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ARTICLE

The impact of expected pensions on consumption: evidence from China

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Abstract
We study how pension participation and expected pension benefits affect working-age adults' consumption based on a nationally representative dataset from the China Health and Retirement Longitudinal Study (CHARLS) during the period 2011–2018. We find that the consumption of working-age adults who participate in China's Residents' Basic Pension is 15.4% higher than that of non-participants. Furthermore, we find that if working-age adults' expected pension benefits increase by RMB 1, their consumption will increase by RMB 0.34. Overall, our findings suggest that pension expectations are critical to the consumption decisions of working-age adults and can, therefore, positively affect total domestic consumption.

Key words: Aging; consumption; pension; retirement

JEL classification: D12; G52; H55

1. Introduction

Apart from providing adequate, affordable, and sustainable retirement income, a desirable pension system also contributes to economic development (e.g., Holzmann and Hinz, 2005). Consumption is an important driver of economic growth. However, consumption growth has slowed down over the past decade: in China, for example, the growth rate of total retail sales of consumer goods was 8% in 2019, down from 23% in 2008 (National Bureau of Statistics, 2009, 2020). Scholars and policymakers have made several suggestions to promote consumption, for example, including increasing local government expenditure on health and education, expanding the market for elderly care, and improving the pension system (Qi and Prime, 2009; State Council, 2018, 2019).

Previous research shows that the pension system and consumption are linked through several channels, including retirement decisions (Gustman and Steinmeier, 2015) and household budget constraints (Krueger and Kubler, 2006; Rojas and Urrutia, 2008). A key element in the link between the pension system and consumption are expectations: individuals' expectations of their pension benefits play an essential role in determining their level of consumption (Bottazzi *et al.*, 2006; Chan and Stevens, 2008). However, individuals may have incorrect expectations of their future pension benefits, especially when pension policies are in flux (e.g., Bernheim, 1989; Bottazzi *et al.*, 2006). This is relevant for China, where the pension system has undergone several major reforms during the past several decades, including the introduction of the New Rural Residents' Pension in 2009 and the Urban Residents' Pension in 2011, and the merging of these two schemes in 2014. As a result, individuals

might have a limited or out-of-date understanding of the rapidly changing pension policies. It is therefore important to study how individuals' expectations of their pension benefits, rather than rules-based computed pension benefits, affect individuals' consumption.

Focusing on the Residents' Basic Pension (RBP), which supported 533 million people in 2019 (Ministry of Human Resources and Social Security, 2020), this paper studies the impact of pension participation and expected pension benefits on working-age adults' consumption. Our study is based on a nationally representative dataset from the China Health and Retirement Longitudinal Study (CHARLS) over the period 2011–2018. We first empirically test the impact of participating in the RBP. After that, we investigate the effect of the expected pension benefits from the RBP on working-age adults' consumption and study how this impact differs by age and gender, by education, and for residents with different numbers of children. To address endogeneity, we apply instrumental variable (IV) estimations and construct IVs based on regional variations in the introduction and expansion of the RBP.

Theoretical studies provide ambiguous results regarding the impact of the pension system on personal savings and consumption. On the one hand, public pensions can effectively insure against longevity risk, and thus release precautionary savings and promote working-age adults' consumption (Leung, 2002; Bucciol, 2011). On the other hand, if working-age adults cannot borrow against future pension benefits and have to tighten their budgets due to pension contributions, working-age adults' consumption might be negatively affected (Hubbard and Judd, 1987; Rojas and Urrutia, 2008). Other factors that can distort the impact of the pension system on consumption include (i) saving motives other than retirement provision, for example, hedging unemployment risk (Bucciol, 2011) and bequest motives (Hong, 2012), (ii) endogenous early retirement resulting in lower labor income (Feldstein, 1974), and (iii) behavioral factors, for example, financial literacy (Clark *et al.*, 2006) and a short planning horizon (Park and Feigenbaum, 2018).

Empirical studies on the impact of the pension system on personal savings and consumption also report inconclusive results. Using macro-level data from the United States, Feldstein (1974) finds a positive effect of social security wealth on consumption and argues that social security would crowd out personal savings by 30–50%. Dicks-Mireaux and King (1984) provide early micro-level evidence from Canada that households reduce their household net worth by 17.1 cents if they have an extra dollar of social security wealth. Most subsequent empirical studies have found that individuals with more pension wealth tend to have lower personal savings and higher consumption (Kapteyn *et al.*, 2005; Bottazzi *et al.*, 2006; Chetty *et al.*, 2014). Other studies find a small effect (Venti and Wise, 1990) or no effect (Zhang and Zhang, 2004) of pension wealth on personal savings or consumption.

Several studies examine the effect of the Chinese pension system on personal savings and consumption. Based on the China Household Income Project Survey (1995, 1999), Feng *et al.* (2011) find for the Employees' Basic Pension (EBP) that a RMB 100 (US$15.1) decrease in pension wealth would reduce pre-retirement consumption by RMB 20–25 (US$3.0–3.8) per year. Based on CHARLS, Zhang *et al.* (2014) find that New Rural Residents' Pension recipients consumed 14.1% more than those without access to this pension. Similarly, Zhao *et al.* (2016) report that a RMB 100 (US$15.1) increase in annual pension benefits would increase retirees' consumption by RMB 8 (US$1.2) per year, based on CHARLS. Chen *et al.* (2018) consider institutional heterogeneity and find that a 1% increase in pension wealth would increase the consumption of EBP participants by 1.26% and the same increase would increase the consumption of the RBP participants by 1%. In summary, the existing empirical studies for China suggest that the pension system has a positive effect on consumption.

Our study makes two contributions to the literature. First, we improve the understanding of the relationship between individuals' expectations of pension benefits and their current consumption. Taking advantage of CHARLS, we directly use expected pension benefits from the RBP reported by working-age adults, while the existing literature estimates working-age adults' future pension benefits using pension policy rules and individual characteristics (e.g., Attanasio and Rohwedder, 2003; Feng *et al.*, 2011). The validity of the estimates used in existing studies relies on a strong underlying

assumption that working-age adults project their future pension benefits based on a full understanding of pension policy rules. However, as explained earlier, individuals might not fully understand the pension policy rules, and updates to their expectations may lag behind changes in the pension policies (Bottazzi *et al.*, 2006). This is a particular concern for the rapidly changing and complex pension system in China. Indeed, we find that <25% of working-age adults accurately predicted their pension benefits from the RBP (allowing for a relative error of 10%). The fact that we use individuals' subjective expectations, which is a key driver of individuals' current consumption, is a strength of our analysis.

