# Boosting pension enrollment and household consumption by example: A field experiment on information provision*

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**Abstract**

In this study, we conduct a large-scale field experiment in the Guangdong province of China to examine the effect of informing individuals about government pension programs on their pension enrollment decisions and household consumption. Our field experiment lasts 12 months and involves 2,539 individuals from 1,064 households randomly selected from three cities in Guangdong. We send an informational brochure to participants, designed differently for those in the control and treatment groups, and repeat the intervention three times. We find that, compared to the control group, those who receive concrete examples of pension benefits show a greater increase in pension enrollment, with a significant effect for those aged 45–55 years. We also find that, among households headed by participants aged 45–55 years, those who receive personalized benefit information exhibit significantly higher consumption than the control group. These findings support the effectiveness of combining concrete and personalized information in designing informational material as well as the importance of targeting the most responsive population during information delivery.

*Keywords*: Pension enrollment, Household consumption, Field experiment

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## 1. Introduction

Governments across the globe expend significant resources on social welfare and social insurance programs; companies as well offer benefits programs to their employees. However, despite their attractive terms and benefits for participants, the government programs often suffer from low enrollment (or a low take-up rate). This low participation may reflect ineligibility, but it may also reflect a lack of available information about the programs or a lack of understanding of the programs and their benefits (Daponte et al., 1999; Heckman and Smith, 2004; Coady et al., 2013; Loprest, 2015; Giles et al., 2018). A vibrant research field has emerged to study this low enrollment issue, with a number of field experiments examining the effect of information provision on enrollment in medical insurance (Kling et al., 2012; Giles et al., 2018), pension programs, and retirement savings (Bhargava and Manoli, 2015; Hastings and Mitchell, 2011; Goda et al., 2014; Duflo and Saez, 2003; Thaler and Benartzi, 2004).

These studies have raised awareness of the low enrollment problem, and governments have responded by providing policy and benefit information directly to workers. For example, the United States Social Security Administration (SSA) sends an annual social security statement to workers (Smith and Coutch, 2014; Mastrobuoni, 2011). In workplaces, employers devote resources to providing benefit information to their employees (Bayer et al., 2009; Bernheim and Garrett, 2003). One study finds that almost 74% of employers in the US provide pension plan summary information, roughly 65% distribute newsletters, and more than 44% offer retirement seminars to their employees (Bayer et al., 2009). Given that both governments and employers play a critical role in providing information to employees, our study addresses the following questions: 1) What kind of information should be provided that can increase employees' awareness of, and hence enrollment into, these

programs? and 2) Do people of different demographics respond to the provided information differently? For example, is our information intervention more effective with older participants?

Our study relates to the literature on information provision and benefit program enrollment. In this stream of the literature, earlier studies examine whether providing information affects program enrollment and subsequent savings or retirement behaviors (Duflo and Saez, 2003; Bayer et al., 2009; Bernheim and Garrett, 2003; Liebman and Luttmer, 2015). Although most of these studies find a positive effect of information provision (Duflo and Saez, 2003; Bernheim and Garrett, 2003; Liebman and Luttmer, 2015), some report no significant effect (Mastrobuoni, 2011) or a significant effect only for certain forms of information provision, such as retirement seminars, but not other forms, such as written materials (i.e., newsletters and pension plan descriptions). Recent studies have begun to implement multiple information treatments to examine the effectiveness of information type (Bhargava and Manoli, 2015; Goda et al., 2014), delivery method, information framing, overall information salience, and repeated information intervention (Allcott and Rogers, 2014; Barton et al., 2014; Brown et al., 2016; Cai and Song, 2017).

As previous experiments have manipulated the level of complexity and salience of information (Bhargava and Manoli, 2015; Chetty et al., 2009), we design treatments that vary the level of concreteness and salience of pension program information. Specifically, we conduct a large-scale field experiment in the Guangdong province of China. In the past two decades, government pension policies in China have undergone significant changes (Frazier, 2004; Cai and Cheng, 2014), leading to a lack of public clarity about program provisions and benefits (Chi et al., 2012). For example, individuals cannot obtain their social security statements. In some advanced provinces, such as Guangdong, residents can log onto the provincial SSA's website to access the number of years they

have contributed to the pension program as well as their cumulative individual and employer contributions. However, even in these provinces, there are no projected benefit calculations or explanations of pension policies. Given the lack of availability of comprehensive benefit information, this setting thus provides an appropriate context within which to study whether and how a simple instrument such as an informational brochure can tackle the problem of pension enrollment. To do so, we conducted a field experiment. Our experiment lasted 12 months and involved 2,539 individuals across 1,064 households from three cities in Guangdong. Participant households were randomly selected from a sample of a household survey conducted by the National Bureau of Statistics of China (NBSC), which is similar to the Current Population Survey in the United States. Our consumption data were drawn from the household daily consumption log. To collect information on pension program enrollment and other related household characteristics, we conducted two rounds of surveys, one before our information intervention and the other after.

The experiment's results are largely consistent with predictions from our conceptual framework: we find that concrete information is beneficial for increasing program participation for those who have not enrolled, and that different age groups respond to the information intervention differently. Specifically, when compared to participants in the control group, individuals who receive concrete examples exhibit a higher tendency to subsequently enroll in a pension program; this treatment effect is significant for those aged 45–55 years. Among households headed by participants aged 45–55 years, we find that personalized benefits information is more effective in increasing household consumption than the general information provided to the control group.

The remainder of the paper is organized as follows. In Section 2, we introduce and discuss the public old-age pension programs in China. We present our conceptual framework in Section 3 and

describe our experimental design in Section 4. Results are reported in Section 5. The discussion and conclusion are in Section 6.

## 2. China Pension Policy Background

To guide our conceptual model and experiment design, we begin with a discussion of the public old-age pension system in China. This system is comprised of one pension program for urban employees and another program for urban non-employees and rural residents. The urban employee program is one of five mandatory benefit programs for employees, alongside medical insurance, unemployment insurance, work injury insurance, and maternity insurance for female employees (hereafter collectively referred to as the "employee pension" program). The latter program is voluntary and covers urban and rural residents who are either unemployed or self-employed ("resident pension"). Below we describe the differences and similarities in the two programs in terms of participation, contributions, benefits, and eligibility requirements (A detailed explanation is provided in Online Appendix A):

*Participation*. Participation in the employee pension program is *mandatory*, and both the employer and employee must contribute to the plan. By contrast, participation in the resident pension program is voluntary. Both unemployed and self-employed individuals can choose to participate in the program. Those who do so pay a certain level of contribution.

*Contribution.* Under the employee pension program, both the employer and employee are required to pay a *fixed* amount to the program (e.g. 20% of payroll for an employer, and 8% of salary for an employee).[2] By contrast, participants in the resident pension program can choose from several contribution levels, depending on their own preference.[3]

[2] Employer contribution varies across cities, but does not exceed 20%. For example, in Guangdong, at the time of our experiment, 2014, the employer contribution rate was 14% in Jieyang, 10% in Zhuhai, and 18% (12%) for state-owned

*Benefit*s. Under the employee pension program, the employer contribution goes to a pooled pension account, while the employee contribution accumulates in her individual pension account. Accordingly, the benefit that each employee receives comes from two sources: one is paid from the pooled pension account with the amount determined by the employee's average salary over the years relative to the local province's salary level multiplied by the number of years of contributions/100;[4] the other is paid from the individual pension account with the amount equal to the individual account balance divided by the number of actuarial months associated with the account.

Likewise, under the resident pension program, an individual's contribution accumulates in her individual account. The benefit that each participant receives also comes from two sources: one is paid solely from government funds, often supported by fiscal revenue (known as the "basic benefit"); the other is paid from the individual account, with the amount calculated in the same way as for the employee pension program. Since all participants receive the same level of basic benefits, regardless of contribution levels or months of contributions, resident pension participants often choose the lowest individual contribution level needed to qualify for the basic benefits.[5]

*Eligibility.* For both the employee and resident pension programs, participants must meet two requirements to be eligible for receiving benefits from the program: first, they must have contributed to the pension account for a minimum of 15 years; second, they must have reached the benefit claim

(private) enterprises in Zhanjiang.

[3] For example, if participants choose to pay annually, the contribution levels are {120, 240, 360, 480, 600, 960, 1,200, 1,800, 2,400, 3,600} RMB in Jieyang and Zhanjiang and {720, 1,200, 1,440} RMB in Zhuhai.

[4] For example, if a program participant earns a salary at the local province's average level and contributes for 15 years, her defined pension benefit amount would equal 15% of the local province's average salary level. For each additional year of contribution, the benefit amount increases by 1 percentage point. If she earns 2 times the local province's average salary level, her benefit amount is the local province's average salary level at the time she claims benefits, multiplied by 1.5 and then by 0.15 (15 years of contribution). The multiplier 1.5 comes from the formula, (1+ the number of times the local province's average salary)/2, and in this case,(1+2)/2=1.5. According to the benefit rule, if a participant's salary exceeds 3 times the local province's average level, the salary term in the numerator is capped at 3, and thus the multiplier would be capped at 2, i.e., (1+3)/2=2.

[5] The basic benefit amount varies across cities. In 2014, the monthly benefits level was 80 RMB in Jieyang and Zhanjiang and 330 RMB in Zhuhai.

age, which is 60 for all participants except female employees, who can start to claim benefits from age 50 (in the case of female workers) and age 55 (in the case of female managers).

## 3. The Conceptual Framework

Our study is built on the findings from existing research on the effect of information provision on individuals' decisions, especially evidence from field experiments. In one study, Liebman and Luttmer (2012) survey a representative sample of Americans aged 50–70 years and find that while some provisions such as delayed benefit claims and widow benefits are relatively well understood, others such as spousal benefits and the provisions on which years of earnings are taken into account are less understood. Regarding the type of information provided, field experiments have shown that *simple information* is more effective than complex information. For example, Duflo et al. (2006) find that customers of a tax preparation service are more responsive to a simple and transparent match offer than to a match expressed in the format of the tax code. Similarly, Drexler et al. (2014) find that a simpler rule-of-thumb training program outperforms standard accounting training for micro-entrepreneurs, especially for less sophisticated participants. Previous research also finds that *information salience* matters. For instance, posting tax-inclusive price tags on grocery items reduces demand by 8%, suggesting that consumers under-react to taxes that are not salient (Chetty et al., 2009; Blumkin et al., 2012; Sexton, 2015). Combining simplified information with heightened salience of benefits can lead to an even larger increase in the likelihood that tax filers will claim benefits (Bhargava and Manoli, 2015). Moreover, previous research shows that *tailored information* raises the awareness of recipients more than does general information. For example, tailored information provided by expert tax professionals is more effective at influencing individuals' earnings behaviors and choices (Chetty and Saez, 2013). Providing a personalized retirement income projection

significantly increases employees' contributions to their retirement accounts (Goda et al., 2014). Finally, Lu et al. (2016) and Chen et al. (2017) show that providing a personalized text message to drivers on their driving behavior significantly reduces their traffic violations in the subsequent month.

In our study, we draw on the information design characteristics identified in previous research and systematically add new information to each treatment which in stepwise order is *simple* (such as illustrating rules and formulas rather than stating them directly), *salient* (such as comparing pension benefits to bank savings), and *personalized* (i.e., calculating tailored projected benefits for each individual). Our experiment is informed by our conceptual model that frames how individuals respond to such information provision. According to China's pension program rules, a person must enroll in and contribute to the program for at least 15 years to be eligible for receiving benefits and can start to receive benefits only at the specified retirement age. In the following model, we denote an individual's current age by *t*, her retirement age by *T*, the enrollment age by $s \geqslant t$, and the minimum number of years of contribution to be eligible for pension benefits by $\tau$. *B* denotes the total amount of pension benefits that she can receive after she retires.[6] *C* is the annual contribution to the pension program. As discussed in Section 2, *B* increases in the number of contribution years except for the "basic benefit" term in the resident pension program.

