although the magnitude varies. Most estimates are significant at the 10% significance level, with insignificant results most likely being largely linked to a gradually decreasing sample size. Across the models applying the preferred linear specification of age, the influence of NRSP benefit receipt on the probability of remaining in the labor force ranges between 15 and 24 percent.

The foundational assumption of regression discontinuity design is that individuals are unable to “perfectly manipulate” the treatment. The validity of the RD design is challenged if respondents could find a way to cheat their age to obtain the pension benefits, e.g., people aged 59 claiming that they are 60. In this case, the people who claim to be 60 may be systematically different from those who are just below the threshold. This could induce a spurious link between age and the error term and thus generate biased estimates. The figures below show the density of observations on age and the enrolment rate of NRSP by age. If perfect manipulation indeed existed, we should have observed a drop at 59 or a jump at 60 in the density, something that clearly is not the case. Starting from age 58, the number of observation by age has a clear downward trend, which is in line with the CHARLS full sample where the number of respondents peak at age 58. Another problem that may generate biases is that people wait until they reach age 60 to join the pension program. The enrollment rate of NRSP over age experiences high fluctuation without any clear trend.

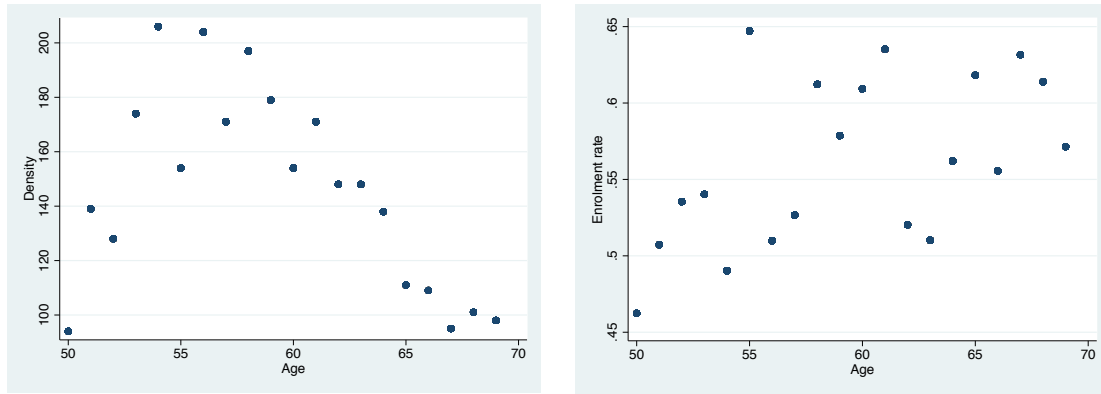


Figure 3: Manipulation check

McCrary (2008) proposes a formal test to check whether such manipulation exists. A Wald test is applied to examine whether the density of rating variable (age in this case) has a discontinuity at the threshold. The null hypothesis is that the discontinuity of the fraction of age is zero. Local linear regressions are conducted separately for the density function below and above the cutoff point. We find no evidence that the predicted log density at the age 60 from those two regressions is significantly different. The  $p$ -value is 0.120. Hence, we cannot reject the null hypothesis that there is no discontinuity at age 60.

Another assumption of RD design is that the functional form of the rating variable ( $f(age_i)$ ) is continuous without the treatment. This assumption means the pension eligibility is the only source of the drop around age 60. This might be violated if people intend to stop working at age 60 regardless of pension provision. Based on previous studies and knowledge about rural China, this is not likely. Giles et al. (2011) shows the employment rate across different age groups based on CHNS 2009. Starting from age 50, the employment in rural area declines gradually with age, without any drastic drop around age 60. Hence, there is no reason to expect a discontinuity around age 60 in absence of pension benefits.

In order to formally test this, we use data from areas where NRSP has yet to be introduced by the time of the survey. The sample analyzed is otherwise similar to that in the main analysis, thus consisting of respondents living in rural areas, with a rural *hukou* and not covered by any other pension programs. Figure 4 outlines the labor force participation change across age for this population. Compared to the main study population, no discontinuity in the share of being in the labor force is visible at age 60. Instead, the proportion of still working individuals gradually decreases from their late 50s. The labor force participation rate among the elderly drops faster than our NRSP sample, especially after age 65. As mentioned above, the pilot program of NRSP has prioritized poor regions. It is expected that the elderly living in the NRSP areas tend

to retire later than other areas. If the labor supply of elderly in the non-NRSP areas does not change significant near age 60, it is unlikely to happen to their counterparts in poorer regions without the introduction of NRSP.