Second, we contribute to the understanding of the heterogeneous impacts of the pension system on consumption. The existing literature focuses on the overall impact of the Chinese pension system on consumption to evaluate the policy implementation impacts. Little attention has been paid to the heterogeneity of this effect. We consider four dimensions of heterogeneity: age, gender, number of children, and level of education.

We find that both pension participation and expected pension benefits increase working-age adults' consumption. Participation in the RBP increases working-age adults' consumption by 15.4%, compared to non-participants. Furthermore, on average, an RMB 1 increase in the expected pension benefits would increase the consumption of working-age adults by RMB 0.34. We find that working-age adults, who are older, are female, have fewer children, or are well educated, respond stronger to the expected pension benefits. We find that <25% of working-age adults accurately predicted their pension benefits from the RBP (allowing for a 10% relative error), and those who had previously underestimated their pension benefits increased their consumption more than others upon receiving pension benefits from the RBP.

Our research supports the following policy implications. Our results highlight the critical role of pension expectations in consumption decisions, as well as the importance of improving the accuracy of individuals' pension expectations. The accuracy of expectations depends on both the level of information completeness and the individuals' ability to process information. We thus suggest two policy measures. First, information about public pension programs, including contribution options and benefit entitlement requirements, should be provided in more accessible, accurate, and easy to understand ways, for example, via a nationwide, easily accessible online inquiry platform. Second, 'pension literacy' education, for example, in the form of community lectures, could be improved to help individuals understand pension contributions and benefits, risks and returns, and the time value of money.

The rest of the paper is organized as follows. Section 2 describes the institutional background of the Chinese public pension system. Section 3 describes the sample we obtained from CHARLS. Section 4 presents our empirical methodology. Section 5 reports the empirical results. Section 6 discusses the accuracy of individuals' pension expectations. Section 7 concludes the paper.

2. China's public pension system

In this section, we briefly describe China's public pension system and its recent reforms. China's public pension system currently operates within a framework consisting of the EBP and the RBP. The EBP is a compulsory public pension system for employees in formally established enterprises, government, and public institutions; it dates back to 1951. The RBP has another line of development in the past decades.

Before 1991, Chinese residents who were ineligible for the EBP relied mainly on family and self-funding for old-age support. To include rural residents in the public pension system, the Rural Residents' Pension was piloted in some rural areas in 1991 and gradually extended nationwide until 1999. However, this system ceased to accept new participants and liquidated its reserves after 1999 due to a series of problems, such as the problems of financing model and fund risks (Zheng, 2007); as a result, the system's coverage shrank rapidly. Most rural residents had to continue working or depend on their family for old-age support (Wang, 2006).

The New Rural Residents' Pension was launched by the Chinese government in 2009 to provide pension benefits for rural residents aged 16 and older who were not in school and not covered by

the EBP (State Council, 2009). The scheme was piloted in 320 rural counties, which were selected by the central and provincial governments. The program was gradually expanded to 838 counties in 2010, 1,914 counties in 2011, and nearly all 2,835 counties by 2012. Moreover, to fill the gap in public pension coverage, the Urban Residents' Pension was created in 2011 to cover urban residents aged 16 and older if they were not in school and not covered by the EBP (State Council, 2011). The Urban Residents' Pension had roughly the same pilot areas as the New Rural Residents' Pension in 2011 and also achieved nearly universal coverage by 2012. Ultimately, these two programs were merged into the RBP in 2014 (State Council, 2014). In the following analyses, we do not distinguish between the short-lived New Rural Residents' Pension and the Urban Residents' Pension but analyze their impact as if there were always one scheme, the RBP.

According to the existing institutional arrangement, the RBP is a voluntary system and aims to cover urban and rural residents aged 16 and older who are not in school and not covered by the EBP. The RBP operates at the county level, and residents who intend to be insured locally should have a local hukou. The pension is funded by general tax (i.e., government subsidies) and voluntary individual contributions with several contribution options. To receive the pension, participants in the RBP need to be at least 60 years old and must have contributed for at least 15 years (with exceptions for people who have <15 years to attain age 60). The RBP has two main benefits, namely basic pension benefits and individual account pension benefits, corresponding to the two sources of funding. The central government sets minimum levels for basic pension benefits, and the province-level government can increase the basic pension benefits based on these minimum levels and according to the province's economic development. Individual account pension benefits are determined by the participant's voluntary contributions, and the monthly individual account pension benefit is equal to the individual account balance at retirement divided by 139.

After a decade of development, the RBP is well established and now has nearly universal coverage. The number of participants in the RBP increased from 86.9 million in 2009 to 532.7 million in 2019. By 2019, the RBP, together with the EBP, covered more than 967.5 million individuals with accumulated funds of more than RMB 6.3 trillion (US$0.91 trillion). However, the RBP still has several problems.

The main problem is its low protection level, especially when compared with the EBP. In 2019, the average yearly pension benefit of the EBP was 20 times that of the RBP (RMB 39,990 (USD 5,796.9) vs. RMB 1,942 (USD 281.8)) (Ministry of Human Resources and Social Security, 2020). The corresponding gap in the pension replacement rate (pension benefits to income) between the two schemes is also very large, given that the average wage of urban employees is only six times that of the average disposable income of rural residents (National Bureau of Statistics, 2020). The Chinese government has increased the basic pension benefits of the RBP several times since 2014. However, the low protection level of the RBP remains a problem now and for the foreseeable future. Our work is motivated by the question of whether the RBP promotes consumption despite its relatively low protection level.

3. Data and sample

Our empirical analyses are based on CHARLS data over the period 2011–2018. CHARLS is designed to be nationally representative of the Chinese middle-aged and elderly population. It collects rich information at the individual, household, and community level, and provides ideal and high-quality data for our analyses. CHARLS surveys respondents aged 45 and older through face-to-face, computer-assisted personal interviews. Its sample covers 450 villages or urban communities from 150 counties or urban districts in 28 provinces of mainland China. We use the national baseline survey conducted in 2011 and three follow-up surveys conducted in 2013, 2015, and 2018, respectively. We also use a supplementary CHARLS life history survey, which was conducted in 2014.

In this study, we focus on rural working-age adults who are eligible to participate in the RBP but have not yet reached the RBP pension eligibility age. Specifically, we construct our sample using the following steps.

- First, we select working-age adults under 60, which is the current minimum pension eligibility age for all RBP participants.
- Second, we exclude those who have pensions other than the RBP, for example, the EBP. This exclusion pins down the target population of the RBP, that is, those who are not covered by the EBP, and eliminates possible distortions of the empirical analyses caused by other pension programs.
- Third, we exclude those who have non-agricultural hukou. The RBP covers both agricultural-hukou and non-agricultural-hukou participants, with the majority of its participants being the former. We exclude those with non-agricultural hukou to focus on the RBP's main target population.
- Fourth, we replace missing values for variables by taking full advantage of the information in CHARLS. For example, if possible, we replace missing values of time-invariant variables in one survey year with corresponding values in other survey years. Otherwise, we exclude observations with missing values.

