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# The Impact of Rural Pensions in China on Labor Migration

*Karen Eggleston, Ang Sun, Zhaoguo Zhan*

We study the impact of China's new rural pension program on promoting migration of labor by applying a regression discontinuity analysis to this new pension program. The results reveal a perceptible difference in labor migration among adult children whose parents are just above and below the age of pension eligibility: The adult children with a parent just attaining the pension-eligible age are more likely to be labor migrants compared with those with a parent just below the pension-eligible age. We also find that with a pension-eligible parent, the adult children are more likely to have off-farm jobs. These abrupt changes in household behavior at the cutoff suggest that these households are credit constrained. In addition, we find that the pension's effect on migration is greater among adult children with a parent in poor health; pension-eligible elderly report that they are more likely to use inpatient services when needed and less likely to rely on adult children for care when they are ill. These results suggest that (expectations regarding) providing care for elderly parents has constrained labor migration from China's rural areas to some extent, and that the new rural pension program has helped to relax this constraint. JEL codes: H23; H31; H55; I38; J22; O15.

**Keywords:** China, employment, household formation, intergenerational transfers, migration, off-farm, pension

*"While your parents are alive, do not journey afar."* — *Confucius*

The social costs of inadequate mobility of rural labor in the developing world, despite the large wage gap between urban and rural areas, have attracted increasing awareness and scrutiny among researchers and policy makers. This issue is especially salient in China, where city dwellers often earn more than three times as much as farmers do (National Bureau of Statistics of China). At the same time, as China's population rapidly ages, the factory labor shortage (*Yong Gong Huang*) highlighted in recent reports may intensify unless China finds ways to relax the constraints on full utilization of China's vast albeit shrinking working-age population (Meng 2012). To facilitate economic development, it is critical to understand the barriers that prevent people living in rural areas from migrating to find better jobs. In this paper, we use regression discontinuity analysis of the novel pension program in rural China to estimate the effect of the "windfall" income on rural migration. Since households can anticipate pension receipt, our findings of abrupt changes in labor migration and off-farm employment of adult children with parent(s) become pension-eligible, suggest that credit constraints are likely to be one factor preventing individuals from migrating in rural China.

This paper also contributes to our general knowledge about public pension programs in developing countries. China's rural pension system is only a few years old and not well studied yet. In comparison, the old age pension system in South Africa, which rapidly expanded in the early 1990s, has been extensively scrutinized. The pensions in South Africa were very generous—twice the median income per capita in rural areas and therefore were plausibly expected to play a significant role in household behaviors.[1] By contrast, the new rural pension program in China provides an opportunity to examine the margins of household behavior when the pension payment is not as generous. The pension is about 10% of the average income in Laiwu county, Shandong province, where our survey is fielded. Will such pension income have a perceptible impact on the well-being of the elderly or impact household decision-making in observable ways? If so, which household behaviors are most responsive? The answers to these questions hold important policy implications as well as general lessons for household theory.[2]

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1.  Researchers find evidence consistent with the hypothesis that pension income also benefits prime-aged adults (promoting migration for some and support within the household for others) as well as the pensioner's grandchildren (Ardington, Case, and Hosegood 2009).

2.  For example, there had been concern that the pension income may not substantially improve outcomes for pensioners because children would reduce their financial support in lock step with the increase in social support. Our results suggest that adult children do not significantly reduce financial transfers to their elderly parents when the parents became pension-eligible. Instead, our findings suggest that the new rural pension income benefits multiple generations in the household, in the sense that pensioners report better security and more labor migration among their adult children, a margin of occupational choice that had been previously constrained.

The pension program in Laiwu, launched in 2007, provides 55 RMB yuan per month to every resident age 60 or older, with funds supplied by the central, provincial, and county governments. The age-based eligibility criterion of the pension program allows for a regression discontinuity design. To evaluate the effect of the pension program, we draw on a detailed survey targeting rural elderly near the pension-eligible age of 60.[3] For each individual between 55 and 70 years old, in addition to basic demographics and socioeconomic information, we asked the respondent detailed questions about the attitudes and plans for support in old age (anticipated sources of long-term care, living arrangements, etc.). We also asked detailed questions about each of their children, including migration history, occupational choices, and living arrangements, regardless of whether the adult child was counted as a household member or was living under the same roof with the respondent at the time of the survey (July 2012).

Comparing the households with an elderly parent just attaining the pension eligible age to households with an elderly parent just below the eligible age, our results reveal several significant patterns. First, even though the pension represents only 10% of average income and households could anticipate receipt, regression discontinuity analysis reveals a perceptible difference in household behavior around the age of pension eligibility, suggesting that these households are likely to be credit constrained. In particular, our results show that after the older parent receives a pension, the adult children are more likely to be a labor migrant and take an off-farm job.[4] Second, we find that the pension's effect on migration is greater among adult children with a parent in poor health. These results are consistent with the previous findings that migration decisions of adult children are influenced by the well-being of elderly parents.[5] Third, we find that pensioners expect that they will be more likely to use hired services and slightly less likely to rely on care from an adult child when ill. There is no change in self-assessed health or health insurance coverage after the pension-eligible age threshold. These results are consistent with the interpretation that the increase in income relaxes the household credit constraint, making medical services more affordable and enabling pensioners to substitute purchased services for instrumental support directly provided by the adult children. This substitution presumably provides the adult children with greater flexibility to participate in the nation-wide labor market.

In addition to exploiting the pension program to scrutinize the household credit constraint, this paper has two key advantages over the prior research

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3.   Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center, FSI, at Stanford University.

4.   For clarity, we use "elderly" or "older parent" to refer to the older adults in our sample, age 55 to 70, to distinguish them from their adult children (typically in prime work ages of 20–40 and mostly parents themselves).

5.   Giles and Mu (2007) find a significantly lower probability that a son will work as a migrant when a parent is seriously ill.

evaluating the impact of old-age pensions. The first advantage lies in our data for studying the effect of a financial windfall on migration. Prior evidence suggests living arrangements are endogenous and directly affected by a financial windfall. Therefore, the characteristics of household members in households receiving a pension may be systematically different from those of nonpension households (Klasen and Woolard 2000).[6] Selective attrition will complicate identifying impacts if a household survey only includes the intact family or cannot track individuals who move away from the pensioner's residence or those who migrate out of the demographic surveillance area. For example, when estimating the effect of pensions on adult labor supply in South Africa, researchers found opposite patterns when the sample only included residents (Bertrand et al. 2003) compared to when the sample was extended to include nonresident household members (Posel, Fairburn, and Lund 2004) within the demographic surveillance area.[7] In this paper, we ask the respondent detailed questions about each of their children, regardless of whether the child is counted as a household member or is living under the same roof. Thus we generate data on the work, migration, and living arrangements of all adult children of pensioners and nonpensioners, without the complication of sample attrition caused by endogenous household formation.

The second advantage of our study is the regression discontinuity design. Life-cycle patterns and cohort heterogeneity profoundly shape the migration decisions of household members. Researchers examining the linkage between pension eligibility and migration have difficulty separating the effect of pension income from that of age or cohort heterogeneity. In this paper, we apply regression discontinuity analysis to address this problem. Residents in Laiwu are eligible for rural pensions beginning at age 60 for both men and women, similar to most other rural areas of China. A basic pension is available to all residents financed by the collective fund, and individuals can purchase additional coverage by choosing from a limited menu of options for contributory pensions. A regression discontinuity design has several advantages over other methods of identification (Edmonds, Mammen, and Miller 2005) and has been applied to many different settings (e.g., Card, Dobkin, and Maestas 2009; Miller, Pinto, and Vera-Hernández 2013).

We recognize that Laiwu is not nationally representative, but we believe this study has methodological advantages and results that make it of broader interest. In particular, the novelty of the survey enables us to shed light on

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6.  For example, the presence of a pension attracts household members who are significantly less educated, more likely to be unemployed and to report being sick or injured (Ardington, Case, and Hosegood 2009). Moreover, there is evidence of a direct causal effect of pension income on household composition through channels such as labor specialization within the extended household (Edmonds, Mammen, and Millier 2005).

7.  Ardington, Case, and Hosegood (2009) use panel data with individual fixed effects to partially address the issue of different characteristics of individuals living with pensioners and those living without a pensioner, but they admit that they cannot follow changes for individuals who exited the demographic surveillance area between the waves of the survey because of migration.

intrahousehold, intergenerational allocation when facing credit constraints. In addition to our survey data, we also use the nationally representative China Health and Retirement Longitudinal Study (CHARLS) baseline data to test the first stage of our fuzzy regression discontinuity design: the impact of age eligibility on pension receipt. However, since CHARLS only has the information on adult children who co reside with the elderly parents, replicating our results in a nationally representative sample is not feasible.[8]

The rest of the paper is organized as follows. Section 2 introduces the related literature and setting of our study. Section 3 describes the data and our identification strategy. Section 4 presents the main results and discusses interpretations. Section 5 examines other outcomes to compare with prior research (e.g., on the case of South Africa). Section 6 offers concluding remarks. Supplemental appendix S1 develops a conceptual framework about migration and contains other supplementary results.