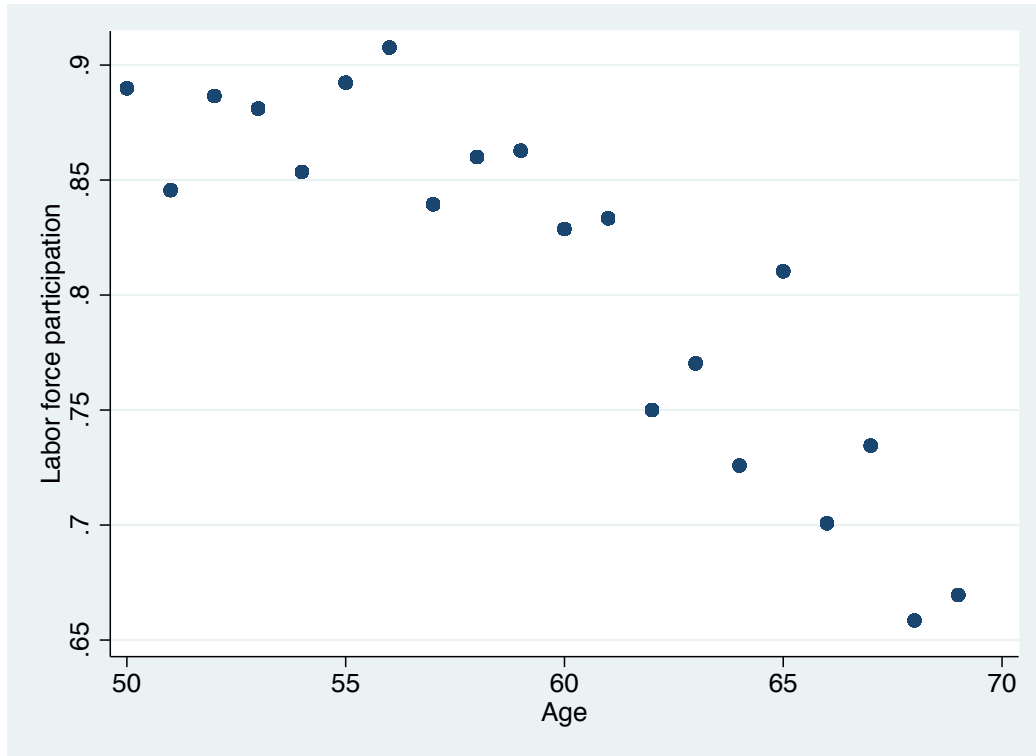


Figure 4: Labor force participation over age in non NRSP areas

The fuzzy regression discontinuity and two stage least square approach is used to deal with the partial compliance problem in the main study sample. The reduced form of 2SLS could be seen as a sharp design assuming all respondents over age 60 sign up for NRSP. In the areas that NRSP hasn't exist we have to assume that all the individuals signed up for the pension. A sharp regression discontinuity is applied to investigate whether the labor force participation rate has a discontinuity around age 60. Table 5 shows the results from sharp regression discontinuity estimation. To make comparison, we run the same model using the NRSP sample. We apply various specification of age and window width. Although the directions are negative, none of the estimates is statistical significant at 10% confident level. Without the present of NRSP, the work status of rural residents does not have discontinuity at age 60. This result provides additional robustness to our argument that the discontinuity of labor supply at age 60 in the main sample is caused by the pension program.

Table 5: Falsification test

Specification of age	Non NRSP sample		NRSP sample	
	Coefficient	Standard Error	Coefficient	Standard Error
<i>Sharp regression discontinuity estimates</i>				
Linear	-0.030	0.023	-0.060**	0.026
Quadratic	-0.027	0.024	-0.058**	0.026
Linear spline	-0.028	0.024	-0.058**	0.026
Quadratic spline	-0.014	0.035	-0.102***	0.039
Observations	3229		2919	

Notes: The estimates of control variables are omitted.

\*\*\* Indicate statistical significant at the 1% level; \*\* for the 5% level; \* for 10% level

Nothing other than treatment status is discontinuous at the cut point. In other words, there are no other variables that causing the different outcomes in two sides of the cut point. Rather, they should be continuous around the cut point. The discontinuity in labor force participation around age 60 may also result from the decline health status or increase in education level. Figure 5 illustrates the education level and proportion of having functional limitation over centered age. The level of education has a downward trend over age with fluctuations between age 60 and 65. The fraction of having functional limitation remains stable until age 65. Generally, both of them have no obvious discontinuity around age 60.