The net present value for the agent is:

$$V(t,s) = \begin{cases} -C(\delta^{s-t} + \cdots + \delta^{T-t-1}) + \delta^{T-t}B, & if\ T-s \geq \tau \\ -C(\delta^{s-t} + \cdots + \delta^{T-t-1}), & if\ T-s < \tau \end{cases}$$

For example, when $\tau$ = 15, if the total number of contribution years, $T-s$, is less than 15 years, the net present value for participation is negative (i.e., there is only the cumulative contribution); otherwise, there is a benefit from the pension program.

[6] Although the pension benefits are paid monthly in practice, we discuss the total benefits here for simplicity.

In our conceptual framework, the objective for an individual is to decide whether to enroll now or later. An individual decides to enroll now instead of later if the following inequalities are satisfied:

$$\forall s, V(t,t) \geq V(t,s) \ \ and \ V(t,t) \geq 0.$$

Therefore, if $t = T - \tau$, and $-C(1 + \cdots + \delta^{\tau-1}) + \delta^{\tau} B \geq 0$, the agent should enroll now. If $t > T - \tau$, the agent should not enroll now.

Compared to the size of *C*, the amount of *B* is calculated based on a complex formula involving multiple parameters. In our experiment, we intervene to help a household member understand that $B$ is actually greater than what she might have thought it was. By increasing a subject's understanding of program benefits, our intervention should increase subsequent pension enrollment. Furthermore, the impact of this information intervention should be different across treatments. This leads to our first research question.

*Research question 1:* Does providing concrete, salient, and personalized information about future pension benefits increase pension enrollment?

Next, we further postulate that different age and gender groups may respond to the information intervention differently. First, in our standard model, we expect that younger people will not be responsive to our intervention. In the case where the amount of $B$ does not vary with the number of years of contribution, e.g., the "basic benefit" amount under the resident pension program, the agent should wait until $T - \tau$, e.g., when $T - \tau = 45$ to enroll. [7,8]

[7] In fact, to encourage pension enrollment, participants who have fewer than 15 years left before retirement age are allowed to pay the required 15-year contribution in a lump sum so as to become eligible for benefits. Therefore, individuals may have an even stronger incentive to postpone their enrollment.

[8] Nevertheless, we admit the existence of counterincentives that encourage an agent to enroll at a younger age. Because of uncertainty, an agent may lose a job in a particular year and not be able to contribute to the employee pension program; similarly, she may not be able to contribute to the resident pension program if experiencing an income shock. For an agent of

Second, in the general case where B increases in the contribution years, we predict that younger people may still be less responsive to the information intervention because of their present bias.[9] Following O'Donoghue and Rabin (1999), we introduce another parameter $\beta, 0 < \beta < 1$, denoting a present-bias preference, such that the net present value for the agent becomes:

$$V'(t,s) = \beta V(t,s) \text{ if } s > t.$$

$$V'(t,t) = -(1-\beta)C + \beta V(t,t) \text{ if } s = t.$$

Since $0 < \beta < 1$, $V'(t,t) < V(t,t)$, then, with present bias, an agent would be less likely to enroll compared to the standard economic agent at the same age. Based on prior findings (e.g., Burks et al. 2012), younger people usually have a stronger present bias, i.e., a smaller $\beta$, which may also explain age differences in the treatment impact. This leads to our next research question.

*Research question 2:* Do different age groups respond to the information intervention differently?

Finally, as for gender differences, since the retirement age $T$ is smaller for women than men in China but $\tau$ is the same, $T - \tau$ is smaller for women, suggesting that the latest age at which an individual enrolls in the pension program is earlier for women. Considering the possibility of job loss or income uncertainty, this means that women would have fewer buffering years to be able to meet the minimum required 15 years of contributions. As a result, we expect that younger women would have a stronger incentive to enroll than men of the same age. Moreover, prior studies have suggested that men exhibit a stronger present-bias compared to women, e.g., Wang and Sloan (2018). For this

age t and $t < T - \tau$, if she loses her job or experiences an income shock and consequently cannot make a pension contribution in more than $T - \tau - t$, then the total number of years of contribution will be less than $\tau$ and she will not be eligible for pension benefits. Consequently, she has incentives to enroll earlier to avoid such uncertainties.

[9] It is worth noting that the discount factor, δ, in the current model captures only the fact that people are impatient, and this implies that individuals' preferences should be time-consistent and their choices should not be affected by when they are asked for an action. However, a large literature in behavioral economics has documented that individuals are present-biased, which is the hyperbolic discounting model (also known as (β,δ)–preference, Phelps and Pollak, 1968; Laibson, 1997; O'Donoghue and Rabin, 1999).

reason as well, given the same age *t*, women should be more likely to enroll than men. Taken together, this leads to our final research question.

*Research question 3:* Do women respond to the information intervention differently?

## 4. Experimental Design

We design the experiment to test the effect of our information intervention on pension program enrollment and consumption. Although the household consumption decision is not directly modelled conceptually, in practice, if the information intervention is proven to be effective, it could boost enrollment. This increased enrollment would then reduce the need for precautionary savings, leading to an increase in current household consumption.

### 4.1. Experiment Participants

We begin with a sample of individuals who participated in the 2014 Urban and Rural Household Survey (UHS), a national survey administered annually by the NBSC and its provincial branches since 1987. The UHS uses quarterly household visits and interviews to obtain information on household members' demographics, wages, employment status, occupation, and industry as well as overall household income and living conditions. The survey is designed at the national level and administered at the provincial level. The national sample is selected via a stratified random sampling method to ensure representativeness. In the first stage of sampling, cities are selected based on their population size. In the second stage, districts, residential communities, and households within selected cities are sampled sequentially.

The three cities in our experiment, Jieyang, Zhanjiang, and Zhuhai, are among those that participated in the UHS in 2014. The number of sample households for the UHS is 660 in Jieyang, 1,000 in Zhanjiang, and 290 in Zhuhai. Working with the provincial branches of the NBSC and

Guangdong SSA, we have access to all sample households in Zhuhai (290 households) as well as households in certain districts in Jieyang (417 households) and Zhanjiang (497 households), giving us a total of 1,204 possible households for our experiment.[10] Since pension program eligibility is limited to women aged 16-55 years, and men aged 16-60 years, we drop individuals not within these age ranges, leaving us with a final sample of 1,064 households for our experiment.

### 4.2. Experimental Treatments

We design different informational brochures for participants in the control and treatment groups. To design the brochures, we conduct a focus-group interview with 12 people (four from each city) to obtain their feedback on drafts of the brochures. For the control group, the informational brochure includes *an overview of the old-age pension program, a description of both the employee and the resident pension programs, a benefit calculation formula for each type of pension program, and information on the enrollment procedure and location (Figure 1)*. For the treatment groups, we provide additional information in the brochure, as described below.

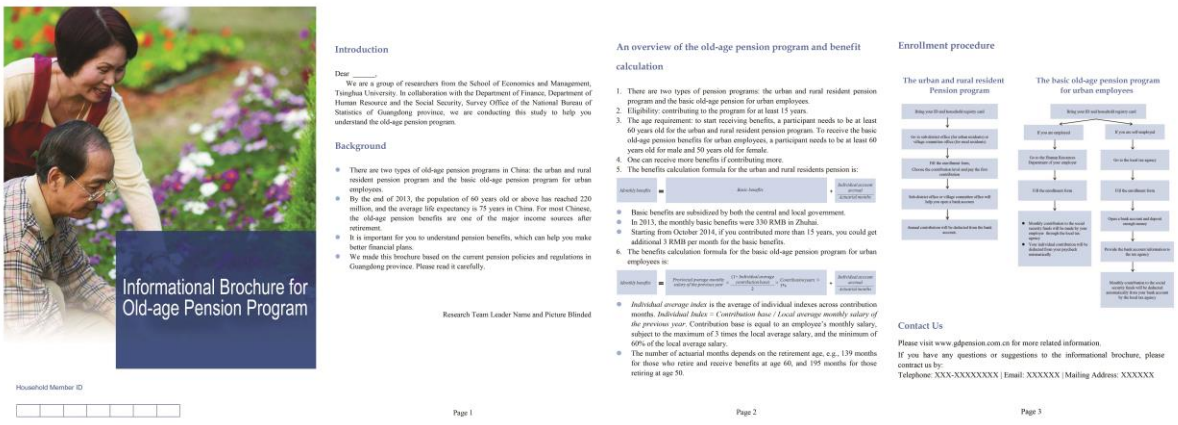



**Figure 1. Control group: Basic information and enrollment procedure**

[10] Based on the UHS data collected before the experiment, the participation rate for pension enrollment is not significantly different between our participating and non-participating samples (Jieyang: 69% vs. 69%, $p$=0.785; Zhanjiang: 72% vs. 71%, $p$=0.816, Pearson $\chi^2$ tests).

In the first treatment, referred to as the "Benefit Example" (*BE*) group, in addition to the information that the control group receives, two examples of pension benefits calculation are provided, one for each type of pension program. We also randomize the order of the two examples in the brochure. Our examples are based on the contribution level and projected future benefits for a hypothetical participant. The age for the hypothetical participant varies by gender. For male participants, the age of the hypothetical participant is 45 years old in both examples, and the contribution level and projected benefits vary by pension type and city. Since the retirement age for most female employees in China is 50 years old, our hypothetical female participant is 35 years old in the employee pension example and 45 years old in the resident pension example.[11] For example, male (female) participants in Zhuhai receive the following examples in their brochures.

*"A 45-year old resident is enrolled in the urban and rural resident pension program this year. (S)He contributes 60 RMB every month. After (s)he turns 60 years old (by that time (s)he would have contributed to the pension program for 15 years), (s)he can claim the pension benefits and receive at least 429 RMB each month."*

*"A 45- (35-) year-old (fe)male employee is enrolled in the basic old-age pension program for urban employees this year. His (her) monthly salary is 4,665 RMB, which is the average salary level in Zhuhai. (S)He would contribute 537 RMB to his (her) individual account. After turning 60 (50) years old, (by that time (s)he would have contributed to the pension program for 15 years), (s)he can claim the pension benefits and receive at least 2,221 (1,972) RMB each month."*

In our second treatment, referred to as the "Benefit Example + Comparison" (*BEC*) group, we use the same example as in the *BE* treatment; in addition, we provide a comparison of pension benefits to

[11] One determinant of pension benefits is the actuarial month. It is 139 months for those who retire at 60 and 195 months for those who retire at 50. Consequently, the projected benefits for male and female employees are different.

bank savings if the same amount is deposited into a savings account for 15 years. Bank savings represent the most popular investment form among Chinese households, and thus people have a good understanding of how to calculate bank savings interest (Gan et al., 2012). We show the comparison in a chart, which is more salient than just providing the numbers. The *BE* treatment contains only page 2 in Figure 2 while the *BEC* treatment contains both pages 2 and 3. The complete brochure is in Online Appendix B.