Through these four steps, we generate our main sample, which contains 10,055 individuals and 22,288 individual-year observations. We provide summary statistics for our sample in Table 1.

The variables used in our regression analyses include consumption as the outcome variable, pension participation and expected pension as explanatory variables of interest, and several individual and household characteristics as control variables. All variables are defined in the Appendix.

We use per capita household consumption expenditure (total household consumption expenditure divided by family size) to capture a respondent's consumption expenditure (see, e.g., Leimer and Richardson, 1992; Chen *et al.*, 2018). We exclude expenditure on education and medical care from consumption because they are investments in human capital rather than ordinary consumption (Aguiar and Hurst, 2005). We define family size as the number of individuals who usually eat meals together in a respondent's home.

The key explanatory variables of interest include a binary variable to indicate pension participation status and a continuous variable to measure the protection level of the pension system. CHARLS requires all surveyed respondents to report their pension participation status, and if they are covered by the RBP, they also need to report their expected pension benefits. We construct two key explanatory variables of interest accordingly. We use a binary variable *Pension participation* to indicate whether a respondent expects to receive nonzero benefits from the RBP. We also construct a continuous variable *Expected pension* containing the individual's expected pension benefits at retirement from the RBP. We set *Expected pension* to zero for individuals who are not covered by the RBP.

Individual characteristics used as control variables include *Male*, *Urban residents*, *Han (ethnic group)*, *Age*, *Married*, *Formal sector (employment sector)*, *Education level*, *Health status*, *Rely on children*, *Current income*, *Pension contribution*, *Disposable income*, and *Health insurance*. Household characteristics include *Living with elderly*, *Family size*, *No. of children*, *% of male children*, and *House owner*. *House owner* is used to proxy for the liquidity constraint of a household (Campbell and Cocco, 2007). We use *No. of children* and *% of male children* to proxy for bequest motives (Chen and Huang, 2013). We deduct individuals' *Pension contribution* to the RBP from their *Current income* to generate their *Disposable income*, and include *Disposable income* in our regressions. We also include a binary variable *Living with elderly* to control for potential effects that the pension benefits of other household members might have on the respondents' consumption.

4. Methodology

To test the impact of pension enrollment and expected pension benefits on working-age adults' consumption, we estimate equation (1):

$$\ln(Consumption)_{i,t} = \alpha + \beta Pension_{i,t} + \gamma X_i + \delta Z_{i,t} + \phi Year_t + \mu_i + \varepsilon_{i,t}, \quad (1)$$

where the subscripts i and t represent individuals and waves, respectively. $\ln(Consumption)_{i,t}$ is the logarithm of consumption. $Pension_{i,t}$ is either pension participation status or expected pension

Table 1. Summary statistics

	$Mean_w$	Median	S.D.	$Mean_w$	Median	S.D.	$Mean_w$	Median	S.D.	$Mean_w$	Median	S.D.
	2011 wave (N = 5,944)			2013 wave (N = 5,405)			2015 wave (N = 6,042)			2018 wave (N = 4,897)		
Consumption	6,625.28	4,370.00	7,633.00	9,456.41	6,057.00	13,281.00	11,796.37	6,744.00	22,756.00	13,444.24	7,457.00	30,575.00
Pension participation	0.20	0.00	0.41	0.63	1.00	0.48	0.63	1.00	0.47	0.80	1.00	0.37
Expected pension	172.85	0.00	692.90	680.76	594.80	1,453.00	884.70	606.20	1,970.00	1,143.08	722.50	1,991.00
Male	0.45	0.00	0.50	0.45	0.00	0.50	0.47	0.00	0.50	0.46	0.00	0.50
Urban resident	0.30	0.00	0.43	0.31	0.00	0.43	0.33	0.00	0.45	0.34	0.00	0.44
Han	0.89	1.00	0.31	0.89	1.00	0.31	0.89	1.00	0.31	0.89	1.00	0.32
Age	51.20	52.00	4.92	51.48	51.00	4.73	50.89	51.00	4.85	52.31	53.00	3.95
Married	0.95	1.00	0.22	0.95	1.00	0.21	0.97	1.00	0.19	0.95	1.00	0.22
Formal sector	0.08	0.00	0.27	0.08	0.00	0.27	0.10	0.00	0.30	0.10	0.00	0.29
Education level	1.69	2.00	1.19	1.81	2.00	1.15	1.93	2.00	1.10	2.03	2.00	1.04
Health status	3.07	3.00	0.90	3.09	3.00	0.95	3.19	3.00	1.01	3.17	3.00	1.03
Rely on children	0.80	1.00	0.40	0.74	1.00	0.44	0.69	1.00	0.46	0.73	1.00	0.44
Current income	13,635.46	4,750.00	52,924.00	16,676.62	4,939.00	57,588.00	20,461.64	6,915.00	37,423.00	20,967.60	8,675.00	39,192.00
Pension contribution	44.18	0.00	157.80	124.78	131.00	249.10	160.06	126.60	425.60	336.30	113.60	1,251.00
Disposable income	13,591.27	4,750.00	52,920.00	16,551.84	4,823.00	57,589.00	20,301.57	6,793.00	37,420.00	20,631.31	8,474.00	39,177.00
Health insurance	0.94	1.00	0.22	0.95	1.00	0.19	0.89	1.00	0.31	0.97	1.00	0.18
Living with elderly	0.22	0.00	0.37	0.10	0.00	0.31	0.09	0.00	0.29	0.10	0.00	0.30
Family size	3.47	3.00	2.49	3.52	3.00	2.12	3.54	3.00	3.05	3.56	3.00	1.83
No. of children	2.31	2.00	0.97	2.31	2.00	1.05	2.22	2.00	0.93	2.22	2.00	0.93
% of male children	0.55	0.50	0.33	0.55	0.50	0.33	0.54	0.50	0.34	0.56	0.50	0.33
House owner	0.92	1.00	0.21	0.90	1.00	0.21	0.88	1.00	0.28	0.86	1.00	0.28

Notes: All variables are defined in the Appendix; $Mean_w$ stands for weighted mean, and the weight is the inverse probability for each respondent to correct for nonresponses. We adjust *Consumption*, *Current income*, *Pension contribution*, and *Disposable income* to the year 2011 using the annual nationwide inflation rate.

benefits, depending on the model specification. X_i is a set of time-invariant control variables. $Z_{i,t}$ is a set of time-variant control variables. $Year_t$ and μ_i are year and individual fixed effects (FE), respectively.