## I. Credit Constraints and Pension in Rural China

Low incomes and limited wealth, combined with incomplete credit markets, make it difficult for households to finance investments even when the returns exceed the costs, and constrain ability to smooth consumption. Certainly it is clear that the rural elderly represent one of the lowest income groups in China, with more than one in four falling below the poverty line. According to the CHARLS baseline study in 2011–12, financial support from children and other household members plays a key role in reducing consumption poverty: the poverty rate based only on the income of the rural elderly and their spouses (including pensions) is 65.1%, but falls to 28.9% when including intrahousehold transfers and transfers from nonresident adult children, as well as public transfers and savings (CHARLS Team 2013).

That lack of access to credit further contributes to constraining rural household's choice sets is also evident, despite rapid improvement alongside economic growth. Much prior research has found that Chinese rural households suffer from a lack of access to credit (International Fund for Agricultural Development 2001; Luo 2004; Dong and Featherstone 2006; Yu 2008).

Rural credit markets in China can be separated into formal and informal markets. Formal credit is mostly used for the financing of agricultural production (Feder et al. 1990). The formal financial institutions currently serving rural China include the Agricultural Bank of China, Agricultural Development Bank

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8.    Moreover, China's large regional diversity allows for testing theories of household behavior under different circumstances regarding local social norms, labor market conditions, and generosity of the social safety net. Thus localized information can provide insight, highlighting dimensions of heterogeneity that may be less evident when the initial analyses aggregate to the national level. Indeed, the strong statistical significance of locality (such as indicator variables for county or province) has been noted by previous researchers on China's economic demography (e.g., Smith et al. 2013).

of China, Rural Credit Cooperatives, and Rural Postal Savings. Formal financial institutions have strict requirements for rural loans and limited lending (Dong, Lu, and Featherstone 2010).

Informal rural credit can take various forms. Interpersonal lending, which includes loans extended among friends, relatives, neighbors, or colleagues, is among the most basic strategies that farmers use to deal with liquidity requirements. The informal rural credit markets are highly segmented, with participants limited to only those with personal relationships. Moreover, informal loans are small and short-term. Other forms include lending from money lenders, pawnshops, and private money houses, some of which are illegal (Tsai 2004). These forms require collateral. In our sample, 40.23% of the elderly individuals report 0 savings, suggesting the limited availability of both formal and informal loans. Although China's overall savings rate is extraordinarily high, the older generation largely missed the opportunity to invest and save except through investing in their children, especially sons who are expected to support them in their old age.

China is not unique in this regard. Throughout the developing world, having children is a way to allocate household resources intertemporally. As Banerjee and Duflo note in *Poor Economics*, "for many parents, children are their economic futures: an insurance policy, a savings product, and some lottery tickets, all rolled into a convenient pint-size package" (118). Both theory and empirical evidence suggest that households often allocate tasks among the extended family members according to comparative advantage as shaped by social norms, with some adult children providing financial support to elderly parents while other children mainly invest their time to assist with the parents' daily activities and provide care when parents are sick or in need of long-term care. In this case, the credit constraint of the overall household can be relaxed by remittances from migrant children. However, small families cannot necessarily use such a strategy. In our sample, 23.4% of the respondents only have one child. Moreover, social norms still dictate that sons carry more responsibility to provide financial and instrumental help to parents than daughters do, and over 50% of the respondents we surveyed only have one son. China's relatively low fertility, largely attributable to China's family planning policies that began during the 1970s and are only recently being relaxed, implies that for a great portion of households in rural China, including in our sample, it is not feasible to use the remittance of one child to enable other children to migrate.

Recognizing that China's demographic change was squeezing families and imperiling the traditional modes of elderly support—as well as the need for a social protection system to undergird a "harmonious society" and help address burgeoning urban-rural disparities—China's leadership introduced the New Rural Pension System (NRPS). Beginning with 320 pilot counties, NRPS covered 838 counties by the end of 2010 and virtually all of rural China by the end of 2012.[9]

9. In 2009, the State Council of China released "the State Council Guidance Regarding the Development of New Rural Pension Pilot" (China [2009] No. 32). Based on a number of pilot studies in

The program represents a financial "windfall" for the current elderly—those who were already, or approaching, 60 years old when the program started. The pension consists of three main parts: an individual premium (*ge ren*), a local government subsidy (*ji ti*), and a central government subsidy (*zheng fu*). For those who voluntarily enroll, the individual premium comprises five categories: 100, 200, 300, 400, and 500 RMB per person per year, with correspondingly increasing benefits that are also supposed to be adjusted according to the increase in China's per capita income. The local government subsidy is required to be no less than 30 RMB per person per year. The central government subsidy, also called the basic pension, starts at 55 RMB per month per person. Current elderly receive the basic pension without ever having paid contributions.

Shandong Province implemented the national standard pension policies in virtually all respects. Laiwu County, located in central Shandong province, has income per capita close to the average for China as a whole. In sum, 60% of Laiwu's total population, and 70% of the residents above age 60, reside in Laiwu's rural areas. Laiwu began the pilot of NRPS in 2007. The pension provided 55 RMB yuan per month to every resident age 60 or older, with funds supplied by the central, provincial, and county governments. In 2012, this pension was raised to 60 RMB yuan per month. Each district and village can offer additional pension options to their residents (such as contributory pensions on top of the guaranteed state-financed minimum), according to local conditions. In our sample, 68.4% of the elderly received only the basic pension—60 RMB. For pension recipients, the pension payments constitute 60.2% of their total income, defined as the sum of labor income and pension income.

Like most rural areas of China, Laiwu has limited options for institutional care; most elderly reside in their own homes, with or without coresidence of (one or more of) their adult children. Over the past several years, a few villages have set up community care centers from village collective funds, providing no-rent dormitory-like housing and cafeteria meals to all elderly village residents. These changes overlap in time with the roll out of the pension scheme. In this article, we focus on the effect of the pension financial "windfall" rather than the community care centers' impact on living arrangements, for two primary reasons. First, institutionalized care, even in the modest form of these community care centers, is not well accepted according to traditional social norms, especially in rural China. In our sample, over 50% of the elderly believe living with children is the most ideal arrangement. Second, most individuals in our sample, especially those around the eligibility threshold of 60 years old, still work in the fields and do not need institutional settings for long-term care.

selected rural areas, government officials indicated that they expected the scheme to cover (i.e., be available for voluntary enrollment) 10% of rural regions by the end of 2009, 50% by 2012, and 100% by 2020. These expectations have been more than exceeded, at least in terms of coverage by the basic benefit program (not voluntary enrollment).

## II. Data and Fuzzy Regression Discontinuity

### Data

This study compares the migration status of adult children who have a pension-eligible parent to the migration status of adult children whose parent(s) are nearly eligible. Data for the study come from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. Our survey is among the most recent and detailed available for studying the impact of the new rural pension system on household decisions. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

We first categorize all villages into three strati according to GDP per capita in 2010. In the first stage, within each stratus, four villages and one community care center are randomly selected and the village heads are interviewed to assess basic village characteristics and the implementation of the pension program.[10] Village heads also provide a residents' roster with basic demographic information of each individual. In the second stage, from each village or community care center a random sample of residents who fall in the age range from 55 to 70 are interviewed with detailed questions about household composition, living arrangements, work-related migration of adult children, and the health and health care utilization of the elderly. In particular, the correspondents report the demographic information and work-related migration for each of their children above ag 16. Our stratified random sample of 12 villages and three community care centers in rural Laiwu includes data on 676 older adults with 1,441 children and 1,553 grandchildren.

Table 1 presents summary statistics for the outcome measures used in this study. Panels A and B report the outcomes for adult children and elderly parents, respectively. The first column reports the mean and standard deviations for the full sample, that is, households with respondents age 55 to 70. Columns (2) and (3) report means and standard deviations when confining the sample to households with a member between ages 55 and 65—5 years around the age cutoff. Column (4) reports the result of a $t$-test comparing the difference between the mean of those below and above the pension eligibility threshold. Note that these descriptive statistics could be different from the true causal effect of pension receipt because the means and $t$-tests capture not only the pension effect, but also any trends regarding aging and cohort heterogeneity. The potential difference underscores the importance of using a rigorous study design such as regression discontinuity to distinguish the effect of pension income from the life cycle pattern of extended household formation and other outcomes.