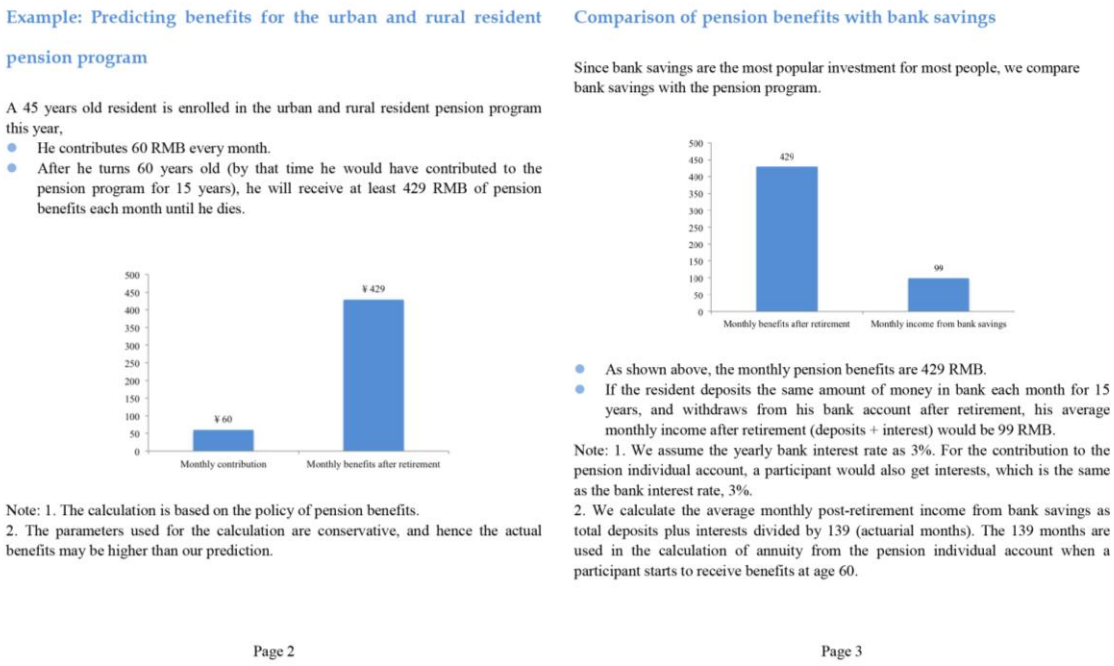



**Figure 2. *BE* and *BEC* treatments: An example and comparison with bank savings**

Finally, in our third treatment, referred to as "Individual Benefit + Comparison" (*IBC*), we identify the projected benefits amount based on an individual's pension contribution record, retrieved from the pension program administrative database of the Guangdong SSA. As shown in Figure 3, we replace "he/she" in the example in the *BE*/*BEC* treatment with "you" in the *IBC* treatment. Otherwise, the information is identical in the *BE/BEC* and *IBC* treatments.

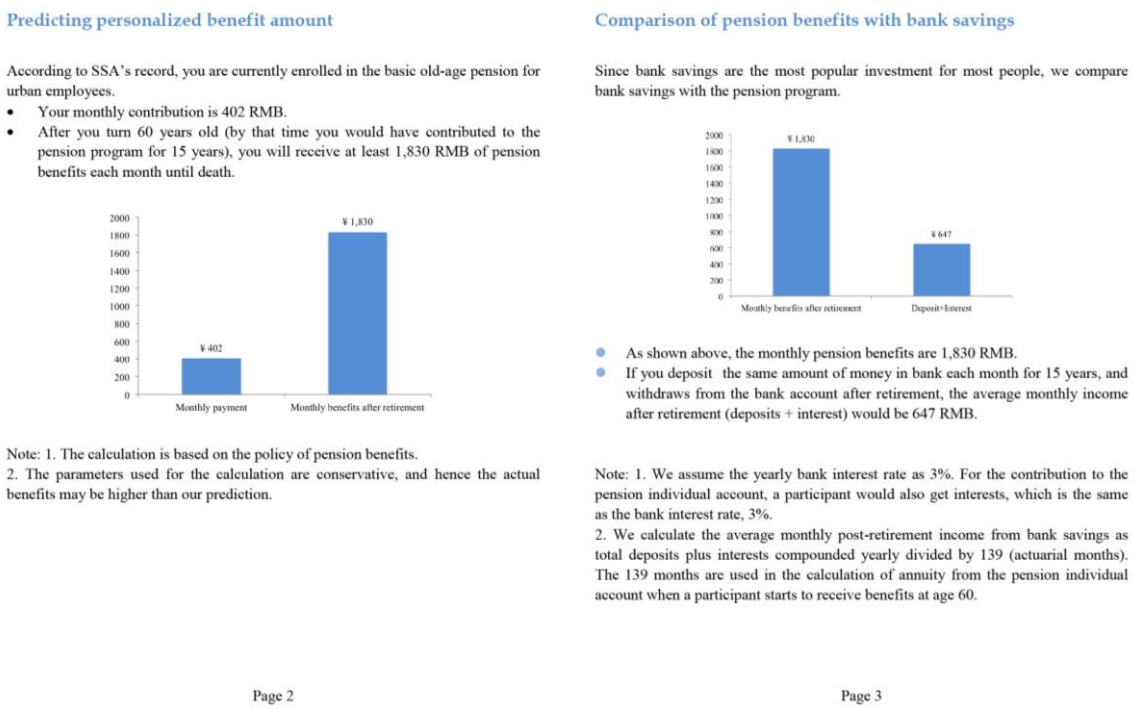



**Figure 3. *IBC* treatment: Individuals' benefit projections and comparisons with bank savings**

### 4.3. Randomization

In our experiment, we use separate randomization procedures to assign households to our experimental conditions based on whether a household's projected benefits can be calculated. We begin by comparing each participant's name and birth year/month to the data entry in the SSA database to determine whether a person is already enrolled in the pension program; we then calculate the individual's benefits amount based on the personal contribution data of those enrolled. We obtain a 55% successful match with the SSA's administrative records for those who self-report being enrolled in a pension plan.[12] Using this information, we classify our experiment participants into two categories: (1) households in which none of an individual's pension benefits can be computed (Type-1 households) and (2) households in which at least one member's individual projected benefits amount can be calculated (Type-2 households). Although this classification is mainly for practical reasons, it

[12] Unsuccessful matches occur for several reasons including duplicate names, unmatched pension types, and insufficient contributions.

nonetheless reflects the information differences between the two types of households before the information intervention. For Type-1 households, since administrative records indicate no household members are enrolled in the pension program, prior knowledge about the pension programs is likely limited. As a consequence, the information intervention would most likely influence their enrollment decision directly. For Type-2 households, since some if not all household members are already enrolled, they have some knowledge about the programs. Consequently, we expect the information intervention would impact their consumption.

Table 1 indicates the number of participants in each category. Since Type-1 households cannot be assigned to the *IBC* treatment, we perform a separate randomization for our two types of households. Type-1 households are randomly assigned into the control, *BE*, or *BEC* group, whereas Type-2 households are randomly assigned into any of the four groups (i.e., the control or one of the three treatment groups). To prevent information spillovers between household members, we randomize at the household level.[13] Because of the heterogeneity between cities, we also randomize separately for each city. We conduct a randomization check by comparing the major characteristics of households and participants across our control and treatment groups, and find no significant difference between groups. In particular, there is no significant age or gender difference across treatments. Online Appendix C reports the detailed analyses of our randomization checks.

[13] Another potential spillover effect might occur between households, and we control for this by asking enumerators to deliver the informational brochure door to door. Although we are unable to completely rule out this spillover effect, we argue that even if it exists, the treatment effect would be *under estimated* because more content is provided to the treatment groups compared to the control group.

**Table 1. Experimental design**

| Treatment | Formula | Hypothetical example | Personalized example | Comparison with bank savings | Type-1 | Type-2 |
|---|---|---|---|---|---|---|
| Control | √ | | | | 216 (508) | 101 (240) |
| *BE* | √ | √ | | | 226 (543) | 98 (236) |
| *BEC* | √ | √ | | √ | 221 (528) | 101 (242) |
| *IBC* | √ | | √ | √ | N/A | 101 (242) |
| Total | | | | | 663 (1,579) | 401 (960) |

*Note.* The number of participants for each control and treatment group is in parentheses.

### 4.4. Experiment Procedure

Our experiment consists of three stages: pre-experiment, experiment, and post-experiment. We administer our pre- and post-experiment surveys as part of the regular NBSC survey received by a sample household. Additionally, each household is required to keep a daily consumption diary, which is collected by the local division of the NBSC each month. From this diary, we obtain monthly household consumption data for our households from March 2014 to February 2015. In particular, these data track the detailed consumption of items such as food and clothing purchases.[14]

4.4.1. Pre-experiment Stage: March to July 2014

The pre-experiment survey was conducted from March 22 to April 11, 2014. To assist us in our data collection and household visits, we recruited enumerators affiliated with the NBSC of Guangdong with experience conducting household visits and surveys. Each enumerator participated in a training session over March 19 to 21, 2014. After the training session, the enumerators were asked if they understood the content of the survey. They were also told that they would deliver informational

[14] A more detailed discussion of the consumption diary can be found in Chamon and Prasad (2010).

brochures to households without knowing the design and purpose of the field experiment. We trained all enumerators to deliver the informational brochure in the same way to minimize any potential heterogeneity in information delivery. They then visited their assigned households and asked each household head or his/her spouse to answer the survey. Since households had already been participating in the NBSC regular survey, we found that they also responded actively to our survey.

4.4.2. Experiment Stage: August to October 2014

In the experiment stage, at the beginning of each month, enumerators visited each participant in the selected households and provided these participants with an informational brochure on the pension plan. The brochure delivery was repeated on a monthly basis to increase the chance that the participant would read it.

To ensure the effectiveness of our treatment manipulation, we performed two manipulation checks. First, to verify whether participants had received the brochure, after the household visits, two research assistants made a follow-up phone call to each of the 846 households for which we had contact information, with a 48% contact success rate. Among the successfully interviewed households, 92.7% indicated that they had received a brochure each month during the experiment, 6.6% were unsure, and only 0.7% (three households) indicated they had not received a brochure. Second, to check participant understanding of the information in the brochure, we included a question sheet with three questions when we distributed the brochure. We provided the question sheet during the first visit and collected it during the second visit. Of the 2,539 participants in our experiment, 93% answered the questions, 68% answered all three questions correctly, and 93% answered at least two questions correctly. This finding suggests that the majority of our participants have a good understanding of the information included in the brochure.

4.4.3. Post-experiment Stage: November 2014 to February 2015

From November 19 to December 11, 2014, enumerators again visited each household to conduct a post-experiment survey. Similar to the pre-experiment survey, this survey contains questions about the respondent and his/her spouse's pension enrollment as well as the household's financial conditions. The respondent was also asked to provide feedback on the informational brochure such as whether it was easy to understand and whether he/she would be willing to receive one again in the future. Of the 1,064 households in our experiment, 1,022 (96%) participated in the post-experiment survey. The 42 households that dropped out in the post-experiment survey due to attrition are evenly distributed across treatments.

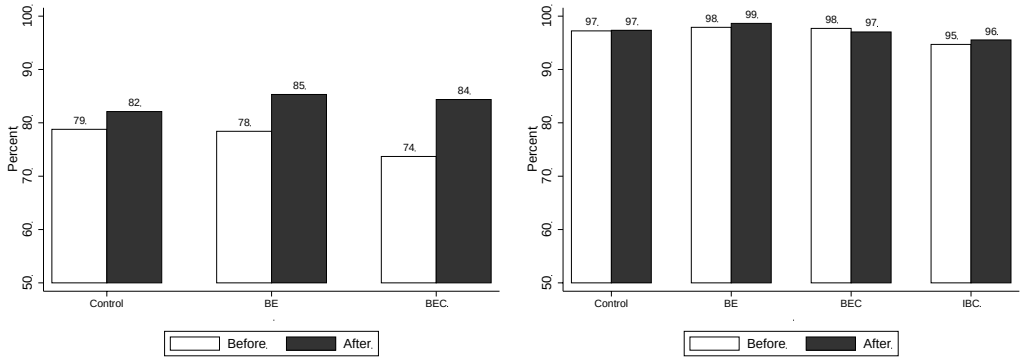
## 5. Results

In this section, we first present the results of the effect of information provision on individuals' pension program enrollment and then report the results on household consumption.[15]

### 5.1. Pension Enrollment

To examine the effect of receiving different informational brochures on individuals' pension enrollment decisions, we focus on the subsample of experiment participants whose pension enrollment status was reported in the post-experiment survey. This subsample consists of 1,415 individual observations from 827 households.