One could argue that $Pension_{i,t}$ could be endogenous, which would bias the ordinary least squares (OLS) estimates. As our sample focuses on working-age adults with no other types of pension, those with a local hukou in the pilot counties are all eligible for the RBP. They generally need to make two sequential decisions, namely whether to enroll in the RBP and to choose the contribution level. These decisions determine their pension participation status and future pension benefits, respectively. Some unobserved individual and household characteristics that determine individuals' consumption decisions may also come into play when individuals make these decisions.

For example, working-age adults' consumption may be determined partly by their risk preference, which is unobserved in our data. For example, for working-age adults who are very risk-averse, we would expect to observe a low consumption, as well as a high take-up rate of, and high contributions to the RBP among working-age adults facing longevity risk. Furthermore, compared with those who can properly discount future consumption, myopic working-age adults would put lower discount rates on future consumption, and would have weaker motivations to save. Thus, among myopic working-age adults, we would find a higher consumption, a lower take-up rate of the RBP, and a lower contribution level to the RBP. However, we are unable to observe whether a respondent is risk-averse or myopic in our data. In both scenarios, the OLS estimates will misestimate the impact of the RBP on working-age adults' consumption because of bias from omitted variables.

To address these concerns, we report the results of three different models: OLS, a fixed-effects model and a fixed-effects model with IV correction. In all models, we control for a rich set of observed variables and year fixed effects $Year_t$, which capture changes in consumption over time that are common for all respondents. In the fixed-effects model, we include individual fixed effects μ_i to address endogeneity problems and correct for time-invariant sources of attrition bias (Cheng *et al.*, 2018). The fixed-effects model cannot correct for the bias resulting from unobserved time-variant factors. If these factors are correlated with both $Pension_{i,t}$ and $\ln(Consumption)_{i,t}$, the regression results of the fixed-effects model will still suffer from selection bias. We use IV regression analysis to correct this bias, so our main empirical approach is a fixed-effects model with IV correction (FE-IV).

In the FE-IV model, we exploit the exogenous timing of the implementation and expansion of the RBP at the county level. Specifically, we construct three binary variables to measure whether the RBP was first officially implemented in a county in 2010, 2011, or 2012 (using the 2009 pilot wave of the RBP as the reference), and we use interactions of these three dummies and year dummies as IVs. We choose these IVs because previous research for China has shown that individuals are less likely to participate in public pension programs or choose a lower contribution level if they have difficulties understanding the program (Lei *et al.*, 2013) and distrust the program (Liu and Sun, 2016). It generally takes time to educate a target population about a public program – especially those with lower education levels – and strengthen their trust in it (see, e.g., Liu *et al.*, 2014). We expect that respondents, who live in a county with an earlier implementation time of the RBP, are more likely to participate in the RBP and have higher expected pension benefits since they had more time to learn about and understand the program and develop a stronger trust in the RBP.

Furthermore, given that pilot areas were selected by the central and provincial governments, it is reasonable to assume that the county-level implementation time of the program is exogenous to households and individuals. The identification strategy crucially relies on the assumption that the IVs only affect working-age adults' consumption through enrollment in the RBP or expected pension benefits from the RBP. We examine and discuss the validity of our IVs in Section 5.3.

We use information from the CHARLS 2011 community survey to determine the implementation time of the RBP in a county. Specifically, in the community survey, the person in the village who is most familiar with social policies reported if and when the New Rural Residents' Pension was implemented, and we determine the implementation time of the program in that village accordingly. If this person reported that the village had not implemented the New Rural Residents' Pension, we assume

Table 2. Pilot counties

	Pilot counties in China			Pilot counties in CHARLS		
Year	Number	Accumulated number	Proportion (%)	Number	Accumulated number	Proportion (%)
2009	320	320	11.29	20	20	13.33
2010	518	838	18.27	28	48	18.67
2011	1,076	1,914	37.95	44	92	29.33
2012	921	2,835	32.49	58	150	38.67

Data sources: Ministry of Human Resources and Social Security and CHARLS.

Table 3. The effect of pension participation on consumption

	(1)	(2)	(3)
Dependent variable	ln(Consumption)	ln(Consumption)	ln(Consumption)
Estimation approach	OLS	FE	FE-IV
Pension participation	0.019	0.054*	0.143**
	(0.024)	(0.031)	(0.064)
Control variables	Yes	Yes	Yes
Individual FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	22,288	22,288	22,288
R^2	0.142	0.598	0.086
Marginal effect	0.019	0.055	0.154
Number of IVs			9
First-stage *F*-statistic			111.80

Notes: We provide individual-level clustered robust standard errors in parentheses. We use the inverse probability weight for each respondent to correct for nonresponses. *p < 0.1, **p < 0.05, ***p < 0.01. We report the full results in the Appendix.

that this village implemented the program in 2012 because the program was expanded to nearly all 2,835 counties by 2012. Finally, we choose the earliest implementation time of the New Rural Residents' Pension in a county as the implementation time of the RBP in this county since, as mentioned previously, the later program originated from the former program. As Table 2 shows, of the 150 counties in CHARLS, the number of counties that implemented the RBP in 2009, 2010, 2011, and 2012 is 20, 28, 44, and 58, respectively.

5. Results

In this section, we present our main empirical results. In Section 5.1, we investigate the impact of pension participation on the consumption of working-age adults. We analyze the effect of expected pension benefits on consumption in Section 5.2. We discuss the validity of the identification assumptions in Section 5.3. We present the heterogeneities in the effect of expected pension benefits on consumption in Section 5.4.

5.1 The impact of pension participation on consumption

Table 3 shows how participation in the RBP affects working-age adults' current consumption. Column (1) reports the results of an OLS model that controls for various individual and household characteristics and year fixed effects. The OLS results suggest that there is no significant impact of the RBP on working-age adults' consumption. Column (2) reports the results of an OLS model with individual fixed effect. These results suggest that the consumption of RBP participants would be $(e^{0.054} - 1) \times 100\% = 5.5\%$ higher than that of other respondents. The difference between the OLS regression result and the fixed effect regression result confirms that there are some unobserved time-invariant variables that would lead to estimation errors in the OLS model. Column (3) reports our main results based on the FE-IV estimation approach to better deal with the estimation errors caused by unobserved

Table 4. The effect of expected pension benefits on consumption

	(1)	(2)	(3)
Dependent variable	ln(Consumption)	ln(Consumption)	ln(Consumption)
Estimation approach	OLS	FE	FE-IV
ln(Expected pension)	0.005	0.009*	0.023**
	(0.004)	(0.005)	(0.010)
Control variables	Yes	Yes	Yes
Individual FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	22,288	22,288	22,288
R^2	0.142	0.598	0.085
Average expected pension	701.8	701.8	701.8
Average consumption	10,203.0	10,203.0	10,203.0
Marginal effect	0.077	0.129	0.335
Number of IVs			9
First-stage *F*-statistic			97.97

Notes: We provide individual-level clustered standard errors in parentheses. We use the inverse probability weight for each respondent to correct for nonresponses. *p < 0.1, **p < 0.05, ***p < 0.01. We report the full results in the Appendix.

variables. The results in column (3) show that the consumption of RBP participants is $(e^{0.143} - 1) \times 100\% = 15.4\%$ higher than that of other respondents.