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10.   We over-sampled elderly living in these dormitory-style community care centers ("yanglao yuan," rarely providing comprehensive nursing services). According to the 2005 National Aged Population Survey only 1.2% of China's rural elderly lived in a nursing home (Chen, Eggleston, and Li 2012).

TABLE 1. Sample Summary Statistics of the Main Outcome Variables

| Dependent variable | [55,70] | [55,60) | [60,65] | Diff (3)-(2) |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **Panel A. Adult Children** | | | | |
| N | 1,441 | 396 | 355 | |
| Migrant laborer (1=Yes, 0=No) | 0.192 | 0.260 | 0.200 | −0.060* |
| | (0.394) | (0.439) | (0.401) | (0.031) |
| Off-farm job (1=Yes, 0=No) | 0.560 | 0.659 | 0.634 | −0.025 |
| | (0.497) | (0.475) | (0.482) | (0.035) |
| Co-reside with elderly parents (1=Yes, 0=No) | 0.060 | 0.141 | 0.031 | −0.110*** |
| | (0.238) | (0.349) | (0.174) | (0.020) |
| **Panel B. Elderly Parents** | | | | |
| N | 676 | 254 | 172 | |
| Expect to be admitted to hospital when | 0.893 | 0.925 | 0.924 | −0.001 |
| recommended (1= Yes, 0=No) | (0.309) | (0.264) | (0.265) | (0.026) |
| Expect to use family care when ill | 0.700 | 0.642 | 0.686 | 0.044 |
| (1=Yes, 0=No) | (0.459) | (0.480) | (0.465) | (0.047) |

*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note:* Panel A reports the summary statistics of the main outcome variables of adult children of the survey respondents; panel B reports the summary statistics of the main outcome variables for the elderly respondents. Column (1) reports the mean and standard deviation (in parentheses) for all respondents. In column (2) and (3), we confine the sample to respondents who fall in the age range of [55, 60) and [60, 65], respectively. The entries in column (4) are the mean and standard errors when conducting the *t*-test comparing the mean in (2) and (3). ***Significant at 1%. **Significant at 5%. *Significant at 10%.

## Fuzzy Regression Discontinuity

Our empirical approach is driven by the age discontinuity in the benefit structure of the social pension program. Among the elderly in Laiwu, Shandong, social pension eligibility depends almost exclusively on age—one becomes eligible for the pension at age 60. Thus pension income does not depend on cumulative work history or the circumstances of the extended family.

To identify the effect of the pension program, we adopt the nonparametric Fuzzy Regression Discontinuity (FRD) design. This design allows the jump in the probability of assignment to the treatment at the threshold to be less than 1 (as indicated by figure 1). In our survey, we collect information on the implementation of the pension program at the village level. We found pension receipt is largely determined by age eligibility and the deviations are mostly driven by the variation in implementation at the village level. Wealthier villages grant pensions earlier, whereas in the poorest village in our sample, only 35% of the eligible elderly received pension income.

The validity of the regression discontinuity design crucially depends on the continuity of the running variable, that is, age measured in days in our FRD design. In this paper, we adopt McCrary's (2008) density test to formally examine

FIGURE 1. Pension Receipt According to Normalized Age (0 = eligibility threshold, age 60)
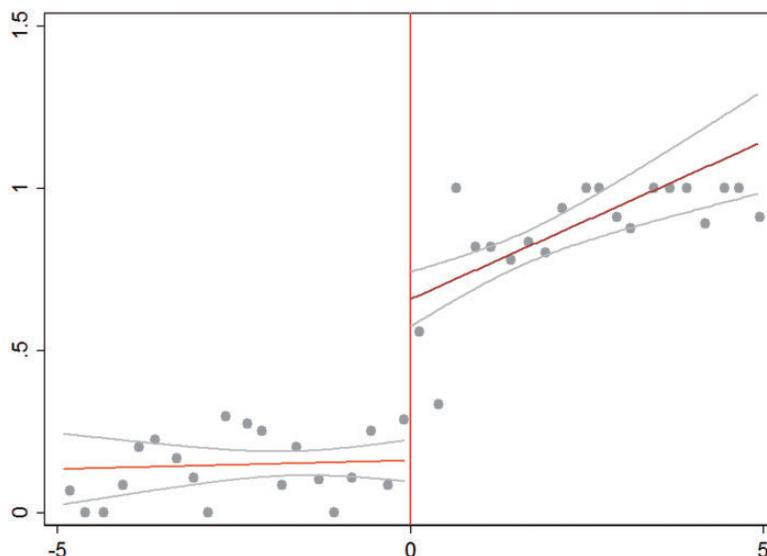


*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note*: This figure uses the sample of the respondents in the age range of (55, 65). The pension eligible age is 60. This figure shows the relationship between the relative age (horizontal axis) and pension receipt (vertical axis). The dots show the sample mean of the indicator variable for receiving a pension (1 if receiving pension, 0 otherwise) in each quarter of (55, 65), that is, by three-month increments of age. The line represents the linear regression of the dummy indicator of receiving pension income on the relative age. The thin, curves show the 90% confidence interval.

whether the density of age is continuous at the cutoff point 60. The outcome of this test is presented in supplemental appendix figure S3.1 (available at http://wber.oxfordjournals.org/), and the null of continuity is not rejected. Graphically, supplemental appendix figure S3.1 shows that there is no immediate jump after age 60, so manipulation of age in order to be eligible for a pension is unlikely to exist in our study.

In this design, the ratio of the jump in the regression of the outcome (denoted by $y_i$ in (1)) on age to the jump in the regression of the treatment indicator (denoted by *pension*$_i$ in (1)) on age is interpreted as an average causal effect of the treatment (Imbens and Lemieux 2008). Formally, the estimand is

$$\tau_{FRD} = \frac{\lim_{a\downarrow 60}E(y_i|age_i=a) - \lim_{a\uparrow 60}E(y_i|age_i=a)}{\lim_{a\downarrow 60}E(pension_i|age_i=a) - \lim_{a\uparrow 60}E(pension_i|age_i=a)} \quad (1)$$

The identification assumption is that the individuals near pension eligibility (i.e., in their late 50s) and those who just became eligible (in their early 60s) are comparable except for pension eligibility. Specifically, two conditions must hold. First, the outcome for an individual depends on resources and characteristics of the household and all of its potential members, and these (unobserved) characteristics must have "continuous" effects on the outcome variables. Second, the characteristics of the household and all its potential members should have continuous distributions around the age threshold. We provide suggestive evidence to show that the unobservable respondents' characteristics are likely balanced within a small neighborhood around the age threshold to the extent that the observable predetermined covariates do not show any significant jump at the threshold. Such graphical evidence is shown in supplemental appendix figure S3.2.

We use local linear regression to calculate $\lim_{a\downarrow 60}E(y_i|age_i=a)$, $\lim_{a\uparrow 60}E(y_i|age_i=a)$, $\lim_{a\downarrow 60}E(pension_i|age_i=a)$ and $\lim_{a\uparrow 60}E(pension_i|age_i=a)$, respectively. For the implementation of local linear regression, we choose the bandwidth by the method proposed by Imbens and Lemieux (2008)[11] and use the rectangular kernel.

For each main outcome variable $y_i$, we conduct RD estimation with local linear regression described above. Both the reduced form estimand $\lim_{a\downarrow 60}E(y_i|age_i=a)$ $-\lim_{a\uparrow 60}E(y_i|age_i=a)$ and the FRD estimand are reported, together with the bandwidth values.

To interpret our result, we need to impose the assumption of monotonicity, that is, older individuals are more likely to receive a pension than younger ones. Specifically, the effect of interest is how pension income impacts subsequent household outcomes for "compliers," defined as individuals who do not receive a pension if not eligible (below age 60) and do receive a pension if eligible (age 60 or older). Then,

$$\tau_{FRD} = \frac{\lim_{a\downarrow 60}E(y_i|age_i=a) - \lim_{a\uparrow 60}E(y_i|age_i=a)}{\lim_{a\downarrow 60}E(pension_i|age_i=a) - \lim_{a\uparrow 60}E(pension_i|age_i=a)}$$
$$= E(y_i(1) - y_i(0)|individual\,i\,is\,a\,complier\,and\,age_i=a) \quad (2)$$

where $y_i(1)$ denotes the outcome when the respondent $i$ is "treated" by the pension program (pension receipt $= 1$) and $y_i(0)$ denotes the outcome when the respondent is "not treated" by the pension program (pension receipt $= 0$). In addition, we interpret $E(y_i(1) - y_i(0)|individual\,i\,is\,a\,complier\,and\,age_i=a)$ as the lower bound of the pension program's average effect at the threshold age $a$

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11.  The optimal bandwidth is chosen by the criteria of minimizing squared bias and variance.

for the compliers because more households will respond to the income windfall given a longer period of time.