[15] We can also examine the treatment effect on the contribution level for resident pension. However, based on records in social security agency's database, 90.71% of resident pension program participants paid the *lowest* contribution level before the experiment. This percentage was 90.36% after the experiment and the difference between these two is not significant ($p$=0.77, two-sided proportion test).




**Type-1 (*N*=848)** **Type-2 (*N*=567)**

**Figure 4. Pension enrollment for Type-1 and Type-2 households**

Figure 4 shows the before- and after-intervention pension enrollment rates for participants in Type-1 and Type-2 households, respectively. Type-1 households are those in which no family member's pension enrollment can be identified or confirmed by the SSA's administrative data, while Type-2 households are those in which at least one member's enrollment can be confirmed. Before the experiment, there is no significant difference in the pension enrollment rate between our control and treatment groups ($p$>0.1, two-sided proportion tests), which confirms the appropriateness of our randomization procedure. By contrast, after the intervention, the pension enrollment rate for Type-1 households in the *BE* and *BEC* treatment groups is significantly higher (*BE*: 78% vs. 85%, $p$=0.006; *BEC*: 74% vs. 84%, $p$=0.000; two-sided McNemar tests).[16] Since the enrollment rate of Type-2 households is already high before the intervention, no significant change in the enrollment rate for this group is found after the intervention (*BE*: 98%vs. 99%, $p$=0.564; *BEC*: 98% vs. 97%, $p$=0.317; *IBC*: 95% vs. 96%, $p$=0.655; two-sided McNemar tests). Thus, in the following regression analysis, we focus on the treatment effect on Type-1 households' pension enrollment. The Probit regression model is specified as follows:

[16] We use the McNemar test here because of the paired and matched binary data adopted in this study (Siegel and Castellan, 1988).

$$y_{it} = \beta_0 + \beta_1 After + \beta_2 BE_i + \beta_3 BEC_i + \beta_{12} BE_i \times After + \beta_{13} BEC_i \times After + u_{it} \quad (1),$$

where $y_{it}$ is a dummy variable indicating whether an individual *i* enrolls in a pension program (1 for enrollment, and 0 for not) at time *t.BE* and *BEC* denote the treatment dummies, and the control group is the baseline for comparison. *After* denotes the experiment intervention (before experiment: *After*=0; after experiment: *After*=1). Table 2 (Column (1)) reports the regression results for overall pension enrollment. Consistent with Figure 4, we see that the estimated coefficients of *BE*×*After* and *BEC*×*After* are positive, but not statistically significant. We also estimate a multinomial Probit model with two outcomes (=1 for employee pension enrollment and =2 for resident pension enrollment) and find that the likelihood of enrolling in the resident pension program as the result of the information intervention is higher (but not statistically significantly so) than the likelihood of enrolling in the employee pension program (Online Appendix D). This finding may reflect the voluntary nature of resident pension program participation.

*Treatment effects across age groups in Type-1 households.* Our discussion in the conceptual framework suggests that treatment effects may vary by age. Specifically we posit that receiving the same information about future benefits may have a smaller impact on younger participants. Results from the pre-experiment survey show that the top reason (26%) for not enrolling in the program is that a participant feels no urge to enroll. We further tabulate non-enrollment reasons by age groups and find that 44% of subjects who are 35 years or younger feel no urge to enroll, while this percent is 19% for those aged 35-45, 20% for those aged 45-55 and zero for 55-60 years old ($p$=0.002, Pearson $\chi^2$ test). Therefore, we consider heterogeneous experiment effects on different age groups: namely 16–35 (35 not included), 35–45 (45 not included), 45–55 (55 not included), and 55–60, by interacting age group dummies with treatment dummies in regression model (1).

The regression analyses in Table 2 (Columns (2)) show that the interaction term: *BEC_Age45-55*After* is positive and significant at the1% level (Column (2): marginal effect 0.171, $p$=0.010). We also observe a positive coefficient estimate for those aged 45-55 in the *BE* treatment, but the effect for this group is not statistically significant (Column (2): marginal effect 0.089, $p$=0.145). The effect size suggests that the after-before increase in the pension enrollment rate would be 17.1 percentage points higher for those aged 45-55 in the *BEC* treatment than that for the control group. To illustrate this effect, we estimate that the population aged 45-55 is about 18.9 million in China, and receiving information about the program could be associated with 2.84 million more people enrolling in the program.[17]No significant treatment effect is found for the other age groups.

***Result 1*** (Treatment Effect on Pension Enrollment)

Compared to the control group, we find that providing 45-55 year old Type-1 household participants with both examples and a comparison to bank savings information significantly increases their pension enrollment.

**Table 2. Probit regressions for pension enrollment for Type-1 households**

| | Dependent variable: *Pension enrollment* | |
|---|---|---|
| | （1） | （2） |
| *After* | 0.033 | 0.032 |
| | (0.034) | (0.032) |
| *BE* | -0.003 | |
| | (0.033) | |
| *BEC* | -0.045 | |
| | (0.032) | |
| *BE*After* | 0.039 | |
| | (0.048) | |
| *BEC*After* | 0.070 | |
| | (0.047) | |
| *BE_Age16-35* | | -0.156*** |
| | | (0.055) |

[17] According to the sixth national population census in 2010 (http://www.stats.gov.cn/tjsj/pcsj/rkpc/6rp/indexch.htm), the proportion of people aged 45-55 is 13.83% of the total population in China. Supposing this proportion is stable, we obtain the estimate of 18.9 million (the total population of 136.8 million multiplied by 13.83%).

| | | |
|---|---|---|
| *BE_Age35-45* | | 0.030 |
| | | (0.051) |
| *BE_Age45-55* | | 0.018 |
| | | (0.040) |
| *BE_Age55-60* | | 0.097 |
| | | (0.077) |
| *BEC_Age16-35* | | -0.209*** |
| | | (0.055) |
| *BEC_Age35-45* | | -0.073 |
| | | (0.046) |
| *BEC_Age45-55* | | 0.005 |
| | | (0.040) |
| *BEC_Age55-60* | | 0.100 |
| | | (0.070) |
| *BE_Age16-35*After* | | -0.004 |
| | | (0.078) |
| *BE_Age35-45*After* | | 0.041 |
| | | (0.074) |
| *BE_Age45-55*After* | | 0.089 |
| | | (0.061) |
| *BE_Age55-60*After* | | -0.032 |
| | | (0.109) |
| *BEC_Age16-35*After* | | -0.002 |
| | | (0.077) |
| *BEC_Age35-45*After* | | 0.040 |
| | | (0.067) |
| *BEC_Age45-55*After* | | 0.171*** |
| | | (0.066) |
| *BEC_Age55-60*After* | | 0.099 |
| | | (0.113) |
| *N* | 1,675 | 1,675 |
| *Log likelihood* | -818.493 | -773.037 |

*Notes*. 1. Standard errors are in parentheses. 2. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.3. Marginal effects are reported.

*Perceived pension benefits amount and pension enrollment.* One possible mechanism that may explain the change in participants' enrollment decisions is a change in their expectations of pension benefits after receiving the information. To validate this conjecture, we analyze participants' responses to a question in the post-experiment survey about whether they think the benefits described in the brochure are higher than, equal to, or lower than their previous estimation. Since we find a

significant treatment effect for participants aged 45–55, we expect that this group should especially perceive a higher benefit amount after receiving the information intervention. Our results show that, for 45-55 year old participants who had not enrolled before the experiment, those in the *BEC* treatment group are more likely to report a "higher than previous estimation" than those in the control group in the post-experiment survey (75% vs. 36%, $p$=0.045, two-sided proportion tests).[18] This finding suggests that information provision, especially the provision of information deemed salient and relevant, could change subjects' perceptions of pension benefits and consequently induce greater participation in the pension program.

*Substitute with commercial program enrollment.* As an additional test of the impact of information provision on pension program enrollment, in both our pre- and post-experiment surveys, we ask participants whether they have enrolled in any commercial old-age insurance programs in addition to the government pension program. Table 3 presents the summary statistics for all participants as well as for those aged 45-55 in Type-1 households. Overall, we find that less than 1 percent of the respondents indicate they are enrolled in a commercial program. This percentage is close to the rate reported by the CHARLS Research Team (2013) (0.30%). We further find that enrollment in a commercial insurance program barely changes after the information intervention in either the control or treatment groups. The commercial program enrollment is not significantly different between our control and treatment groups in either the pre- or post-experiment stage ($p$>0.1, two-sided proportion tests). We summarize our findings in Result 2.

[18] Those in the *BE* treatment group are also more likely to report a "higher than previous estimation" than those in the control group but the difference is not significant (70% vs. 46%, $p$=0.256, two-sided proportion tests).

***Result* 2** (Belief and Pension Enrollment)

(1) The significant treatment effect on pension enrollment occurs through changes in subjects' perceptions of future retirement wealth, to some extent.

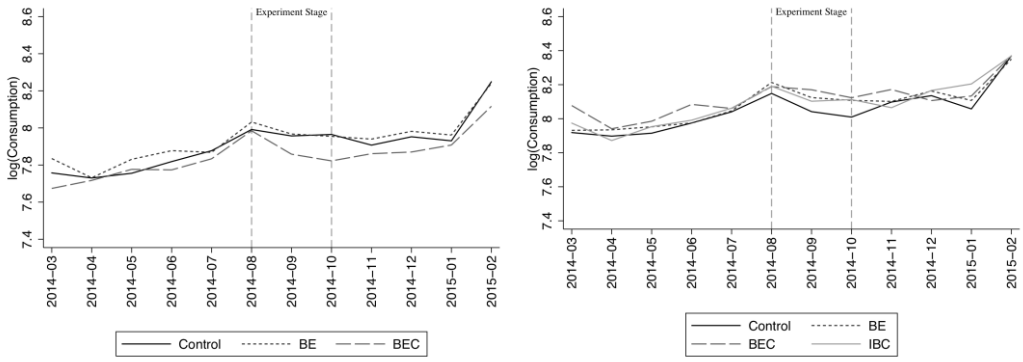
(2) The increase in the government pension enrollment as result of receiving benefit information does not crowd out commercial old-age insurance program enrollment.

**Table 3. The enrollment rate for commercial old-age insurance for Type-1 households**

| | All Participants | | | Age 45-55 | | |
|---|---|---|---|---|---|---|
| | Control | *BE* | *BEC* | Control | *BE* | *BEC* |
| Pre-experiment | 0.365% | 1.049% | 0.000% | 0.000% | 0.694% | 0.000% |
| Post-experiment | 0.377% | 1.064% | 0.000% | 0.000% | 0.704% | 0.000% |
| *N* | 274 | 286 | 288 | 144 | 144 | 139 |

## 5.2. Household Consumption

In addition to examining the effect of information provision on pension enrollment, we are interested in which type of information affects household consumption, following Chetty and Szeidl (2007, 2016). Of the 1,064 households participating in our experiment, 178 stopped keeping a consumption diary during the period of the experiment, yielding 886 households for our consumption analysis (525 Type-1 and 361 Type-2 households).[19]




**Type-1 (*N*=525)** **Type-2 (*N*=361)**

**Figure 5. Logarithm of monthly household consumption**

[19] These 175 households are evenly distributed between the control and treatment groups ($p$>0.1, two-sided proportion tests).