The estimated impact of the RBP is consistent with the findings of other works evaluating the effects of the RBP. These works mainly focus on the New Rural Residents' Pension, which is one of the two precursors of the RBP, and which was targeted at Chinese rural residents. For example, Van Dullemen *et al.* (2017) and Zhao *et al.* (2016) find that participation in the New Rural Residents' Pension has no significant impact on household consumption, while Zhang *et al.* (2014) find a significant but weak crowd-in effect, that is, 14.1%. One possible reason for the estimated impact of the RBP is the low protection level of the RBP, as mentioned previously. Furthermore, other studies have found that the elderly covered by the New Rural Residents' Pension have a lower probability of receiving private transfers (Zhang and Chen, 2014) and living with their children (Cheng *et al.*, 2015), which may be another possible explanation for the estimated impact: individuals save more for old age because they expect to receive less family support.

5.2 The impact of expected pension benefits on consumption

Next, we analyze the effect of the expected pension benefits from the RBP on working-age adults' current consumption. The estimated coefficients on ln(*Expected pension*) is positive in the OLS, fixed-effects, and FE-IV models. The FE-IV estimates are larger in magnitude than the OLS and FE estimates. In the following discussion, we focus primarily on the results from the FE-IV estimates. Column (3) in Table 4 shows that if the expected pension benefits of RBP participants increase by 1%, their consumption increases by 0.023%. The results suggest that higher pension benefits motivate individuals to increase consumption. To assess whether the impact of expected pension benefits on respondents' consumption is economically significant, we calculate the mean difference between expected pension benefits and consumption. On average, if respondents' expected pension benefits increase by 1%, the corresponding absolute change of their expected pension benefits is RMB $701.8 \times 1\% = 7.018$; if respondents' consumption increases by 0.023%, the corresponding absolute change of their consumption is RMB $10,203 \times 0.023\% \approx 2.347$. Thus, we can conclude that, on average, if the expected pension benefits increase by RMB 1, working-age adults' consumption would increase by RMB $2.347/7.018 = 0.335$, indicating that the expected pension benefits of the RBP are an important determinant of working-age adults' consumption.

5.3 Validity of the identification assumption

In this subsection, we address several potential concerns about the validity of our empirical design. The first potential concern is weak IVs, namely that the IVs are not strongly correlated with

Table 5. Tests of the validity of the identification assumption

	(1)	(2)	(3)	(4)
	No migration	Ineligible sample	Winsorize	County-level clustered S.E.
Dependent variable	ln(Consumption)	ln(Consumption)	ln(Consumption)	ln(Consumption)
Estimation approach	FE-IV	FE	FE-IV	FE-IV
ln(Expected pension)	0.029***		0.023**	0.029*
	(0.011)		(0.010)	(0.017)
Program duration		0.021		
		(0.074)		
Control variables	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	12,578	4,237	19,225	19,225
R^2	0.116	0.197	0.084	0.082
Average expected pension	600.1		674.2	701.8
Average consumption	8,667.0		9,312.0	10,203.0
Marginal effect	0.425		0.315	0.426
First-stage *F*-statistic	83.54		98.20	13.91

Notes: We provide individual-level clustered standard errors in parentheses in columns (1) to (3). We provide county-level clustered standard errors in parentheses in column (4). We use the inverse probability weight for each respondent to correct for nonresponses. *p < 0.1, **p < 0.05, ***p < 0.01.

respondents' pension participation status and expected pension benefits. We assess the quality of our IVs using the *F*-test in the first stage of the FE-IV regressions. The first-stage *F*-statistic in our regressions is well above the usual threshold value of 10 for weak IV identification in the literature, suggesting no weak instruments.

The second concern is the migration of working-age adults between counties. If working-age adults could easily migrate from a nonpilot county to a pilot county to participate in the RBP, this would invalidate our IVs. However, this migration is highly unlikely due to the requirement of having a local hukou in order to participate in the RBP. It is difficult for Chinese residents to change their hukou registration across counties, and even harder for those aged 40 and above (Cai *et al.*, 2012). In China, marriage migration and attending college are two main channels through which people change their hukou location, but working-age adults aged 45 and above are unlikely to experience these situations (Cheng *et al.*, 2018). To further alleviate this concern, we retest the impact of expected pension benefits by restricting our sample to those who did not move after 2009, which rules out the estimation bias caused by migration. As shown in column (1) in Table 5, our main findings regarding the impact of expected pension benefits on consumption hold in this case. Thus, we argue that migration between counties for the RBP is not an issue here.

In column (2) of Table 5, we sample working-age adults who are covered by the EBP and check whether there are unobserved characteristics of counties that are correlated with individuals' choices regarding pension participation, contribution level, and consumption. Since EBP participants are not eligible for the RBP but share the same county-level heterogeneity with our main sample, we expect that the program duration of the RBP at the county level should have no significant impact on EBP participants. The regression results support our conjecture.

Apart from the concerns previously noted regarding the validity of our IVs, we also consider the possible estimation biases caused by extreme values and the correlation of the residuals within the cluster. In column (3) of Table 5, we winsorize the data at the 1st and 99th percentiles of the consumption, nonzero expected pension benefits, nonzero current income from work, and nonzero pension contribution. The result is roughly the same as that in column (3) of Table 4, suggesting that extreme values in consumption, expected pension benefits, current income from work, and pension contribution do not impact our main results on the relationship between expected pension benefits and consumption. Moreover, since our IVs vary at the county level, some unobserved county characteristics may induce a correlation of the residuals within the county-level cluster. To address this concern,