To check the sensitivity of the reduced-form nonparametric estimation, we also employ an alternative parametric method using all observations, by modeling the outcome $y_i$ as

$$y_i = \alpha + \tau \cdot \mathbf{1}(age_i \geq 60) + \beta \cdot f(age_i - 60) + \delta \cdot \mathbf{1}(age_i \geq 60)f(age_i - 60) + \epsilon_i \quad (3)$$

where $f(age_i - 60)$ is a polynomial function of the normalized age, $age_i - 60$.[12] To test the robustness of the nonparametric FRD estimands, we employ the 2SLS estimator $\tau$ in (4), using $Z_i = \mathbf{1}(age_i \geq 60)$ as the IV for $pension_i$

$$y_i = \alpha + \tau \cdot pension_i + \beta \cdot f(age_i - 60) + \delta \cdot \mathbf{1}(age_i \geq 60)f(age_i - 60) + \epsilon_i \quad (4)$$

Both the reduced-form estimand $\tau$ in equation (3) and the IV estimand $\tau$ from (4) are reported.

Standard errors of estimates reported in the paper are clustered at the village level.[13] More detailed discussion on clustered standard errors is contained in the supplemental appendix S3.2.

During the survey, we asked the respondents about the main outcomes prior to the survey, when the pension program was not yet launched. As a placebo test, we redo the reduced form estimations using this preprogram information and show no effect prior to the pension policy.

## III. RESULTS AND INTERPRETATIONS

### The First Stage: Pension Receipt

Figure 1 plots the probability that a respondent reports receiving a social pension, according to the respondent's normalized age (=0 if age is 60). The 20 dots on each side of the cutoff are the 3-month average of the dummy indicator of receiving a pension. In addition, the figure shows the regression line and the 90% confidence interval, where $y$ is the dummy indictor of receiving pension (1 if receiving pension, 0 otherwise). We see a sharp jump of the fitted value of pension receipt at the age cutoff of 60. Figure 1 shows a strong first stage of our FRD estimation.

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12.  We report the outcome of OLS and IV based on second order polynomials for consistency, since quantitative criteria suggest various choices of the order, and produce qualitatively similar results for most of outcome variables we study.

13.  They are computed by the routine STATA cluster option. Alternatively (as suggested by one referee), we also consider the [moulton 1986 random] correction for standard errors, which is reported in supplemental appendix (table S3.2–S3.7).

Table 2 reports the result of RD estimation. In panel A, when using our Laiwu county data, the two estimation methods yield very similar results: at the eligibility cutoff point, approximately 59.4% of the elderly receive pension payments. This jump is highly significant. To confirm that our Laiwu data are not misleadingly different from the national situation in rural China, we show in panel B that using the nationally representative CHARLS data yield smaller but equally significant OLS and RD estimands.

To have a better understanding of the first stage, we also examine the discontinuity of living in community care centers at the eligible age cutoff because together with the pension program, some villages in Laiwu County also provide subsidized community care centers. Supplemental appendix figure S3.3 does not reveal a significant jump of the propensity of living in institutions at the pension-eligible age. Neither nonparametric nor parametric RD regression shows a significant change at the age cutoff. Therefore, in this paper we focus on the income effect of the pension program.

## *Migration and Occupation of Adult Children*

In our survey, we asked the respondent about whether each adult child was a migrant worker. If not, we asked the timing of her last work-related migration if she migrated before. We also solicited information about each adult child's current job, her last job, and the timing of the last change of jobs. Therefore, we can examine migration status and off-farm employment in 2012 (after the pension program was fully in effect) as the main results and compare to results in 2006 (one year before pensions were introduced) as a placebo test.[14]

Figure 2 plots fitted values from a linear regression of the dummy indicator for work-related migration on relative age, as well as the 90% confidence band. Figure 2 panel A for treatment in 2012 shows the jump of the dummy indicator for adult children migrating for work at the age when the elderly parent becomes pension-eligible. By contrast, we do not see the same pattern in panel B using the migration information one year before implementation of the pension program.

Table 3 panel A reports the RD estimands using the sample composed of all adult children of the respondents. Columns (2) and (3) show the nonparametric RD and FRD estimands using local linear regressions in the postprogram period are statistically significant at the 5% level. Columns (4) and (5) show that the RD and FRD estimands from fitting OLS regressions with second-order control functions yield similar results. The coefficients of pension eligibility are significant at the 10% level. The magnitudes of the nonparametric FRD and 2SLS estimands are 31.1 and 25.4 percentage points, respectively. The large magnitude could be in part because of our small sample size, which leads to large confidence intervals but also because the pension, although modest, constitutes a substantial increase in the income of the elderly. In our sample, most elderly rely upon

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14. Most of the adult children only changed jobs once during the period between 2006 and 2012.

TABLE 2. First Stage: RD Estimands of Pension Receipt

| Dependent variable | N | Local linear regression | OLS with 2nd-order polynomial |
|---|---|---|---|
| | (1) | (2) | (3) |
| **Panel A. Laiwu Survey** | | | |
| Indicator of Pension Receipt | 670 | 0.594*** | 0.589*** |
| (1=Yes; 0=No) | | (0.080) | (0.084) |
| Bandwidth | | 7.508 | |
| **Panel B. CHARLS Sample** | | | |
| Indicator of Pension Receipt | 3,671 | 0.252*** | 0.444*** |
| (1=Yes; 0=No) | | (0.036) | (0.032) |
| Bandwidth | | 4.180 | |

*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note*: Panel A uses the data from our Laiwu Survey and panel B uses the China Health and Retirement Longitudinal Study (CHARLS) sample. In each panel, column (1) is the number of observations; column (2) reports the nonparametric RD estimand. We use local linear regression with the uniform kernel and choose the bandwidth by the method proposed by Imbens and Lemieux (2008); the results in column (3) report the parametric RD estimand with 2nd-order polynomials of the running variables, using all observations. ***Significant at 1%. **Significant at 5%. *Significant at 10%.
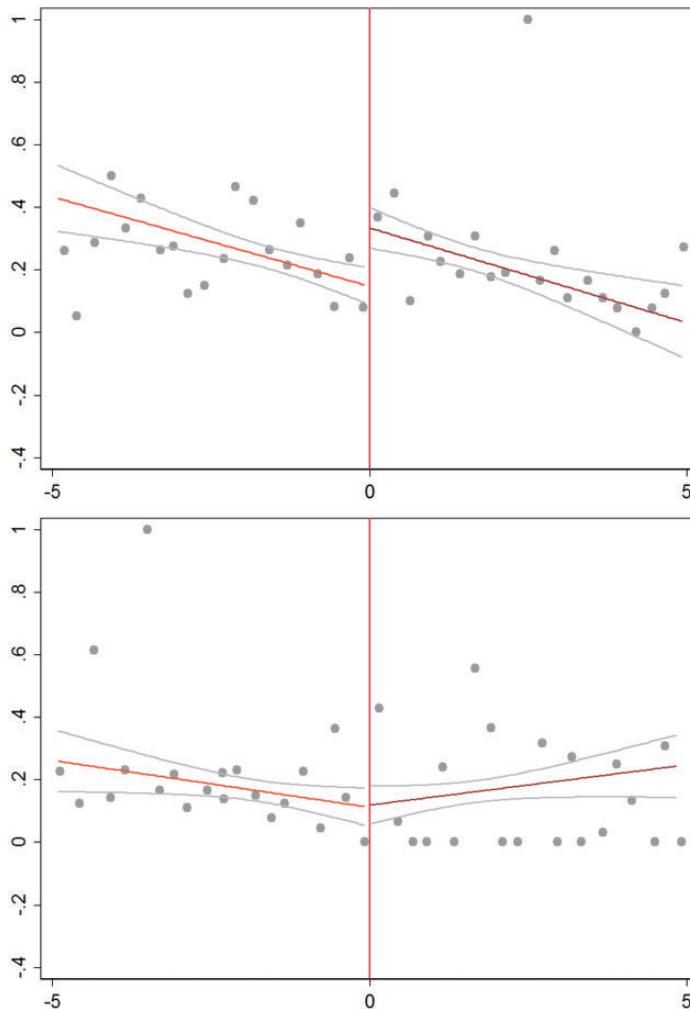
support from their adult children. For pension recipients, the pension payments constitute 60.2% of their total income, defined as the sum of labor income and pension income.