Figure 5 presents the mean logarithm of monthly household consumption for Type-1 and Type-2 households from March 2014 to February 2015. Before the information intervention (i.e., March to July 2014), there is no significant difference between the control and treatment groups ($p$>0.1, two-sided t-tests). From August 2014 to February 2015, we see that Type-1 households' consumption for the *BEC* group is always lower than that for the control group, while Type-2 households' consumption across all three treatment groups is higher than that for the control group. To control for seasonal consumption fluctuations (e.g., higher consumption during holiday seasons), we estimate the treatment effects via an OLS regression model, specified as follows:

$$y_{it} = \beta_0 + \beta_1 After + \beta_2 BE_i + \beta_3 BEC_i + \beta_4 IBC_i + \beta_{12} BE_i \times After + \beta_{13} BEC_i \times After + \beta_{14} IBC_i \times After + \lambda_t + u_{it}, \quad (2)$$

where $y_{it}$ denotes the logarithm of household $i$'s consumption in month $t$. The independent variables include the treatment dummies *BE*, *BEC*, and *IBC* (only for Type-2 households) and interactions between treatment groups and an after-intervention dummy. We control for month fixed effects $\lambda_t$ by including month dummy variables. We report the results for Type-1 and Type-2 households in Table 4. During the three months of the experiment when participants receive the brochure each month, we observe no significant difference between the treatment and control groups for either Type-1 or Type-2 households (Columns (1) and (3) in Table 4).

**Table 4. OLS regressions for household consumption for Type-1 and Type-2 households**

| | Dependent variable: *Monthly logarithm of household consumption* | | | |
|---|---|---|---|---|
| | Type-1 households | | Type-2 households | |
| | Aug. 2014 - Oct. 2014 | Nov. 2014 - Feb. 2015 | Aug. 2014 - Oct. 2014 | Nov. 2014 - Feb. 2015 |
| | (1) | (2) | (3) | (4) |
| *After* | 0.305*** | 0.173*** | 0.156* | 0.134 |
| | (0.063) | (0.061) | (0.084) | (0.083) |
| *BE* | 0.035 | 0.035 | 0.006 | 0.006 |
| | (0.039) | (0.038) | (0.055) | (0.056) |
| *BEC* | -0.045 | -0.045 | 0.163*** | 0.163*** |

| | | | | |
|---|---|---|---|---|
| | (0.039) | (0.039) | (0.056) | (0.057) |
| *IBC* | | | 0.040 | 0.040 |
| | | | (0.056) | (0.057) |
| *BE*After* | -0.066 | -0.060 | 0.065 | -0.006 |
| | (0.063) | (0.058) | (0.090) | (0.084) |
| *BEC*After* | -0.075 | -0.053 | 0.012 | -0.087 |
| | (0.064) | (0.058) | (0.092) | (0.086) |
| *IBC*After* | | | 0.085 | 0.030 |
| | | | (0.091) | (0.086) |
| *Month dummy* | YES | YES | YES | YES |
| Constant | 7.737*** | 7.737*** | 7.919*** | 7.919*** |
| | (0.043) | (0.043) | (0.057) | (0.057) |
| *N* | 2,979 | 3,294 | 2,171 | 2,420 |
| $R^2$ | 0.022 | 0.043 | 0.019 | 0.038 |

*Notes*. 1. Standard errors are in parentheses. 2. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Since the treatment effect on pension enrollment occurs mainly for those 45–55 years of age, we also examine whether the influence of information treatments on households' consumption varies by age groups (Table 5). Here, we do not find any heterogeneous treatment effect for Type-1 households across age groups. For Type-2 households, the estimate for the interaction term, *IBC_Age45-55*After*, is marginally significant (Column (3) in Table 5: 0.201, $p$=0.095). This estimate shows that, compared to that for the control group, the after-before increase in monthly household consumption for 45-55 year olds in the *IBC* treatment group is 20.1 percentage points higher (766 RMB or $110 for an average-income household). Additionally, this estimate for the *IBC* treatment is larger than that for the *BEC* treatment, although the difference is not significant ($p$>0.1, Wald tests).

Our conjecture is that two opposing forces influence consumption (Goda et al., 2014). First, learning about projected future benefits increases an individual's perceived wealth. In other words, a lack of knowledge about pension benefits could lead one to err on the side of caution by overinvesting in precautionary savings and reducing consumption. Consequently, providing information on

projected pension benefits may reassure the individual, who may then feel more comfortable increasing his/her consumption (*income effect*). On the contrary, people not already enrolled may divert their consumption spending to pay for their pension contributions when they do enroll, due to a *substitution effect*. As discussed in Section 4, Type-2 households include those with at least one household member's pension contribution confirmed by the SSA. Thus, by design, more than 95% of our Type-2 subjects have already enrolled in the pension program and made contributions before the information intervention. Providing this group with personalized projected benefits amounts helps them gain more accurate and relevant knowledge about their future retirement income, but does not change their benefit contribution. Consequently, the *income effect* dominates, and their consumption significantly increases. To provide some evidence for this conjecture, for Type-2 households headed by individuals aged 45–55 years, we find that those in the *IBC* treatment group are more likely to report that "the benefit amount is higher than previous estimation" than those in the control group of the same age (52% vs. 35%, $p$=0.214, two-sided proportion tests). Compared to other age groups of *IBC* treatment, this percentage is also higher (52% for age 45–55 vs. 14% for age 16–35 and about 40% for age 35–45 and 55–60). This leads to our third result.

**Table 5. OLS regressions for household consumption by age groups for Type-1 and Type-2 households**

| | Dependent variable: *Monthly logarithm of household consumption* | | | |
|---|---|---|---|---|
| | Type-1 households | | Type-2 households | |
| | Aug. 2014 - Oct. 2014 | Nov. 2014 - Feb. 2015 | Aug. 2014 - Oct. 2014 | Nov. 2014 - Feb. 2015 |
| | (1) | (2) | (3) | (4) |
| *After* | 0.303*** | 0.170*** | 0.155* | 0.131 |
| | (0.062) | (0.060) | (0.084) | (0.082) |
| *BE_Age16-35* | 0.001 | 0.001 | 0.046 | 0.046 |
| | (0.076) | (0.074) | (0.167) | (0.169) |
| *BE_Age35-45* | 0.314*** | 0.314*** | 0.019 | 0.019 |
| | (0.072) | (0.070) | (0.068) | (0.069) |
| *BE_Age45-55* | -0.027 | -0.027 | -0.048 | -0.048 |
| | (0.047) | (0.046) | (0.074) | (0.075) |

| | | | | |
|---|---|---|---|---|
| *BE_Age55-60* | -0.023 | -0.023 | 0.119 | 0.119 |
| | (0.070) | (0.068) | (0.128) | (0.130) |
| *BEC_Age16-35* | 0.401*** | 0.401*** | 0.546*** | 0.546*** |
| | (0.082) | (0.080) | (0.122) | (0.124) |
| *BEC_Age35-45* | 0.024 | 0.024 | 0.047 | 0.047 |
| | (0.060) | (0.059) | (0.072) | (0.073) |
| *BEC_Age45-55* | -0.155*** | -0.155*** | 0.205** | 0.205** |
| | (0.052) | (0.051) | (0.084) | (0.085) |
| *BEC_Age55-60* | -0.206*** | -0.206*** | 0.118 | 0.118 |
| | (0.067) | (0.065) | (0.115) | (0.116) |
| *IBC_Age16-35* | | | 0.025 | 0.025 |
| | | | (0.128) | (0.130) |
| *IBC_Age35-45* | | | 0.107 | 0.107 |
| | | | (0.073) | (0.074) |
| *IBC_Age45-55* | | | 0.044 | 0.044 |
| | | | (0.074) | (0.075) |
| *IBC_Age55-60* | | | -0.325** | -0.325** |
| | | | (0.150) | (0.152) |
| *BE_Age16-35*After* | 0.039 | 0.130 | -0.052 | -0.072 |
| | (0.124) | (0.112) | (0.272) | (0.253) |
| *BE_Age35-45*After* | -0.149 | -0.280** | 0.061 | -0.071 |
| | (0.117) | (0.109) | (0.111) | (0.104) |
| *BE_Age45-55*After* | -0.071 | -0.036 | 0.091 | 0.065 |
| | (0.076) | (0.069) | (0.120) | (0.112) |
| *BE_Age55-60*After* | -0.058 | -0.069 | 0.050 | 0.070 |
| | (0.113) | (0.103) | (0.210) | (0.195) |
| *BEC_Age16-35*After* | -0.166 | -0.117 | -0.071 | -0.119 |
| | (0.132) | (0.121) | (0.198) | (0.190) |
| *BEC_Age35-45*After* | -0.115 | -0.123 | 0.024 | -0.120 |
| | (0.098) | (0.090) | (0.117) | (0.109) |
| *BEC_Age45-55*After* | 0.031 | 0.053 | 0.032 | -0.027 |
| | (0.084) | (0.076) | (0.137) | (0.129) |
| *BEC_Age55-60*After* | -0.178 | -0.136 | -0.006 | -0.052 |
| | (0.109) | (0.100) | (0.187) | (0.175) |
| *IBC_Age16-35*After* | | | 0.182 | -0.009 |
| | | | (0.210) | (0.195) |
| *IBC_Age35-45*After* | | | -0.001 | -0.038 |
| | | | (0.119) | (0.111) |
| *IBC_Age45-55*After* | | | 0.201* | 0.102 |
| | | | (0.120) | (0.114) |

| | | | | |
|---|---|---|---|---|
| *IBC_Age55-60*After* | | | -0.198 | 0.090 |
| | | | (0.245) | (0.228) |
| *Month dummy* | YES | YES | YES | YES |
| Constant | 7.740*** | 7.740*** | 7.920*** | 7.920*** |
| | (0.043) | (0.042) | (0.056) | (0.057) |
| *N* | 2,979 | 3,294 | 2,171 | 2,420 |
| $R^2$ | 0.054 | 0.074 | 0.040 | 0.056 |

*Notes*. 1. Standard errors are in parentheses. 2. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

***Result 3*** (Treatment Effect on Consumption)

Compared to the control group, providing personalized information marginally significantly increases household consumption for Type-2 households headed by individuals aged 45–55 years in the short-run.

Furthermore, we examine whether the treatment effect on consumption persists over time. In this test, we estimate the same regression model as in Equation (2), with the dependent variable including post-experiment household consumption from November 2014 to February 2015, while excluding the intervention period from August to October 2014.Columns (2) and (4) in Tables 4 and 5 report the results for Type-1 and Type-2 households, respectively. The treatment effect for the *IBC* group is not significant at 10% for this period (Column (4) in Table 5), indicating that the effect of the information intervention fades away in the long run.

Following our conceptual framework, we also examine whether women and men at the same age respond to our information intervention differently. Specifically, we estimate the regressions from further breaking up the age groups for men and women and interacting the age-gender groups with treatment group dummies, and find no significant difference for either pension participation or household consumption (Online Appendix D).

Moreover, to address the multiple hypotheses testing problem, we employ the False Discovery Rate (FDR) of Benjamini and Hochberg (1995), which is commonly used in the literature (e.g.,

Edmonds and Theoharides, 2020; Massetet al., 2020). After the p-value correction, the result for pension participation, i.e., *BEC*_Age45-55*After (Column (2) in Table 2) remains, though the *p*-value changes from $p$=0.01 to $p$=0.057. By contrast, the marginal significance for *IBC*_Age45-55*After (Column 3 in Table 5) drops ($p$=0.095 to $p$=0.434). Nevertheless, the multiple hypotheses testing procedure provides a rigorous and robust examination of our results, especially since we include all the interactions of our age group and treatment group dummies, and the number of hypotheses is large (up to $N$=32).