Table 6. Heterogeneity of the impact of expected pension benefits

	(1)	(2)	(3)	(4)
Subsample	Age⩽52	Age>52	Female	Male
Dependent variable	ln(Consumption)	ln(Consumption)	ln(Consumption)	ln(Consumption)
Estimation approach	FE-IV	FE-IV	FE-IV	FE-IV
Ln(Expected pension)	0.022	0.037**	0.025*	0.018
	(0.016)	(0.015)	(0.014)	(0.015)
Control variables	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	9,299	10,887	12,236	10,052
R^2	0.102	0.079	0.080	0.097
Average expected pension	637.0	750.8	666.4	743.6
Average consumption	9299.0	10887.0	10219.0	10185.0
Marginal effect	0.321	0.543	0.382	0.251
First-stage *F*-statistic	34.60	39.81	56.57	42.64
	(5)	(6)	(7)	(8)
Subsample	No. of children⩽2	No. of children>2	Less than secondary school	Secondary school or above
Dependent variable	ln(Consumption)	ln(Consumption)	ln(Consumption)	ln(Consumption)
Estimation approach	FE-IV	FE-IV	FE-IV	FE-IV
Ln(Expected pension)	0.027**	0.005	0.023*	0.031**
	(0.013)	(0.015)	(0.013)	(0.015)
Control variables	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	15,293	6,995	13,754	8,534
R^2	0.082	0.108	0.086	0.090
Average expected pension	757.8	580.3	630.4	811.8
Average consumption	10687.0	9152.0	9421.0	11407.0
Marginal effect	0.385	0.072	0.340	0.435
First-stage *F*-statistic	57.58	42.42	59.29	41.33

Notes: We provide individual-level clustered standard errors in parentheses. We use the inverse probability weight for each respondent to correct for nonresponses. *p < 0.1, **p < 0.05, ***p < 0.01.

we re-estimate equation (1) with standard errors that are clustered at the county-level and report the result in column (4) of Table 5. The estimated coefficient is of similar magnitude as our main results reported in column (3) of Table 4 (0.029 vs. 0.023). As described in Petersen (2009), standard errors are inconsistent when the number of clusters in regression models is small (i.e., <500 clusters). Since CHARLS only covers 150 counties, we use individual-level clustered standard errors in the main body of our paper to avoid this inconsistency issue.

5.4 Heterogeneity of expected pension benefits' impact on consumption

In this subsection, we analyze how the impact of the expected pension benefits on consumption differs by age, gender, number of children, and education (in Table 6).

We consider age because Attanasio and Brugiavini (2003) show in a lifecycle model that younger individuals respond less to an increase in pension benefits because they have a longer time horizon over which to smooth consumption. Furthermore, younger individuals tend to be liquidity constrained (Feng *et al.*, 2011) and may have other saving motivations than retirement, i.e., housing and education (Chamon and Prasad, 2010). Columns (1) and (2) of Table 6 present the FE-IV results separately for two age groups that are identified by the threshold of 52 years old, 52 being the median age of our sample. The results echo existing findings and show that the estimated coefficient of ln(*Expected pension*) is bigger in absolute terms for the older cohort. Specifically, among respondents who are older than 52 years old, if the expected pension benefits increase by RMB 1 on average, their consumption

would increase by RMB 0.543, while there is no statistically significant change in consumption among respondents aged 52 and younger.

One common saving motive is to have sufficient resources in old age (Leung, 2002; Bucciol, 2011). In order to avoid running short of the necessary funds in their later years, individuals might hold some precautionary savings against longevity risk. Pensions can effectively help individuals cope with longevity risk, and therefore provide an incentive for individuals to hold fewer precautionary savings and spend more. Since women generally have a longer life expectancy than men, they face a greater longevity risk. Thus, we expect to find that women's consumption responds more strongly to expected pension benefits, which is confirmed in columns (3) and (4) of Table 6: the estimated effects are RMB 0.382 for women and not statistically significant for men.

Economic theory suggests that those who have savings motives other than old-age support, for example, bequest motives (Hong, 2012), will be less responsive to changes in pension benefits, as these saving motives cannot be satisfied by increasing pension wealth (Hong and Ríos-Rull, 2007). According to current Chinese policies, the RBP has two main benefits, namely basic pension benefits and individual account pension benefits, and children can only inherit the latter from their parents. Thus, we expect to find a weaker effect of expected pension benefits on consumption in absolute value among individuals with strong bequest motives. Since the number of children can reflect individuals' degree of bequest motives to some extent, we present the FE-IV results separately for the two groups that are identified using the threshold of three children in columns (5) and (6) of Table 6. The estimated effect among respondents with two or less children is RMB 0.385, which is not statistically significant among respondents with more than two children. These results validate our conjecture.

Previous research has found that individuals may not have sufficient knowledge regarding pension systems (Bottazzi *et al.*, 2006). If individuals cannot understand how pension systems work, they may have less capacity to adjust their savings and consumption (Chetty *et al.*, 2014). Thus, one might argue that the impact of expected pension benefits on consumption for individuals with a higher education degree is larger in absolute value. The results in columns (7) and (8) show that, on average, if the expected pension benefits increase by RMB 1, consumption increases by RMB 0.340 among individuals with less than secondary school education, which increases to RMB 0.435 among individuals with secondary school education or above.

6. Discussion: accuracy of pension expectations

We find that individuals' expectations of their pension benefits from the RBP at retirement affect their current consumption. However, we recall that previous literature has found that individuals can have incorrect expectations of their future pension benefits, especially when pension policies are in flux (e.g., Bernheim, 1989; Bottazzi *et al.*, 2006). The RBP has experienced dramatic changes during recent decades. Therefore, we turn to the accuracy of individuals' pension expectations in the following discussion. We compare individuals' expected pension benefits and their realized pension benefits from the RBP. We focus on respondents who passed the minimum pension eligibility age of the RBP, that is, 60, during the survey period 2011–2018 as these respondents reported their expected pension benefits in one survey and their realized pension benefits in a later follow-up survey. We calculate the relative error of individuals' expected pension benefits to measure the accuracy of individuals' expectations of their pension benefits:

$$Relative\ error_i = \left| \frac{Expected\ pension_i - Realized\ pension_i}{Realized\ pension_i} \right| \times 100\%.$$

As shown in Table 7, <25% of respondents predicted their pension benefits within a 10% relative error, suggesting that individuals often have incorrect expectations of their pension benefits. This result suggests that Chinese working-age adults have a large chance of overestimating or underestimating their pension benefits at retirement. Given the strong positive effect of expected pension benefits

Table 7. Accuracy of individuals' expectations of pension benefits

	p10	p25	Median	p75	p90	Mean	S.D.	*N*
Expected pension (EP)	605.600	626.546	683.505	880.873	1,139.175	1,039.064	1,398.686	929
Realized pension (RP)	580.690	674.472	825.819	1,017.688	1,496.599	1,144.912	1,414.397	929
EP-RP	−483.652	−247.641	−79.778	79.310	251.579	−124.362	818.577	929
Relative error	0.035	0.102	0.214	0.338	0.520	0.313	0.517	929

Table 8. Changes in consumption upon receiving RBP pension benefits

	Pessimistic		Optimistic		
Section A	*N*	Mean	*N*	Mean	Mean difference
Change in consumption	480	975.840	312	925.770	50.070
Section B	Biased		Accurate		
	N	Mean	*N*	Mean	Mean difference
Change in consumption	321	1,818.240	471	368.550	1,449.680

on consumption that we documented in Section 5, it is important to guide individuals toward more accurate expectations of pension benefits.