In table 3 columns (6) and (7), we report the nonparametric and parametric reduced-form RD estimands using migration status in the placebo year and do not find any discrete change at the age cutoff, which lends credibility to the linkage between the discrete change and pension receipt in our benchmark analysis.

We run similar analyses for the dummy indicator of off-farm employment of adult children. Figure 3 panel A shows a slight insignificant increase in the likelihood of off-farm employment, when bandwidth is 5 years of age. Table 4 panel A column (3) shows that the FRD estimand on the likelihood of off-farm employment increases significantly at the margin of pension eligibility when bandwidth is confined to around 3.57 years of age. Figure 3 panel B and table 4 panel A columns (6) and (7) show that the increase in off-farm employment disappears when examining the placebo before-pension period. It is worthy to note that without the pension program, the signs of the RD estimands are negative, which is consistent with lower off-farm employment among older cohorts.

We study heterogeneity in the pension effect to shed light on the mechanism(s) through which pension income affected household decisions. As discussed in section 2, similar to other countries in the developing world, elderly residents in rural China suffer a high risk of poverty and lack social safety net. In this circumstance, instrumental help from adult children is essential. In particular, family care provided by adult children is most common when an elderly family member falls ill. In the supplemental appendix S1, we sketch a simple model to

FIGURE 2. Work-related Migration Status of Adult Children, for Treatment (2012) and Placebo (2006) Years
Panel A. Treatment 2012     Panel B. Placebo 2006



*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.
*Note*: This figure uses the sample composed of the adult children of respondents in the age range of (55, 65). The pension eligible age is 60. This figure shows the relationship between the elderly parent's relative age and work-related migration of adult children. The dots show the sample mean of the dummy indicator for work-related migration (1 if migrate for work, 0 otherwise) in each quarter of (55, 65). The line represents the linear regression of the dummy indicator of work-related migration on the relative age. The thin, curves show the 90% confidence interval. Panel A shows the result for the treatment year 2012, while panel B shows a placebo test of the same relationship in the year 2006 prior to the first implementation of the pension program in Laiwu.
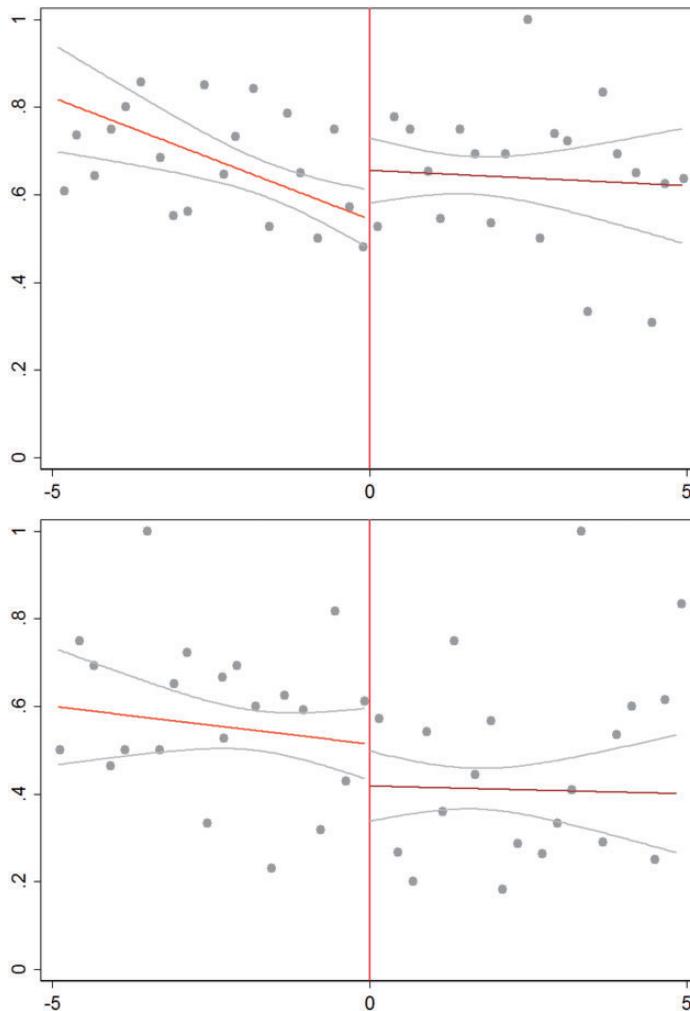
TABLE 3.  RD Estimation on Labor Migration for Adult Children

| | | After implementation (2012) | | | | Before implementation (2006) | |
|---|---|---|---|---|---|---|---|
| | | Local linear regression | | OLS with 2nd-order polynomial | | Local linear regression | OLS with 2nd-order polynomial |
| Dependent variable | | | | | | | |
| Migrant laborer=1; 0 otherwise | N | Reduced form RD | FRD | Reduced form RD | FRD | Reduced form RD | Reduced form RD |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Panel A. All adult children of the respondents | | | | | | | |
| | 1,441 | 0.154** | 0.311** | 0.138* | 0.254* | −0.020 | −0.001 |
| | | (0.074) | (0.147) | (0.073) | (0.139) | (0.041) | (0.039) |
| Bandwidth | | 3.800 | 3.827 | | | 11.765 | |
| Divide the sample by elderly parents' health Panel B. Adult children with a parent in fair or poor health | | | | | | | |
| | 885 | 0.193** | 0.383** | 0.175* | 0.353* | | |
| | | (0.084) | (0.166) | (0.086) | (0.199) | | |
| Bandwidth | | 4.790 | 4.818 | | | | |
| Panel C. Adult children with a parent in good health | | | | | | | |
| | 556 | 0.099 | 0.208 | 0.113* | 0.173** | | |
| | | (0.099) | (0.193) | (0.058) | (0.077) | | |
| Bandwidth | | 3.362 | 3.391 | | | | |

*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note:* Panel A uses the data from the whole Laiwu sample; panel B uses the sample confined to adult children with a parent in fair or poor health; and panel C uses the sample confined to adult children with a parent in good or excellent health. In each panel, column (1) is the number of observations; using the nonparametric method, column (2) and column (3) report the reduced form RD estimands and the FRD estimands, respectively. We use local linear regression with the uniform kernel and choose the bandwidth by the method proposed by Imbens and Lemieux (2008). As robustness checks, for both columns (4) and (5), we use all observations to fit an OLS regression with 2nd-order polynomials on both sides of the age cutoff. In column (4), the coefficient of the dummy indicator of age eligibility is interpreted as the reduced form RD estimand, and in column (5) the coefficient of the dummy indicator of pension receipt instrumented by age eligibility is interpreted as the FRD estimand. Column (6) and column (7) report the reduced form RD estimand using nonparametric and parametric methods, respectively, as a placebo test using the data one year prior to the implementation of the pension program. ***Significant at 1%. **Significant at 5%. *Significant at 10%.

FIGURE 3.    Off-farm Employment Status of Adult Children, for Treatment (2012) and Placebo (2006) Years
Panel A. Treatment 2012      Panel B. Placebo 2006



*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.
*Note*: This figure uses the sample composed of the adult children of respondents in the age range of (55, 65). The pension eligible age is 60. This figure shows the relationship between the elderly parent's relative age and off-farm employment of adult children. The dots show the sample mean of the dummy indicator for off-farm employment (1 if employed off-farm, 0 otherwise) in each quarter of (55, 65). The line represents the linear regression of the dummy indicator of off-farm employment on the relative age. The thin, curves show the 90% confidence interval. Panel A shows the result for the treatment year 2012, while panel B shows a placebo test of the same relationship in the year 2006 prior to the first implementation of the pension program in Laiwu.