In a final robustness check, we discuss whether our non-finding of effects is due to low power. To address this concern, we conduct a power calculation for the Type-1 households in our sample which we expect to observe significance for pension participation. Specifically, among Type-1 households, the pension enrollment rate for the control group before the experiment is 80.5% with a standard deviation of 0.397. By setting the base at 80%, we can calculate the sample size required for capturing different sizes of treatment effects. To detect a 7% increase in the pension participation, as found in our experiment for the *BEC* treatment (Column 1 in Table 2), in principle we need at least 396 participants. We have 221 subjects in the *BEC* treatment in our experiment. Although still smaller than the ideal sample size, this sample size may not be too small for detecting the treatment effect. As such, we consider that our non-finding of an effect should not be completely due to low power. Nevertheless, we acknowledge that our sample size is smaller than would be ideal.

## 6. Conclusion

Globally, government and employers play a significant role in their employees' pension choices, not only through their financial contributions, but through their provision of information about pensions. Several experiments have been conducted to test whether providing information

significantly affects employees' decisions to enroll in a program or to increase their amount of savings in their pension account (Bhargava and Manoli, 2015; Hastings and Mitchell, 2011; Goda et al., 2014; Duflo and Saez, 2003; Thaler and Benartzi, 2004). Retirement seminars and one-to-one consultation meetings are often found to be more effective than a brochure or flier in boosting pension enrollment and retirement savings (Bayer et al., 2009; Thaler and Benartzi, 2004).

To contribute to this line of research, we examine *which type* of information can increase individuals' knowledge of pension plans and encourage pension program enrollment. Although retirement seminars and one-to-one consultation sessions are more effective than informational brochures, they are also costlier. Therefore, we focus on how informational brochures can be designed to maximize their impact on subsequent enrollment decisions. Specifically, we design different information treatments, positing that information which is concrete and personalized can be more influential on an individual's pension decisions.

Our results show that, for subjects from Type-1 households (non-enrollers), providing a concrete example about the pension benefits amount (our *BE* and *BEC* treatments) increases pension program enrollment in the *BEC* treatment for those who feel a greater sense of urgency to enroll (i.e., participants aged 45–55 years). For Type-2 households (those who have enrolled), providing the most concrete personalized information about future benefits (our *IBC* treatment) to households headed by individuals aged 45–55 years results in significantly higher household consumption than for the control group. We further find that this effect weakens in the four months after the information brochure is no longer provided.

In summary, this study illustrates the relative effectiveness of certain informational brochure designs on individual pension enrollment and household consumption behavior, suggesting the

importance of choosing an appropriate design when launching such programs in both companies and the public sector. Our follow-up survey shows that 92% of respondents indicated that the brochure helped them understand pension benefits and 60% were willing to receive brochures regularly in the future. These findings suggest that a simple non-pecuniary instrument such as an informational brochure can alter individuals' beliefs and lower their uncertainty about retirement income. We estimate the total cost of our information treatment in the three cities including printing and delivery costs is 60,000-75,000 RMB (around $10,000USD), though this may not account for the wages and salary for the survey teams and SSA and Statistics Bureau's agents who distribute the survey. Our finding of a heterogeneous treatment effect on different age groups also indicates the importance of targeting the relevant population when providing information in order to improve social welfare through enrollment and household consumption.

After our experiment, we followed up with officials from the SSA in the three cities where we conducted the experiment and learned that the policymakers are interested in putting behavioral economics to work. They have even begun using multiple channels, including mobile applications and online information platforms, to disseminate pension program information. For example, Zhuhai has been using Wechat, the largest social networking platform in China, to diffuse pension policy information. For future research, it would be interesting to evaluate the effectiveness of these different information delivery channels and to identify individuals with higher centrality in social networks, who can more broadly spread pension information after they receive it (Banerjee et al., 2013; Rao et al., 2017).

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## Online Appendix

## Appendix A. An Introduction of Old-age Pension Programs in Guangdong

Guangdong old-age pension programs consist of the basic old-age pension program for urban employees and the pension program for urban non-employed residents and rural residents. We introduced the history and status of each program in Guangdong. For our experiment, we calculated expected pension benefits for participants based on the most updated policies at the time of the field experiment.

Before introducing each pension program, we outline the administrative structure of social security programs. Several provincial agencies are involved in the administration of social security programs: Department of Human Resource and Social Security (HRSS) is responsible for making and implementing social security policies; Department of Finance takes the responsibility of managing social security funds and allocating fiscal resources to social security funds if needed; A subsidiary of HRSS, Social Security Administration (SSA), is responsible for serving individual participants, administering their pension accounts, and paying social security benefits. For urban employees, since their pension contribution is made through their employer, and for the convenience of employers, pension contribution is collected by the local tax agency, along with other local taxes that employers need to pay. For non-employed or rural residents, SSA directly collects pension contribution.

*1. Basic old-age pension program for urban employees*

China's old-age pension reform started in 1984, with experiments on pension pooling in some cities and counties (Song and Chu, 1997). Before the reform, each work unit managed their pension program and paid pension benefits to retirees from their unit. Under such a highly decentralized system, pension benefits were not portable across enterprises, thus discouraging workers from changing jobs and causing inefficiency. In addition, before the reform, taking full and sole responsibility for administering pensions, enterprises, especially older ones, bore a heavy financial burden. As the enterprise reform proceeded, enterprises were freed from government control and became self-running to make profits. The obligation to offer pension benefits naturally shifted from the enterprise to society. Guangdong pension reform followed the national trend. During the period 1984-1990, Guangdong started the pension reform on urban employed workers, and required all employees to contribute to the pension pool. By 1990, this task was completed, and the pension pool was formed at the city and county level.

In 1991, the state council issued the *Decision on the Pension Reform for Urban Employees*, which provided guidelines for the pension reform. Government, enterprises, and individual employees bore the pension cost together; contributions to the pension pool were mainly on the pay-as-you-go basis, and each province set its own contribution rate but needed to report to the state council (Song and Chu, 1997). Following this policy, Guangdong started to implement the pension program in which both enterprises and employees contributed to the pension pool. Employees' individual accounts were established. In 1993, the *Interim Provisions of Old-age Pension Program in Guangdong Province* was promulgated. Thus, the year of 1994 became a critical year for the old-age pension program in Guangdong. Taking this year as the dividing line, the old-age pension program participants were divided into "the old", "the middle", and "the new". "The old" refers to the employees who retired before 1994; "The middle" refers to those who started working before 1994 and had not retired by 1994; and "the new" refers to those who started working after 1994. The transition policies were established for "the old" and "the middle."

In July 1997, the State Council promulgated the *Decisions on Establishment of a Unified Basic Old-age Pension System for Enterprise Employees*, which was implemented from January 1, 1998, and it unified the basic old-age pension system nationwide. Guangdong Province implemented the *Basic Old-age Pension Regulations of Guangdong Province* from July 1, 1998. As a result, the classification of "the old", "the middle" and "the new" and the basic pension structure had corresponding changes, taking the year of 1998 as the new threshold for defining the different groups. Additionally, according to the regulations, enterprises' contribution to the pension pool should not exceed 20% of the payroll, and the individual contribution started at 4% of salary, to be raised by 1% every two years, finally reaching 8%.

In 2006, Guangdong provincial government enacted the *Notification of the Implementation of State Council's Decision to Improve Enterprise Employees' Basic Old-age Pension System*. Because of this new policy, the individual's pension contribution rate, contribution base, benefit calculation methods were adjusted. The current urban employees' pension contribution and benefit calculation were both originated from this stipulation, and were directly concerning our project, which aims at calculating employees' pension benefits for participants of our study in the three cities, Jieyang, Zhanjiang and Zhuhai.

1. Pension benefits from the individual account

*Monthly pension benefits from the individual account =Accumulated contribution to the individual account / Actuarial months*

The calculation for the accumulated contribution to the individual account is similar to bank savings. Since July 1, 2006, employees' contribution rate to the individual account decreased from 11% to 8% of the contribution base. An individual's Contribution base is equal to her monthly salary, subject to the maximum of three times the local average salary, and the minimum of 60% of the local average salary.

Second, in Guangdong, currently, the number of actuarial months is 139 for those who retire at age 60, and is 195 if retiring at age 50.

2. Pension benefits from the basic old-age pension pool

This calculation of the benefits is described below.

(1) Individual index

*Individual Index = Contribution base / Local average monthly salary of the previous year*

Therefore, the value of this index is between 0.6 and 3.

Moreover, *Individual average index* is the average of individual indexes across contribution months. Contribution months refer to months contributing to the pension program.

(2) Average contribution base

*Average contribution base = Provincial average monthly salary of the previous year* × *Individual average index*

(3) Monthly basic old-age pension benefits

*Monthly basic old-age pension benefits* = (*Provincial average monthly salary of the previous year + Average contribution base*) / 2 × (*Contribution month* / 12) ×1%

In total, the monthly pension benefits for urban employees are the sum of the pension benefits from the individual account and the monthly basic old-age pension benefits.

*2. Urban and Rural Resident Pension System*

Urban and Rural Resident Pension System comprises the New Rural Pension Program and the Urban Resident Pension Program.

2.1 The New Rural Pension Program

In 2009, Guangdong launched the pilot program that covered about 10 percent of counties and regions in Guangdong Province. The pilot program is expected to be gradually expanded, and by 2020, will have covered the entire province.

*Eligibility*: rural residents, over 16 years old, with the households registered in Guangdong and who have not enrolled in the basic old-age pension for urban employees, are allowed to enroll in the new rural pension program on a voluntary basis.

*Contribution*: the required pension contribution differed by cities. There are multiple levels of contribution. A rural resident can choose any level to contribute to an individual account. The contribution levels are summarized in Table A.1. As a pilot city, Zhuhai started the program in 2006, setting four levels of contribution and adding the fifth level in 2009. In Zhuhai, the amount that a person chooses to contribute can change from year to year, but must not change within a year. Jieyang and Zhanjiang started the program in 2009.

*Pension benefits*: pension benefits comprise two parts: (1) a basic benefits amount which is subsidized by government (50% from central government, 25% from province, and 25% from city/county), and this amount differed across cities; (2) the amount from the individual account, which is calculated the same way as that for urban employees, equal to the accumulated contribution amount in the individual account divided by the number of actuarial months. Jieyang and Zhanjiang provided the same basic pension benefits, 55 RMB per month. Zhuhai increased basic monthly benefits from 100 RMB in 2006 to 165 RMB in 2009. At age 60, participants can start to receive benefits from the new rural pension program.

**Table A1. New Rural Pension Program**

| | Jieyang | Zhanjiang | Zhuhai |
|---|---|---|---|
| Contribution | 5 levels: 120, 240, 360, 480, 600 RMB per year | 5 levels:100, 200, 300, 400, 500 RMB per year | 5 levels: 40, 60, 80, 100,110 RMB per month |
| Pension benefits (monthly) | Basic benefits (55 RMB) +Individual account benefits | Basic benefits (55 RMB) +Individual account benefits | Basic benefits (165 RMB) + Individual account benefits |

2.2 Urban Resident Pension Program

In 2011, to expand the coverage of pension program to all urban residents, including those not covered by urban employees' basic pension program, Guangdong government promulgated the *Measures for Urban Residents' Pension Pilot Program*, in accordance with the *Guiding Principles for Urban Residents' Pension Pilot Program* issued by the State Council. The pilot program started in the second half of 2011. By 2012, the program had covered the whole province.