An interesting question is whether individuals adjust their consumption patterns after they realize that they have incorrect expectations of their pension benefits. In Table 8, we calculate changes in consumption upon receiving pension benefits from the RBP and compare them between different groups of people. In Section A of Table 8, we find that pessimistic individuals (i.e., those who underestimated their pension benefits) generally increase their consumption more than optimistic individuals (i.e., those who overestimate their pension benefits). This phenomenon may be driven by the fact that pessimistic individuals may have accumulated more precautionary savings since they thought the RBP could not provide sufficient resources for their old age. After realizing the actual protection level of the RBP, individuals can use these additional precautionary savings to consume. In Section B of Table 8, following Baldini *et al.* (2019), we use 0.25, rather than 0.1, as the threshold to pin down accurate individuals and biased individuals to ensure that sample sizes of said two groups of people are comparable. We find that biased individuals, that is, those with a relative error larger than 0.25, generally increase their consumption by a larger magnitude than accurate individuals, that is, those with a relative error smaller than 0.25. These findings suggest that having accurate expectations of pension benefits can help individuals better smooth their consumption over the lifecycle.

7. Conclusion

In this paper, we analyzed the impact of pension participation and expected pension benefits on working-age adults' consumption. We used data from CHARLS over the period 2011–2018 and focused on China's RBP.

Our three main findings are as follows. First, participation in the RBP promotes the consumption of working-age adults by 15.4%, compared to non-participants. Second, on average, working-age adults increase their consumption by RMB 0.34 if their expected pension benefits increase by RMB 1. Third, the consumption of working-age adults who are older, are female, have fewer children, or are well-educated is more sensitive to the expected pension benefits.

We also analyzed the accuracy of pension expectations. We found that <25% of our sample predicted their pension benefits from the RBP within a relative error of 10%, which shows that most individuals have incorrect expectations of their pension benefits. Upon receiving pension benefits from the

RBP, those who had previously underestimated their pension benefits increased their consumption more than those who had overestimated their pension benefits.

Our research highlights the critical role of pension expectations in consumption decisions, which underscores the importance of improving the accuracy of individuals' pension expectations. Enhancing the completeness of information and individuals' ability to process information are two possible ways to improve the accuracy of individuals' pension expectations. With regard to the first, we suggest a more accessible, accurate, and comprehensible disclosure of pension policies, for example, via a nationwide, easily accessible online inquiry platform. As for the second, we suggest that RBP participants should receive additional 'pension literacy' education, for example, in the form of community lectures, so they can better understand pension information and form more accurate pension expectations.

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Appendix

Definitions of variables

Outcome variables

Consumption

The sum of durable consumption and nondurable consumption excludes expenditure on education and medical care. Nondurable consumption includes work-related expenditure, expenditure on food consumed at home, expenditure on entertainment, and expenditure on other nondurable goods. Durable consumption includes expenditure on furniture, automobiles, and other durable goods. The Consumer Price Index obtained from the National Bureau of Statistics is used to deflate consumption at the 2011 price level.

Independent variables

Pension participation

A binary variable indicating whether the respondent expects to receive pension benefits from the Rural Residents' Pension, the New Rural Residents' Pension, the Urban Residents' Pension, or the RBP. We note that participants in the Rural Residents' Pension automatically became participants in the New Rural Residents' Pension, according to documents released by the State Council in 2009.

Expected pension

The self-reported expected pension benefits at retirement from the RBP. The expected pension benefits are deflated to the 2011 price level.

To calculate the expected pension benefits, three steps are required.

(1) First, we calculate respondents' expected pension benefits from the RBP. Generally, residents are supposed to have only one type of pension. However, during the public pension system's transition process, respondents may have had more than one type of pension or misunderstood the complex composition of their pension benefits after retirement. Thus, for those who reported participating in the New Rural Residents' Pension, the Urban Residents' Pension, and the RBP, or a combination thereof, we choose the largest expected pension benefits from the above three residents' pensions to represent their expected pension benefits from the RBP. If respondents participate in the Rural Residents' Pension and any of the above-mentioned three schemes, we add the expected pension benefit from the Rural Residents' Pension to the previous basis to obtain the final expected pension benefits from the RBP according to the guidelines on developing a new type of rural social endowment insurance pilot (State Council, 2009).
(2) Second, we fill the missing values of respondents' expected pension benefits from the RBP. If CHARLS failed to collect information on participants' expected pension benefits for the RBP, we supplement missing values in one year with corresponding nonzero values in other years.
(3) Third, we correct the incorrect values of respondents' expected pension benefits from the RBP. Some individuals reported receiving nonzero pension benefits from both the RBP and the EBP, which is not allowed under current Chinese pension policies. We correct the expected pension benefits for these individuals from the RBP to zero.

Realized pension

The realized pension benefits at retirement from the RBP. The realized pension benefits are deflated to the 2011 price level.

Control variables

Birth year, age

Respondents' self-reported birth year and age. If the respondent did not report their birth year, we substitute the birth year reported in the ID card for missing values. If the values of the birth year are different among different waves, we substitute the first wave's value for the following two waves' values. After that, if the respondent's birth year is still missing, we supplement missing values of this variable in one year with corresponding values in other years. Finally, we generate the respondent's age when surveyed using their birth year and the surveyed year.

Male

A binary variable indicating whether the respondent is male. We supplement missing values of this variable in one year with corresponding values in other years. If the values of this variable are different among different waves, we substitute the first wave's value for the following two waves' values.

Married
A binary variable indicating whether the respondent is married. If the respondent's marital status is missing, we supplement the missing values according to the internal logical relationship of the questionnaire. According to the CHARLS questionnaire, the respondent should report their number of children based on their marital status.

Living in an urban area
A binary variable indicating whether the respondent lives in an urban area.

Formal sector
A binary variable indicating whether the respondent is currently employed in the formal sector. The formal sector consists of the public sector and the private sector, where public sector includes government agencies, public institutions, state-owned enterprises, and nonprofit organizations.