TABLE 4.  RD Estimation on Off-farm Employment for Adult Children

| Dependent variable | | After implementation (2012) | | | | Before implementation (2006) | |
| | | Local linear regression | | OLS with 2nd-order polynomial | | Local Linear Regression | OLS with 2nd-order polynomial |
| | N | Reduced Form RD | FRD | Reduced Form RD | FRD | Reduced Form RD | Reduced Form RD |
| Off-farm job=1; 0 otherwise | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Panel A. Whole Sample | 1,441 | 0.118 | 0.231* | 0.200** | 0.365*** | −0.094 | −0.069 |
| | | (0.075) | (0.137) | (0.069) | (0.116) | (0.188) | (0.103) |
| Bandwidth | | 3.564 | 3.570 | | | 2.597 | |
| Divide the sample by elderly parents' health | | | | | | | |
| Panel B. Adult children with a parent in fair or poor health | 885 | 0.155 | 0.374** | 0.287*** | 0.621*** | | |
| | | (0.108) | (0.190) | (0.085) | (0.198) | | |
| Bandwidth | | 4.225 | 4.201 | | | | |
| Panel C. Adult children with a parent in good health | 556 | 0.071 | 0.081 | 0.106 | 0.128 | | |
| | | (0.131) | (0.219) | (0.138) | (0.193) | | |
| Bandwidth | | 3.607 | 3.656 | | | | |

*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note:* Panel A uses the data from the whole Laiwu sample; panel B uses the sample confined to adult children with a parent in fair or poor health; and panel C uses the sample confined to adult children with a parent in good or excellent health. In each panel, column (1) is the number of observations; using the nonparametric method, column (2) and column (3) report the reduced form RD estimands and the FRD estimands, respectively. We use local linear regression with the uniform kernel and choose the bandwidth by the method proposed by Imbens and Lemieux (2008). As robustness checks, for both columns (4) and (5), we use all observations to fit an OLS regression with 2nd-order polynomial control functions on both sides of the age cutoff. In column (4), the coefficient of the dummy indicator of age eligibility is interpreted as the reduced form RD estimand, and in column (5) the coefficient of the dummy indicator of pension receipt instrumented by age eligibility is interpreted as the FRD estimand. Column (6) and column (7) report the reduced form RD estimand using nonparametric and parametric methods, respectively, as a placebo test using the data one year prior to the implementation of the pension program. ***Significant at 1%. **Significant at 5%. *Significant at 10%.

illustrate how the commitment of adult children to invest their time in instrumental support of their elderly parent constrains them from migration to improve their earnings in the next period. This framework implies that adult children with parent(s) in poor health are more constrained from migrating than those with parent(s) in better health. (Of course, a parent's health status is far from random; for example, richer households are both more likely to have healthy parents and be free from credit constraints.[15]) This framework is also consistent with Giles and Mu's (2007) empirical findings of a significantly lower probability that a Chinese son will work as a migrant when a parent is seriously ill.

In this setting, pension income makes medical services more affordable, therefore, enables pensioners to substitute purchased services for instrumental support directly provided by the adult children. This substitution presumably provides the adult children with greater flexibility in participation in the nation-wide labor market. Such flexibility matters more for the most constrained households, that is, the households with a parent in poor health. This heterogeneity could also reflect the lack of a complete insurance market because respondents in poor health could face higher interest rates for a loan and/or caring for an elder in poor health is likely to lower households' overall income.

We categorize the sample by respondents' self-reported health status. We find that the RD estimands for migration and off-farm employment are consistently of larger magnitude for those adult children whose parent(s) report fair or poor health (in panel B of table 3 and table 4), compared to the estimands using the whole sample (in panel A of table 3 and table 4) or the estimands using the sample composed of households with a parent in good health (in panel C of table 3 and table 4).[16] Conducting RD estimation using an even smaller sample could limit precision of the estimation, which may partly explain the larger magnitude and confidence intervals of the RD estimands, but comparison between the results in panels B and C (both with smaller subsamples) clearly illustrates that the households with a parent in fair or poor health are mostly affected by the pension program.

As a robustness check, we run a placebo test of the RD analysis to investigate the indicator of pension receipt and the potentially interesting outcomes at the placebo "assumed age cutoff" of 58. Under our premise of credit constraint, household behavior should not change at age 58 because the "windfall" has not yet been received. As shown in the supplemental appendix table S3.1, none of the RD coefficients are statistically significant, consistent with our premise.

15.  If the elderly respondents' health reflects the extent to which a household is credit constrained, it is still interesting to document the heterogeneity of the pension effect.

16.  For the subsample composed of households with a parent in good health, the magnitude of the jump for both results are of much smaller magnitude, indicating the statistical insignificance is unlikely to be caused by smaller sample size.

*Respondents' Expectations on the Form of Care They Will Receive When Ill*

If adult children are constrained from leaving their parents because purchasing substitute instrumental support is unaffordable and if such a constraint is relaxed by pension income, then we should be able to observe the substitution of hired services for instrumental support from adult children, especially in household plans for intensive care of ill parents.

To test this prediction, we examine respondents' expectations regarding the kind of care that they expect to receive if they become ill. We ask the respondents "If you get ill, will your adult children provide you care?" We draw upon the question "If you get ill and are recommended by a doctor to be hospitalized, will you stay in hospital?" to shed light on whether more income boosts the respondents' expectations of access to nonfamilial care when ill.[17]

Consistent with this hypothesis, we find that elderly parents have lower expectations of receiving care provided by children, as shown in table 5 panel A, although the nonparametric estimand for expectation of receiving care from adult children is not significant when bandwidth is four years of age. The OLS estimation with second-order polynomials yields significant negative RD estimand upon the pension eligible age. The insignificant nonparametric estimand could be consistent with the roughness of our survey indicator and China's tradition of filial piety. Children are regarded as responsible to provide care to parents when sick, and depending on the severity of illness, adult children are almost inevitably involved in some form of family care. Thus, the indicator may not be able to capture the change in expected intensity of involvement of adult children in future family care.

In addition, table 5 panel A demonstrates that after they become pension-eligible, respondents report being more likely to use inpatient services when recommended by a doctor. The results are consistently significant at the 5% level. We address the skepticism that such increase could be caused by more affordable medical services or worsening of health. Rural residents of all ages are covered by the subsidized New Cooperative Medical Scheme (NCMS) health insurance. There is no evidence in our data of different coverage between residents below and above age 60. Table 5 panel B shows no discrete change in NCMS enrollment at age 60 in either the nonparametric or OLS regression. In addition, we examine the health status of individuals and find no discontinuity of the self-reported health status at age 60, suggesting that the abrupt change in expectation of using inpatient services is unlikely to be attributable to sudden worsening of health. The magnitudes of the RD coefficients in panel B are very small, indicating that the chance of a discrete change in these variables is very low.

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17. Although inpatient medical care (e.g., for a surgical procedure) is different from in-home care by children when sick (e.g., cooking, preparing an herbal remedy, feeding, bathing), at least in rural China there are reasons to suspect a degree of substitutability. Even in high-income Japan, there is a large controversy about "social hospitalization" for elderly with long-term care needs, as manifest by hospital lengths of stay far exceeding most other OECD countries.

TABLE 5. Expectation on Services Will Receive When Ill by Elderly Parents

| Dependent Variable | | Local linear regression | | OLS with 2nd-order polynomial | |
|---|---|---|---|---|---|
| | N | Reduced form RD | FRD | Reduced form RD | FRD |
| | (1) | (2) | (3) | (4) | (5) |
| Panel A. Suggestive evidence on consumption | | | | | |
| Expect when ill to receive family care provided by adult children (1=Yes, 0=No) | 676 | −0.066 (0.082) | −0.125 (0.143) | −0.193** (0.076) | −0.321*** (0.107) |
| Bandwidth | | 3.993 | 3.978 | | |
| Expect to use inpatient services when recommended (1=Yes, 0=No) | 676 | 0.130** (0.059) | 0.232** (0.107) | 0.173** (0.077) | 0.277** (0.123) |
| Bandwidth | | 3.696 | 3.682 | | |
| Panel B. Test continuity of health and take-up rate of social health insurance | | | | | |
| NCMS enrollment (China's subsidized health insurance for rural residents)(1=Yes, 0=No) | 676 | 0.013 (0.019) | | −0.009 (0.019) | |
| Bandwidth | | 4.980 | | | |
| Self-reported health status (1-5) | 676 | −0.002 (0.100) | | −0.035 (0.112) | |
| Bandwidth | | 6.438 | | | |

*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note:* The results use the data of correspondents in the Laiwu Survey. In panel A, column (1) is the number of observations; using the nonparametric method, column (2) and column (3) report the reduced form RD estimands and the FRD estimands, respectively. We use local linear regression with the uniform kernel and choose the bandwidth by the method proposed by Imbens and Lemieux (2008). As robustness checks, for both columns (4) and (5), we use all observations to fit an OLS regression with 2nd-order polynomials on both sides of the age cutoff. In column (4), the coefficient of the dummy indicator of age eligibility is interpreted as the reduced form RD estimand, and in column (5) the coefficient of the dummy indicator of pension receipt instrumented by age eligibility is interpreted as the FRD estimand. In panel B, we check the continuity of respondents' self-reported health and the dummy indicator of taking up the New Cooperative Medical System, which is the subsidized voluntary health insurance program for rural residents in China. Columns (2) and (4) report the RD estimands using nonparametric and parametric methods, respectively. ***Significant at 1%. **Significant at 5%. *Significant at 10%.