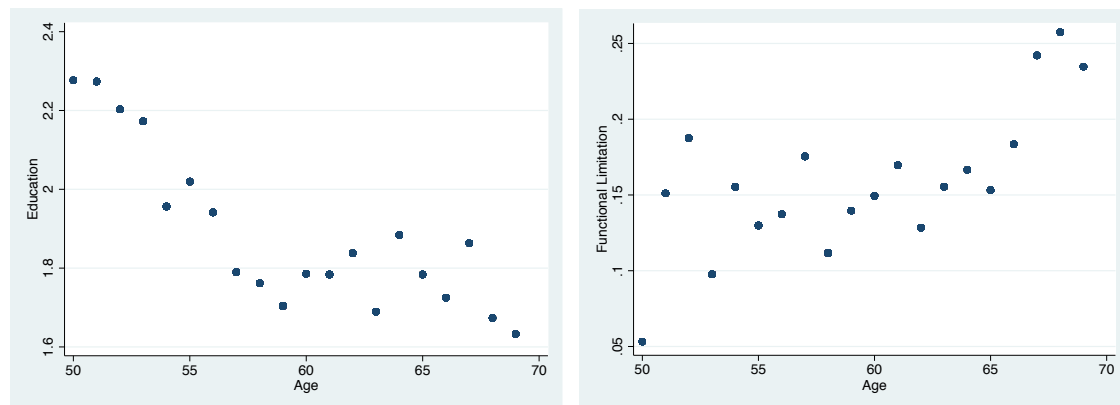


Figure 5: Functional limitation and education over age

As a final robustness check, we assign a placebo age-threshold in order to test whether the relationship between pension receipt and labor force participation is spurious. Following Eggleston et al. (2014), the age 59 is chosen. There are two reasons to choose this special age. The first is to investigate whether the reduction in labor supply is indeed caused by the pension eligibility or by other age-related covariates. Elderly who are 59 cannot receive pension benefits, but their characteristics are similar with those aged 60. If the relationship between the placebo



age cutoff and the outcome does not exist, we can more confidently argue that the negative link that was found in the main analysis is not spurious. Secondly, this procedure allows for the examination whether the elderly exit labor market before they actual receive the pension benefits. More specifically, if people anticipate that they will have pension income later on, they may smooth the consumption and retire earlier, also violating the exogeneity assumption of the NRSP according to this study design.

Table 6 provides the regression discontinuity estimates using age 59 as the cutoff point. We use the preferred linear specification for both the reduced form regression and 2SLS regression, controlling for covariates. Neither estimate is significant, as well as being very small in size. Thus, it additionally corroborates the negative relationship previously obtained between receiving pension and labor force participation.

Table 6: Placebo age cutoff at 59

	Discontinuity at age 59	
	Coefficient	Standard Error
Sharp regression discontinuity estimates	-0.016	0.026
2SLS regression discontinuity estimates	-0.093	0.143
Observations	2919	

Notes: The estimates of control variables are omitted.

\*\*\* Indicate statistical significant at the 1% level; \*\* for the 5% level; \* for 10% level

## 7. Conclusion

The purpose of the paper was to investigate the effects of the NRSP pension reform that was gradually introduced across Chinese provinces from 2009 to 2012. The reform made individuals residing in rural areas past the age of 60 eligible for benefits of 55 or 60 yuan per month. The NRSP participants who enroll NRSP when they are over age 60 years of age are entitled the pension benefits without paying pension premium. Exploiting the features of the program, we applied a regression discontinuity design to study the impact of pension benefits on the elderly labor force participation. Given the non earning-test and no retirement incentive nature of NRSP, the pension benefits generate a pure income effect on employment.

The estimates show that the receipt of pension benefits has a sizable negative effect on old age labor force participation. Depending on the model specification, the likelihood of labor force participation decreased by 13.5% to 37.2%. Providing the small amount of NRSP benefits, the response of labor force participation is large. It is in accordance with Davis (1991)'s view that the lacking financial resources is the main reason for the "ceaseless toil" in rural China. The NRSP provides additional

income for the elderly and offers them potential option to retire. When given the opportunity of pension, there is a 15% increase in the probability of retiring from the labor force. In this regard, it indeed improves the wellbeing of rural Chinese.

Our result is in line with the studies from other developed countries like Ukraine and Brazil (Danzer 2010; de Carvalho Filho 2008). An increase in pension income causes decline in old age labor force participation. Since even the pure income effects have sizable negative influences on elderly labor supply, the poverty-reduction program need to take the negative labor supply response into consideration. On the other hand, the overall labor supply response also depends on the policy effects on the prime-age population. The public transfers may crowd out the private intergenerational transfers from adult children. Thus it mitigates the burden on adult children. The retired elderly could spend more time on taking care of grandchildren and thus allow their children to moving out. The evaluations of pension program need to take all those aspects into account.

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## Appendix

## The implementation of NRSP

Year	Coverage	Participants
2009	The overall coverage is 10%. 320 counties participated in the pilot program.	15.38 million <sup>12</sup>
2010	The overall coverage is 24%. 838 counties from 27 provinces are involved in the national pilot. Additionally, 316 counties from 15 provinces initial NRSP pilot themselves. Beijing, Tianjin, Zhejiang, Jiangsu, Ningxia, Qinghai, Hainan and Xizang achieved full coverage.	103 million persons participated in the national pilot. Out of them 74.14 million are under age 60. The total participants are 143 millions <sup>13</sup> .
2011	The overall coverage is 60%. 1914 counties from 27 provinces are involved in the national pilot. Additionally, 339 counties from 17 provinces initial NRSP pilot themselves.	326 million participants in the national pilot and 237 million are under age 60. The number of total participants is 358 million.
2012	Nationwide coverage for all 2853 counties.	460 million.

<sup>12</sup> [http://www.gov.cn/jrzg/2010-06/10/content\\_1625109.htm](http://www.gov.cn/jrzg/2010-06/10/content_1625109.htm)

<sup>13</sup> All other data are from the annual report of Ministry of Human Resources and Social security, PRC.