Han
A binary variable indicating whether the respondent is of Han ethnicity. If the value of this variable is missing, we assume that the value of this variable is zero if at least one of the respondent's parents and children belongs to an ethnic minority. After this step, we supplement missing values of this variable in one year with corresponding values in other years.

Education level
The highest education level completed by the respondent, with 0 = no formal education, 1 = can read and write, 2 = elementary school, and 3 = secondary school or above. We supplement missing values of this variable in one year with the values reported in another year. That is, we assume that the CHARLS respondents have not obtained further education.

Health status
Self-reported health status of the respondent, where 1 = very poor health, 2 = poor health, 3 = fair health, 4 = good health, and 5 = excellent health.

Family size
The number of individuals who usually eat meals together in the respondent's home. If the value of this variable is missing, we use the number of individuals living together in the dwelling as collected in the household roster to make up the missing values.

No. of children
The number of the respondent's living children.

% of male children
The proportion of male children of the respondent's living children. For childless respondents, we assume that this proportion is 0.5.

Rely on children
A binary variable indicating whether the respondent mainly relies on their children for old-age support.

Current income
Employment wage for employees, business income for self-employed respondents, net agricultural income for respondents participating in farming, income from side jobs, and fringe benefits in the past year. The Consumer Price Index obtained from the National Bureau of Statistics is used to deflate income from work to the 2011 price level.

Pension contribution
The annual contribution to the RBP. The Consumer Price Index obtained from the National Bureau of Statistics is used to deflate pension contribution to the 2011 price level.

Disposable income
Disposable income after deducting pension contributions from current income.

Table A1. The effect of pension participation on consumption (full results)

Dependent variable Estimation approach	(1) ln(Consumption) OLS	(2) ln(Consumption) FE	(3) ln(Consumption) FE-IV
Pension participation	0.019	0.054*	0.143**
	(0.024)	(0.031)	(0.064)
Male	−0.028		
	(0.021)		
Urban resident	0.169***		
	(0.022)		
Han	−0.131***		
	(0.027)		
Age	−0.017***	0.048***	0.043***
	(0.002)	(0.005)	(0.007)
Married	0.060	−0.063	−0.072
	(0.041)	(0.091)	(0.090)
Formal sector	0.033	0.021	0.016
	(0.032)	(0.033)	(0.032)
No formal education	−0.168***	0.069	0.102
	(0.027)	(0.118)	(0.115)
Can read or write	−0.131***	0.171*	0.202**
	(0.024)	(0.100)	(0.098)
Elementary school	−0.045*	0.179**	0.201**
	(0.024)	(0.086)	(0.086)
Very poor health status	−0.024	0.087*	0.074*
	(0.035)	(0.045)	(0.045)
Poor health status	−0.074***	−0.056*	−0.062**
	(0.024)	(0.032)	(0.029)
Good health status	0.057**	0.027	0.026
	(0.024)	(0.026)	(0.025)
Excellent health status	0.125***	0.059*	0.062*
	(0.031)	(0.032)	(0.032)
Rely on children	−0.065***	−0.017	0.003
	(0.020)	(0.027)	(0.024)
Disposable income/1000	0.002**	0.000	0.000
	(0.001)	(0.001)	(0.001)
House owner	−0.177***	−0.037	−0.054
	(0.045)	(0.048)	(0.048)
Health insurance	−0.026	0.071	0.068
	(0.042)	(0.057)	(0.054)
Living with elderly	−0.100***	−0.076***	−0.076***
	(0.023)	(0.028)	(0.028)
Family size	−0.075***	−0.069***	−0.068***
	(0.017)	(0.021)	(0.021)
No. of children	0.025**	0.036	0.027
	(0.011)	(0.024)	(0.023)
% of male children	−0.002	−0.060	−0.065
	(0.025)	(0.095)	(0.093)
Individual FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	22,288	22,288	22,288
R^2	0.142	0.598	0.086

Notes: We provide individual-level clustered robust standard errors in parentheses. We use the inverse probability weight for each respondent to correct for nonresponses. *p < 0.1, **p < 0.05, ***p < 0.01.

Health insurance

A binary variable indicating whether the respondent participates in any health insurance.

Living with elderly

A binary variable indicating whether the respondent lives with individuals aged 60 and over.

Table A2. The effect of expected pension benefits on consumption (full results)

Dependent variable Estimation approach	(1) ln(Consumption) OLS	(2) ln(Consumption) FE	(3) ln(Consumption) FE-IV
ln(Expected pension)	0.005	0.009*	0.023**
	(0.004)	(0.005)	(0.010)
Male	−0.028		
	(0.021)		
Urban resident	0.170***		
	(0.022)		
Han	−0.132***		
	(0.027)		
Age	−0.017***	0.047***	0.042***
	(0.002)	(0.006)	(0.007)
Married	0.060	−0.062	−0.071
	(0.040)	(0.091)	(0.090)
Formal sector	0.034	0.021	0.017
	(0.032)	(0.033)	(0.032)
No formal education	−0.168***	0.069	0.102
	(0.027)	(0.118)	(0.115)
Can read or write	−0.130***	0.172*	0.203**
	(0.024)	(0.100)	(0.098)
Elementary school	−0.044*	0.179**	0.201**
	(0.024)	(0.086)	(0.086)
Very poor health status	−0.024	0.087*	0.074*
	(0.035)	(0.045)	(0.045)
Poor health status	−0.074***	−0.056*	−0.062**
	(0.024)	(0.032)	(0.029)
Good health status	0.057**	0.026	0.026
	(0.024)	(0.026)	(0.025)
Excellent health status	0.125***	0.059*	0.061*
	(0.031)	(0.032)	(0.032)
Rely on children	−0.065***	−0.017	0.004
	(0.020)	(0.027)	(0.024)
Disposable income/1,000	0.002**	0.000	0.000
	(0.001)	(0.001)	(0.001)
House owner	−0.179***	−0.038	−0.054
	(0.045)	(0.048)	(0.048)
Health insurance	−0.030	0.070	0.067
	(0.042)	(0.058)	(0.054)
Living with elderly	−0.100***	−0.077***	−0.076***
	(0.023)	(0.028)	(0.028)
Family size	−0.075***	−0.069***	−0.068***
	(0.017)	(0.021)	(0.021)
No. of children	0.025**	0.036	0.027
	(0.011)	(0.024)	(0.023)
% of male children	−0.001	−0.060	−0.064
	(0.025)	(0.095)	(0.093)
Individual FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	22,288	22,288	22,288
R^2	0.142	0.598	0.085

Notes: We provide individual-level clustered standard errors in parentheses. We use the inverse probability weight for each respondent to correct for nonresponses. *p < 0.1, **p < 0.05, ***p < 0.01.

House owner

A binary variable indicating whether the respondent owns a house.

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