## IV. Other Outcomes

In addition to labor migration, the effect of pensions on other outcomes, such as intergenerational transfers and living arrangements, are of economic interest and have been studied in prior research on South Africa's pension program (Ardington, Case, and Hosegood 2009; Duflo 2003; Edmonds, Mammen, and Miller 2005). To compare the pension program in rural China with that in South Africa, we provide supplementary results on how these outcomes respond to pension receipt in our Laiwu data.

### Living Arrangements

The migration of adult children could directly lead to a change in living arrangements, with the adult children moving away from their natal home either temporarily or permanently. However, labor-related migration of adult children does not necessarily result in a significantly smaller family size or lower likelihood of the pensioners living together with their adult children because the low proportion of initial coresidence may have been too small to detect much impact on that margin and because of competing forces changing other margins of living arrangements upon pension receipt. For example, Edmonds, Mammen, and Miller (2005) find that prime working age women depart, but the presence of children under five and young women of child-bearing age increases. They interpret the finding as suggestive evidence about a setting where prime age women have a comparative advantage in work away from extended family relative to younger women. This subsection studies the setting of rural China to explore the effect of the pension program on extended family living arrangements.

In rural China, extended families have traditionally been composed of parents, their unmarried children, and one or more married sons with wives and children, while daughters leave their natal family behind and become part of their husbands' families at the time of marriage (Lang 1946). For extended families with multiple adult sons, one or more married sons usually move away from the parents' house to live independently. Economic factors are major forces in determining when adult children leave their parents' house (Cohen 1992). Therefore, to investigate the potential effect of pension receipt on family living rearrangements, we confine the sample to adult sons and focus on the outcome of coresidence with elderly parents.

Table 6 reports the results regarding living arrangements. Panel A uses the sample of adult sons. In the postprogram period, for adult sons, although there is no significant effect on coresidence, the coefficients in column (2)–(5) are consistently negative. The insignificant estimands could partially be because the portion of coresidence in our sample is low on average and therefore not very responsive to migration. In table 6 columns (6) and (7), we document the living arrangements of adult children in the placebo year 2006.[18] Without the implementation of pension program, the RD coefficient on coresidence is not significant. Moreover, the RD coefficients are positive, indicating the average likelihood of coresidence is greater among the older cohorts. This is consistent with the declining time trend of coresidence across generations in rural China (Peng 2011).

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18.   In our survey, we asked the respondents "in what year did the current living arrangement start?" and "with whom did you live before this change?" For the latter question, the respondents choose from among "living alone," "living with spouse," "living with (other) children," "living with (other) relatives," and "living in a nursing home." The respondents are also asked to provide the demographic information of current household members, from which we construct the variables describing current living arrangements.

TABLE 6. RD Estimation on Living Arrangements

| | | After implementation (2012) | | | | Before implementation (2006) | |
| | | Local linear regression | | OLS with 2nd-order polynomial | | Local linear regression | OLS with 2nd-order polynomial |
| Dependent variable | N (1) | Reduced form RD (2) | FRD (3) | Reduced form RD (4) | FRD (5) | Reduced form RD (6) | Reduced form RD (7) |
|---|---|---|---|---|---|---|---|
| Panel A. Sample of adult sons | | | | | | | |
| Co-reside with the respondent | 768 | −0.058 | −0.088 | −0.063 | −0.084 | 0.164 | 0.179 |
| (1=Yes, 0=No) | | (0.088) | (0.148) | (0.094) | (0.132) | (0.154) | (0.146) |
| Bandwidth | | 4.551 | 4.542 | | | 7.760 | |
| Panel B. Sample of the grandchildren from the sons' families | | | | | | | |
| Co-reside with the respondent | 849 | −0.114 | −0.168 | −0.098 | −0.148 | | |
| (1=Yes, 0=No) | | (0.090) | (0.166) | (0.100) | (0.154) | | |
| Bandwidth | | 4.351 | 4.333 | | | | |
| Panel C. Sample of the elderly parents with adult sons | | | | | | | |
| Numbers of co-residing adult | 533 | −0.123 | −0.206 | −0.093 | −0.126 | 0.299 | −0.042 |
| sons | | (0.108) | (0.185) | (0.117) | (0.162) | (0.251) | (0.068) |
| Bandwidth | | 5.680 | 5.675 | | | 6.852 | |

*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note:* Panel A uses the data of adult children from the Laiwu Sample; panel B uses the sample of grandchildren from the sons' families; and panel C uses the sample of elderly parents with at least one adult son. In each panel, column (1) is the number of observations; using the nonparametric method, column (2) and column (3) report the reduced form RD estimands and the FRD estimands, respectively. We use local linear regression with the uniform kernel and choose the bandwidth by the method proposed by Imbens and Lemieux (2008). As robustness checks, for both columns (4) and (5), we use all observations to fit an OLS regression with 2nd-order polynomial control functions on both sides of the age cutoff. In column (4), the coefficient of the dummy indicator of age eligibility is interpreted as the reduced form RD estimand, and in column (5) the coefficient of the dummy indicator of pension receipt instrumented by age eligibility is interpreted as the FRD estimand. Column (6) and column (7) report the reduced form RD estimand using nonparametric and parametric methods, respectively, as a placebo test using the data one year prior to the implementation of the pension program. ***Significant at 1%. **Significant at 5%. *Significant at 10%.

We examine the outcome of coresidence with respondents using the sample of grandchildren from adult sons' families. The results are shown in table 6 panel B. The coefficients of pension eligibility in columns (2)–(5) are consistently negative but not significant. The results show no evidence of family division or respondents bringing in grandchildren upon pension receipt. In table 6 panel C, we report the results estimating the RD coefficient of family size for respondents with adult sons (i.e., excluding the childless and those who have only daughters). The results are similar to those in panel A: the coefficients of pension eligibility in panel C columns (2)–(5) are consistently negative but not significant, and columns (6) and (7) show that the results do not have stable negative signs using the data of 2006. The results in panels B and C show no evidence that pension receipt was associated with significant effects on extended family living arrangements.

### Intergenerational Transfers

This paper emphasizes the mechanism that pension income enables elderly pensioners to be less reliant on instrumental support from their adult children, by for example substituting use of hired or inpatient services. Prior research focuses on other channels behind the effect of pension income on prime-age household members' migration, such as using the pension income to cover migration costs of adult children or enabling the elderly parents to take care of grandchildren left behind by their migrating parents. The channel of "staking" the migrant has been discussed by Ardington, Case, and Hosegood (2009) in the case of South Africa.[19] Duflo (2003) also shows in-kind transfers from grandmothers to granddaughters when receiving the pension income. Our simple model discusses the relationship between the two channels. The model is presented in supplemental appendix S1.

To compare this study with prior research by Ardington, Case, and Hosegood (2009) in the case of South Africa, we examine whether the pension payment impacts intrahousehold, intergenerational transfers. Our survey asks parents to recall the value of all monetary transfers and service exchange between them and their adult children and grandchildren in the previous 12 months. To examine the transfers during the 12-month period after and before pension eligibility, we redefine the cutoff age as 61. The results are reported in table 7.

Regarding pecuniary transfers, we find no effects on transfers to the elderly from all adult children or on transfers in the opposition direction. It is not surprising that respondents do not transfer more to adult children, given that the pension income only amounts to around 10% of the average income in the locality. This is also consistent with the interpretation of decreasing instrumental help

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19. Note that these mechanisms are consistent with independent living being a normal good (i.e., that an income windfall would allow greater privacy to each generation, while still providing companionship and support; see Costa 1997, 1999 and Salcedo, Schoellman, and Tertilt 2012).

TABLE 7. Transfers between Elderly Parents and Adult Children

| Dependent variable | N (1) | Local linear regression | | OLS with 2nd-order polynomial | |
|---|---|---|---|---|---|
| | | Reduced form RD (2) | FRD (3) | Reduced form RD (4) | FRD (5) |
| Panel A. Adult children | | | | | |
| Range of money transfers from the elderly to all adult children | 1,437 | 0.050 (0.385) | 0.139 (0.665) | 0.287 (0.320) | 0.492 (0.525) |
| Bandwidth | | 6.431 | 6.689 | | |
| Range of money transfers to the elderly from all adult children | 1,437 | 0.343 (0.365) | 0.329 (0.767) | 0.209 (0.414) | 0.323 (0.710) |
| Bandwidth | | 3.719 | 3.887 | | |
| Panel B. Grandchildren from adult sons' family | | | | | |
| Receive presents or money from the elderly (1=yes, 0=no) | 594 | −0.088 (0.150) | −0.091 (0.260) | −0.113 (0.108) | −0.154 (0.196) |
| Bandwidth | | 3.898 | 3.950 | | |
| Care by the elderly (1=yes, 0=no) | 594 | −0.007 (0.129) | −0.032 (0.241) | −0.042 (0.096) | −0.093 (0.179) |
| Bandwidth | | 4.844 | 4.868 | | |

*Source:* Data for the study comes from the July 2012 Survey of senior citizens in Laiwu, Shandong, China. The survey was conducted by Xi'an Jiaotong University, China, and the Shorenstein Asia-Pacific Research Center at Stanford University.