*Eligibility*: urban residents who are above 16 years old (excluding students) and are not eligible for the basic old-age pension program for urban employees, can enroll in the urban residents' pension program on a voluntary basis. This pension program is to cover non-working individuals in urban areas who cannot enroll in the urban employees' pension program. The urban resident pension fund is mainly made up of individual contribution and government subsidies.

*Contribution*: urban residents who enroll in the urban residents' pension program can choose a level of contribution (as shown in Table A.2). Jieyang and Zhanjiang are similar in the required contribution amount. In these two cities, government subsidized the pension program by contributing 30 RMB per person and year, among which provincial, city, and county government each contributed 10 RMB. Zhuhai is different from the other two cities: in Zhuhai, the contribution amount is fixed at 110 RMB per person and month, and thus 1,320 RMB per year; the government subsidizes the pension program, matching 50% of the individual contribution amount per person, and city and district governments share this cost equally.

*Pension benefits:* similar to the new rural pension program, urban resident pension benefits comprise two parts: (1) basic benefits subsidized by the government, which differed by cities; (2) the benefits from the individual account, which is calculated the same way as that for urban employees, equal to the accumulated contribution amount in the individual account divided by the number of actuarial months. To receive benefits, in Jieyang and Zhanjiang, participants need to be at least 60 years old; and in Zhuhai, participants also need to have contributed to the pension program for 15 years, or they can contribute a lump sum amount to make up to the 15 years of contribution. In all three cities, qualified individuals receive monthly benefits.

**Table A2. Urban Resident Pension Program**

| | Jieyang | Zhanjiang | Zhuhai |
|---|---|---|---|
| Contribution | 10 levels: 100, 200, ..., 1,000 RMB per year | 10 levels: 100, 200, ..., 1,000 RMB per year | 1,320 RMB per year (or 110 RMB per month) |
| Pension benefits (monthly) | Basic benefits (55 RMB) +Individual account benefits | Basic benefits (55 RMB) +Individual account benefits | Basic benefits (165 RMB) +Individual account benefits |

2.3 The Rural and Urban Resident Pension Program

In September 2013, Guangdong Province made an important decision to integrate the rural and urban resident pension systems, and hence issued the *Measures for Implementing the Urban and Rural Resident Pension Program for Guangdong Province*.

*Eligibility:* The urban and rural resident pension program is designed for rural residents and urban non-employed residents over 16 years old who are not covered by the basic old-age pension program for urban employees, and have their households registered in Guangdong Province (except students). Participation in the urban and rural resident pension program is voluntary. Before 2013, there was a bundling policy that parents could not claim pension benefits unless their adult children enrolled in the pension program, but the bundling policy was removed after the integration of urban and rural resident pension program.

*Contribution:* In Jieyang and Zhanjiang, the rural and urban resident pension program permits 10 levels of contribution; in Zhuhai, the rural and urban resident pension program permits 3 levels of contribution, as shown in Table A.3, and a resident can choose any level to contribute to their individual account each year.

*Pension benefits:* pension benefits comprise two parts: (1) basic benefits, which differ across cities but are the same for participants within a city; (2) benefits from the individual account based on individual contribution. In all three cities, to receive benefits, participants need to be at least 60 years

old, and have contributed to the program for 15 years or made a lump sum payment up to the 15-year contribution.

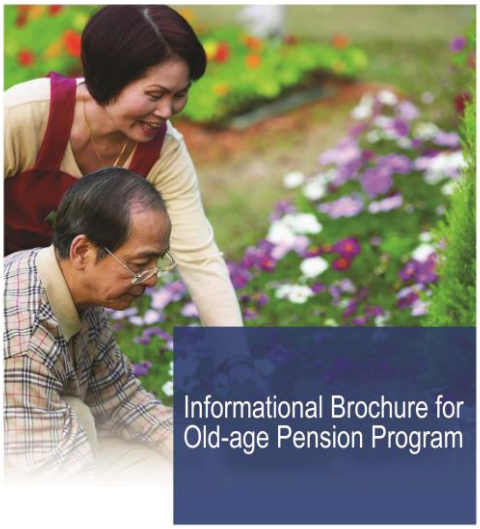
**Table A3. The Urban and Rural Resident Pension Program**

| | Jieyang | Zhanjiang | Zhuhai |
|---|---|---|---|
| Contribution | 10 levels: 120, 240, 360, 480, 600, 960, 1,200, 1,800, 2,400, 3,600 RMB per year | 10 levels: 120, 240, 360, 480, 600, 960, 1,200, 1,800, 2,400, 3,600 RMB per year | 3 levels: 60, 100, 120 RMB per month |
| Pension benefits (monthly) | Basic benefits (before 8/1/2014, 65 RMB; after 8/1/2014, 80 RMB)+ Individual account benefits | Basic benefits (before 8/1/2014, 65 RMB; after 8/1/2014, 80 RMB)+ Individual account benefits | Basic benefits (330 RMB)+Individual account benefits |

Reference:

Song S, Chu GSF (1997) Social Security Reform in China: The Case of Old-Age Insurance. *Contemporary Economic Policy* 15 (2): 85-93.

# Appendix B. Experiment Brochure




Household Member ID

| | | | | | | |
|---|---|---|---|---|---|---|
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## Introduction

Dear _____,

We are a group of researchers from the School of Economics and Management, Tsinghua University. In collaboration with the Department of Finance, Department of Human Resource and the Social Security, Survey Office of the National Bureau of Statistics of Guangdong province, we are conducting this study to help you understand the old-age pension program.

## Background

- There are two types of old-age pension programs in China: the urban and rural resident pension program and the basic old-age pension program for urban employees.
- By the end of 2013, the population of 60 years old or above has reached 220 million, and the average life expectancy is 75 years in China. For most Chinese, the old-age pension benefits are one of the major income sources after retirement.
- It is important for you to understand pension benefits, which can help you make better financial plans.
- We made this brochure based on the current pension policies and regulations in Guangdong province. Please read it carefully.

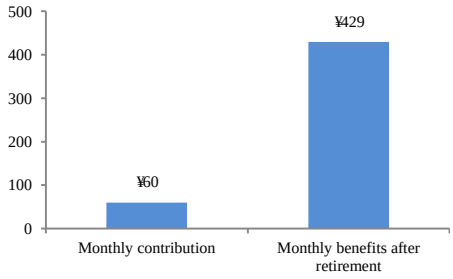
Research Team Leader Name and Picture Blinded



## Example: Predicting benefits for the urban and rural resident pension program

A 45 years old resident is enrolled in the urban and rural resident pension program this year,

- He contributes 60 RMB every month.
- After he turns 60 years old (by that time he would have contributed to the pension program for 15 years), he will receive at least 429 RMB of pension benefits each month until he dies.

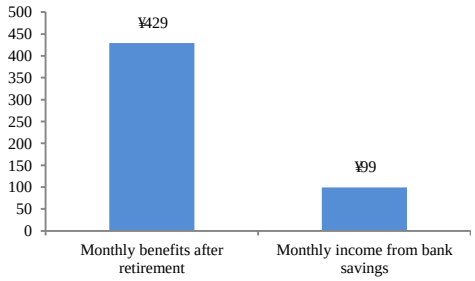



Note: 1. The calculation is based on the policy of pension benefits.
2. The parameters used for the calculation are conservative, and hence the actual benefits may be higher than our prediction.



## Comparison of pension benefits with bank savings

Since bank savings are the most popular investment for most people, we compare bank savings with the pension program.




- As shown above, the monthly pension benefits are 429 RMB.
- If the resident deposits the same amount of money in bank each month for 15 years, and withdraws from his bank account after retirement, his average monthly income after retirement (deposits + interest) would be 99 RMB.

Note: 1. We assume the yearly bank interest rate as 3%. For the contribution to the pension individual account, a participant would also get interests, which is the same as the bank interest rate, 3%.
2. We calculate the average monthly post-retirement income from bank savings as total deposits plus interests divided by 139 (actuarial months). The 139 months are used in the calculation of annuity from the pension individual account when a participant starts to receive benefits at age 60.

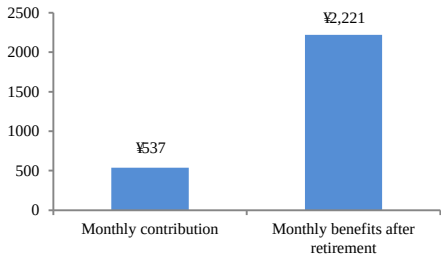


**Figure B1. Front cover and pages 1-3 of informational brochure for the *BEC* treatment**

## Example: Predicting benefits for the basic old-age pension program for urban employees

A 45 years old male employee is enrolled in the basic old-age insurance for urban employees this year, and his monthly salary is 4,665 RMB, which is the average salary level in Zhuhai.

- On average, he contributes 537 RMB to his individual account each month. His employer contributes 805 RMB (12% of his monthly salary) to the pension funds each month.
- After he turns 60 years old (by that time he would have contributed to the pension program for 15 years), he would receive at least 2,221 RMB per month.

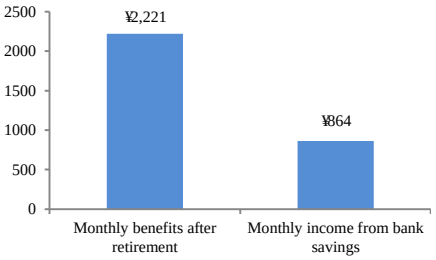



Note: 1. The calculation is based on the policy of pension benefits.
2. The parameters used for the calculation are conservative, and hence the actual benefits may be higher than our prediction.



## Benefits comparison with bank savings

Since bank savings are the most popular investment for most people, we compare bank savings with the pension program.




- As shown above, the monthly pension benefits are 2,221 RMB.
- If the employee deposits the same amount of money in bank each month for 15 years, and withdraws from his bank account after retirement, his average monthly income after retirement (deposits + interest) would be 864 RMB.

Note: 1. We assume the yearly bank interest rate as 3%. For the contribution to the pension individual account, a participant would also get interests, which is the same as the bank interest rate, 3%.
2. We calculate the average monthly post-retirement income from bank savings as total deposits plus interests divided by 139 (actuarial months). The 139 months are used in the calculation of annuity from the pension individual account when a participant starts to receive benefits at age 60.



## An overview of the old-age pension program and benefit calculation

1. There are two types of pension programs: **the urban and rural resident pension program** and **the basic old-age pension for urban employees**.
2. Eligibility: contributing to the program for at least 15 years.
3. The age requirement: to start receiving benefits, a participant needs to be at least 60 years old for **the urban and rural resident pension program**. To receive **the basic old-age pension benefits for urban employees**, a participant needs to be at least 60 years old for male and 50 years old for female.
4. One can receive more benefits if contributing more.
5. The benefits calculation formula for **the urban and rural residents pension** is:

$$\text{Monthly benefits} = \text{Basic benefits} + \frac{\text{Individual account accrual}}{\text{Actuarial months}}$$

- Basic benefits are subsidized by both the central and local government.
- In 2013, the monthly basic benefits were 330 RMB in Zhuhai.
- Starting from October 2014, if you contributed more than 15 years, you could get additional 3 RMB per month for the basic benefits.