*Note:* In panel A, the money transfers received from each child are aggregated to a range: 0 for no transfer, 1 for below 50 RMB yuan, 2 for 50~99RMB yuan, 3 for 100~199RMB yuan, 4 for 200~499RMB yuan, 5 for 500~999RMB yuan, 6 for 1000~2999RMB yuan, 7 for 3000~4999RMB yuan, 8 for 5000~9999RMB yuan, 9 for more than 10000RMB yuan. Panel A uses the data of adult children from the Laiwu sample. We collect the data of intergenerational transfers by asking about such transfers during the past 12 months in our survey. We aim to investigate the transfers during the 12 months following pension receipt. Therefore, we define the cutoff age as 61 when running the RD modules. In each panel, column (1) is the number of observations; using the nonparametric method, column (2) and column (3) report the reduced form RD estimands and the FRD estimands, respectively. We use local linear regression with the uniform kernel and choose the bandwidth by the method proposed by Imbens and Lemieux (2008). As robustness checks, for both columns (4) and (5), we use all observations to fit an OLS regression with 2nd-order polynomials on both sides of the age cutoff. In column (4), the coefficient of the dummy indicator of age eligibility is interpreted as the reduced form RD estimand, and in column (5) the coefficient of the dummy indicator of pension receipt instrumented by age eligibility is interpreted as the FRD estimand. Panel B uses the sample of grandchildren from adult sons' family. ***Significant at 1%. **Significant at 5%. *Significant at 10%.

from children and the elderly parents spending more money on purchased services. The lack of effect of a pension on transfers from children to elderly parents has multiple aspects. On the one hand, the adult children may earn more income after migrating, enabling them to send remittances to their parents. On the other hand, migration costs could exhaust the premium wage they earn, at least for the first months or year. The competing forces render net transfers to parents undetermined.

To study intergenerational exchange of services (i.e., nonpecuniary transfers), we estimate the pension effect on a dummy indicator for the respondents providing day-care services to their grandchildren. The RD coefficient is not significant.

On the one hand, upon parental migration, if a child is left behind, then she is likely to be looked after by grandparents. On the other hand, the child might migrate to live in a new location with their parents, which decreases the likelihood of receiving care from grandparents.

In sum, in contrast with the case of South Africa, we do not find significant transfers between pensioners and other household members. This difference is not surprising, given that the pension income in rural China is not as sizable as that in South Africa, which leaves the direction of transfers unclear.

## V. Conclusions

Estimating the effect of a novel rural pension program on household outcomes in rural China, we find significant impact of the windfall income on the migration of adult children. The likelihoods of labor-related migration and off-farm employment increased by over twenty percentage points. The magnitude of the estimated pension effects seems particularly striking. The large magnitude could be because our sample is small and therefore, confidence intervals are large. However, the magnitude may not be too surprising in this setting: although the current pension is modest (only about 10% of average income in Laiwu), it represents a large increase in the income of the elderly (who often rely upon support from their adult children).

The empirical results are consistent with our hypothesis that the monetary support upon pension eligibility enables other family members to reduce the time commitment to instrumental support of aging parents or at least to defer those commitments to when the elderly parent might need them more (in their 70s or 80s).[20] These findings suggest that a market for in-home medical and long-term care services is likely to develop in rural areas alongside the consolidation and strengthening of the pension program so that such services will become increasingly available for purchase. An interesting further question for research is how this service market develops and who participates as suppliers. Labor migration to fulfill the long-term care needs of the urban elderly may ironically constrain the availability of labor for long-term care in rural areas.

Encouragingly, we do not find evidence that adult children significantly reduce transfers to their elderly parents when the parents became pension-eligible, as some analysts and policymakers had feared might happen. Instead, the public expenditures contribute to multigeneration improvements, with better security for the elderly and more freedom of occupational choice and urban migration for the adult children.

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20. In a somewhat similar way, Antman (2012) finds that adult children substitute for their siblings' time contributions with their own financial contributions to support elderly parents.

## Reference

Antman, F. M. 2012. "Elderly Care and Intrafamily Resource Allocation when Children Migrate." *Journal of Human Resources* 47 (2): 331–363.

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

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

Card, D., Dobkin C., and Maestas N. 2009. "Does Medicare Save Lives?" *Quarterly Journal of Economics* 124 (2): 597–636.

CHARLS Team 2013. "Challenges of Population Aging in China: Evidence from the National Baseline Survey of the China Health and Retirement Longitudinal Study." Available May 2013 at http://charls.ccer.edu.cn/en/articles/103 (accessed 24 September 2013).

Chen, Q., Eggleston, K., and Li, L. 2012. "Demographic Change, Intergenerational Transfers, and the Challenges for Social Protection Systems in the Peoples Republic of China." In *Aging, Economic Growth, and Old-age Security in Asia*, eds. D. Park, S.-H. Lee, and A. Mason Cheltenham, UK: Edward Elgar Publishing.

Cohen, M. L. 1992. "Family Management and Family Division in Contemporary Rural China." *China Quarterly* 130: 357–77.

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

Costa, D. L. 1999. "A House of her Own: Old Age Assistance and the Living Arrangements of Older Nonmarried Women." *Journal of Public Economics* 72 (1): 39–59.

Dong, F., and Featherstone A. M. 2006. "Technical and Scale Effciencies for Chinese Rural Credit Cooperatives: A Bootstrapping Approach in Data Envelopment Analysis." *Journal of Chinese Economic and Business Studies* 4 (1):57–75.

Dong, F., Lu J., and Featherstone A. M. 2010. "Effects of Credit Constraints on Productivity and Rural Household Income in China." Center for Agricultural and Rural Development, Iowa State University.

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

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

Feder, G., Lau L. J., Lin J. Y., and Luo X. 1990. "The Relationship between Credit and Productivity in Chinese Agriculture: A Microeconomic Model of Disequilibrium." *American Journal of Agricultural Economics* 72 (5): 1151–57.

Giles, J., and Mu R. 2007. "Elderly Parent Health and the Migration Decisions of Adult Children: Evidence from Rural China." *Demography* 44 (2): 265–88.

Imbens, G. W., and Lemieux T. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142 (2): 615–35.

International Fund for Agricultural Development 2001. Thematic Study on Rural Financial in China. Report No. 1147-CN Rev.1. Technical report.

Klasen, S., and Woolard I. 2000. "Unemployment and Employment in South Africa, 1995–1997." Pretoria: Department of Finance. Mimeographed.

Lang, O. 1946. *Chinese Family and Society*. New Haven, CT: Yale University Press.

Luo, M. 2004. "Rural Financial Services: The Supply and Demand Situation, Issues and Strategies." *Rural Finance and Credit Infrastructure in China*, 354.

McCrary, J. 2008. "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test." *Journal of Econometrics* 142 (2): 698–714.

Meng, X. 2012. "Labor Market Outcomes and Reforms in China." *Journal of Economic Perspectives*, 75–101.

Miller, G., Pinto D., and Vera-Hernández M. 2013. "Risk Protection, Service Use, and Health Outcomes under Colombia's Health Insurance Program for the Poor." *American Economic Journal: Applied Economics* 5 (4):61–91.

Moulton, B. R. 1986. "Random Group Effects and the Precision of Regression Estimates." *Journal of Econometrics* 32 (3): 385–97.

Peng, X. 2011. "Chinas Demographic History and Future Challenges." *Science* 333 (6042): 581–87.

Posel, D., Fairburn J. A., and Lund F. 2006. "Labour Migration and Households: A Reconsideration of the Effects of the Social Pension on Labour supply in South Africa." *Economic Modeling* 23 (5): 836–53.

Salcedo, A., Schoellman T., and Tertilt M. 2012. "Families as Roommates: Changes in US Household Size from 1850 to 2000." *Quantitative Economics* 3 (1): 133–75.

Smith, James P., Tian M., and Zhao Y. 2013. "Community Effects on Elderly Health: Evidence from CHARLS National Baseline." *Journal of the Economics of Aging*, 1: 50–59

Tsai, K. S. 2004. "Imperfect Substitutes: The Local Political Economy of Informal Finance and Microfinance in Rural China and India." *World Development* 32 (9): 1487–507.

Yu, C. 2008. "Entrepreneurship and Credit Constraints: Evidence from Rural Households in China."