6. The benefits calculation formula for **the basic old-age pension program for urban employees** is:

$$\text{Monthly benefits} = \text{Provincial average monthly salary of the previous year} \times \frac{(1 + \text{Individual average contribution base})}{2} \times \text{Contribution years} \times 1\% + \frac{\text{Individual account accrual}}{\text{Actuarial months}}$$

- *Individual average index* is the average of individual indexes across contribution months. *Individual Index = Contribution base / Local average monthly salary of the previous year*. Contribution base is equal to an employee's monthly salary, subject to the maximum of 3 times the local average salary, and the minimum of 60% of the local average salary.
- The number of actuarial months depends on the retirement age, e.g., 139 months for those who retire and receive benefits at age 60, and 195 months for those retiring at age 50.
- Pension benefits are calculated based on a participant's salary for all contribution years. To predict future salaries, we assume that an individual's monthly salary, and provincial and local average monthly salaries all grow at 5% per year.
- To compare pension benefits and bank savings, we assume that the yearly interest rate for both the pensions individual account and bank savings is 3%.



## Enrollment procedure

### The urban and rural resident Pension program

Bring your ID and household registry card

↓

Go to sub-district office (for urban residents) or village committee office (for rural residents)

↓

Fill the enrollment form. Choose the contribution level and pay the first contribution

↓

Sub-district officer or village committee office will help you open a bank account

↓

Annual contribution will be deducted from the bank account

### The basic old-age pension program for urban employees

Bring your ID and household registry card

| If you are employed | If you are self-employed |
|---|---|
| ↓ | ↓ |
| Go to the Human Resources Department of your employer | Go to the local tax agency |
| ↓ | ↓ |
| Fill the enrollment form | Fill the enrollment form |
| ↓ | ↓ |
| • Monthly contribution to the social security funds will be made by your employer through the local tax agency<br>• Your individual contribution will be deducted from your paycheck automatically | Open a bank account and deposit enough money |
| | ↓ |
| | Provide the bank account information to the tax agency |
| | ↓ |
| | Monthly contribution to the social security funds will be deducted automatically from your bank account by the local tax agency |

## Contact Us

Please visit www.gdpension.com.cn for more related information.

If you have any questions or suggestions to the informational brochure, please contact us by:
Telephone: XXX-XXXXXXXX | Email: XXXXXX | Mailing Address: XXXXXX



**Figure B2. Pages 4-7 of informational brochure for the *BEC* treatment**

## Appendix C. Randomization

**Table C1. Randomization check (Jieyang)**

| | Control | *BE* | *BEC* | *IBC* | Control vs. *BE* | Control vs. *BEC* | Control vs. *IBC* | *BE* vs. *BEC* | *BE* vs. *IBC* | *BEC* vs. *IBC* |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| *Panel 1: Type-1 households* | | | | | | | | | | |
| Monthly income | 3,265.99 | 3,692.51 | 3,072.03 | | 0.290 | 0.599 | | 0.186 | | |
| | (1,816.44) | (3,274.85) | (2,902.91) | | | | | | | |
| Consumption amount | 3,422.57 | 3,711.74 | 3,518.93 | | 0.434 | 0.662 | | 0.598 | | |
| | (1,449.81) | (3,092.41) | (1,436.23) | | | | | | | |
| Household size | 4.12 | 4.18 | 4.08 | | 0.773 | 0.867 | | 0.675 | | |
| | (1.27) | (1.61) | (1.52) | | | | | | | |
| Rate of pension enrollment | 65.45% | 67.74% | 65.77% | | 0.612 | 0.945 | | 0.660 | | |
| | (0.477) | (0.469) | (0.476) | | | | | | | |
| Male | 55.91% | 55.05% | 54.95% | | 0.856 | 0.840 | | 0.985 | | |
| | (0.50) | (0.50) | (0.50) | | | | | | | |
| Education level | | | | | 0.596 | 0.596 | | 0.839 | | |
| Below high school | 64.55% | 67.43% | 68.92% | | | | | | | |
| High school | 25.45% | 25.23% | 22.97% | | | | | | | |
| Above high school | 10.00% | 7.34% | 8.11% | | | | | | | |
| Age group | | | | | 0.450 | 0.940 | | 0.180 | | |
| <35 | 49.09% | 46.79% | 50.45% | | | | | | | |
| [35, 45] | 15.91% | 20.18% | 13.96% | | | | | | | |
| [45, 55] | 25.45% | 26.61% | 25.23% | | | | | | | |
| [55, 60] | 9.55% | 6.42% | 10.36% | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of households | 86 | 89 | 87 | | | | | | | |
| Number of subjects | 220 | 218 | 222 | | | | | | | |
| *Panel 2: Type-2 households* | | | | | | | | | | |
| Monthly income | 3,060.58 | 3,622.15 | 2,891.67 | 3,164.10 | 0.382 | 0.754 | 0.865 | 0.229 | 0.494 | 0.634 |
| | (2,071.79) | (2,498.43) | (1,832.91) | (2,288.89) | | | | | | |
| Consumption amount | 5,949.04 | 3,432.66 | 4,087.95 | 3,444.47 | 0.256 | 0.419 | 0.259 | 0.364 | 0.972 | 0.387 |
| | (11,107.32) | (1,037.69) | (3,499.40) | (1,371.79) | | | | | | |
| Household size | 4.81 | 4.96 | 5.00 | 4.50 | 0.709 | 0.636 | 0.475 | 0.911 | 0.214 | 0.173 |
| | (1.67) | (1.25) | (1.24) | (1.39) | | | | | | |
| Rate of pension enrollment | 86.84% | 84.29% | 90.28% | 82.86% | 0.660 | 0.512 | 0.501 | 0.283 | 0.820 | 0.194 |
| | (0.340) | (0.367) | (0.298) | (0.380) | | | | | | |
| Male | 46.05% | 51.43% | 56.94% | 54.29% | 0.516 | 0.185 | 0.320 | 0.510 | 0.735 | 0.750 |
| | (0.50) | (0.50) | (0.50) | (0.50) | | | | | | |
| Education level | | | | | 0.730 | 0.231 | 0.396 | 0.305 | 0.811 | 0.426 |
| Below high school | 77.63% | 82.86% | 81.94% | 85.71% | | | | | | |
| High school | 18.42% | 14.29% | 18.06% | 12.86% | | | | | | |
| Above high school | 3.95% | 2.86% | 0.00% | 1.43% | | | | | | |
| Age group | | | | | 1.000 | 1.000 | 1.000 | 0.760 | 0.940 | 1.000 |
| <35 | 42.11% | 41.43% | 41.67% | 41.43% | | | | | | |
| [35, 45] | 34.21% | 41.43% | 30.56% | 32.86% | | | | | | |
| [45, 55] | 22.37% | 14.29% | 25.00% | 24.29% | | | | | | |
| [55, 60] | 1.32% | 2.86% | 2.78% | 1.43% | | | | | | |
| Number of households | 26 | 26 | 27 | 26 | | | | | | |
| Number of subjects | 76 | 70 | 72 | 70 | | | | | | |

*Note*. Monthly income (RMB) is household gross income in 2013. The amount of consumption (RMB) is the average monthly consumption amount from March to July 2014. Standard deviations are in parentheses. For continuous variables, *p*-values from two-sided t-test are presented; for categorical variables, *p*-values from Pearson $\chi^2$ tests are presented.

## Table C2. Randomization check (Zhanjiang)

| | Control | *BE* | *BEC* | *IBC* | Control vs. *BE* | Control vs. *BEC* | Control vs. *IBC* | *BE* vs. *BEC* | *BE* vs. *IBC* | *BEC* vs. *IBC* |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| *Panel 1: Type-1 households* | | | | | | | | | | |
| Monthly income | 3,372.08 | 3,564.26 | 3,749.94 | | 0.549 | 0.409 | | 0.693 | | |
| | (1,986.63) | (2,499.85) | (4,058.30) | | | | | | | |
| Consumption amount | 2,380.51 | 2,579.00 | 2,340.81 | | 0.400 | 0.849 | | 0.335 | | |
| | (1,336.67) | (1,893.86) | (1,568.98) | | | | | | | |
| Household size | 4.67 | 4.77 | 4.61 | | 0.652 | 0.806 | | 0.437 | | |
| | (1.73) | (1.37) | (1.48) | | | | | | | |
| Rate of pension enrollment | 70.78% | 69.84% | 72.38% | | 0.825 | 0.703 | | 0.534 | | |
| | (0.456) | (0.460) | (0.448) | | | | | | | |
| Male | 53.88% | 53.17% | 53.97% | | 0.878 | 0.984 | | 0.859 | | |
| | (0.50) | (0.50) | (0.50) | | | | | | | |
| Education level | | | | | 0.553 | 0.169 | | 0.666 | | |
| Below high school | 73.06% | 69.44% | 65.69% | | | | | | | |
| High school | 21.92% | 23.41% | 25.94% | | | | | | | |
| Above high school | 5.02% | 7.14% | 8.37% | | | | | | | |
| Age group | | | | | 0.970 | 0.660 | | 1.000 | | |
| <35 | 42.01% | 46.43% | 43.10% | | | | | | | |
| [35, 45] | 19.18% | 17.86% | 24.69% | | | | | | | |
| [45, 55] | 31.96% | 30.56% | 25.94% | | | | | | | |
| [55, 60] | 6.85% | 5.16% | 6.28% | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of households | 97 | 104 | 101 | | | | | | | |
| Number of subjects | 219 | 252 | 239 | | | | | | | |
| *Panel 2: Type-2 households* | | | | | | | | | | |
| Monthly income | 3,299.52 | 3,145.05 | 2,771.97 | 3,456.02 | 0.835 | 0.460 | 0.811 | 0.510 | 0.537 | 0.149 |
| | (3,498.50) | (2,381.67) | (2,155.89) | (1,730.62) | | | | | | |
| Consumption amount | 2,316.87 | 3,104.04 | 3,001.42 | 2,652.81 | 0.280 | 0.133 | 0.400 | 0.895 | 0.533 | 0.445 |
| | (1,636.08) | (3,923.27) | (2,062.93) | (1,701.89) | | | | | | |
| Household size | 4.63 | 4.78 | 4.39 | 4.56 | 0.650 | 0.506 | 0.823 | 0.190 | 0.397 | 0.575 |
| | (1.59) | (1.07) | (1.27) | (1.11) | | | | | | |
| Rate of pension enrollment | 92.11% | 95.95% | 91.36% | 89.77% | 0.322 | 0.865 | 0.605 | 0.246 | 0.135 | 0.725 |
| | (0.271) | (0.199) | (0.283) | (0.305) | | | | | | |
| Male | 55.26% | 56.76% | 54.32% | 53.41% | 0.854 | 0.906 | 0.812 | 0.761 | 0.670 | 0.905 |
| | (0.50) | (0.50) | (0.50) | (0.50) | | | | | | |
| Education level | | | | | 0.342 | 0.677 | 0.825 | 0.686 | 0.425 | 0.544 |
| Below high school | 61.84% | 72.97% | 67.90% | 63.64% | | | | | | |
| High school | 27.63% | 18.92% | 24.69% | 23.86% | | | | | | |
| Above high school | 10.53% | 8.11% | 7.41% | 12.50% | | | | | | |
| Age group | | | | | 0.290 | 0.210 | 0.510 | 0.650 | 0.100 | 0.970 |
| <35 | 34.21% | 27.03% | 38.27% | 45.45% | | | | | | |
| [35, 45] | 26.32% | 48.65% | 38.27% | 27.27% | | | | | | |
| [45, 55] | 39.47% | 22.97% | 19.75% | 21.59% | | | | | | |
| [55, 60] | 0.00% | 1.35% | 3.70% | 5.68% | | | | | | |
| Number of households | 35 | 32 | 33 | 36 | | | | | | |
| Number of subjects | 76 | 74 | 81 | 88 | | | | | | |

*Note*. Monthly income (RMB) is household gross income in 2013. The amount of consumption (RMB) is the average monthly consumption amount from March to July 2014. Standard deviations are in parentheses. For continuous variables, *p*-values from two-sided t-test are presented; for categorical variables, *p*-values from Pearson $\chi^2$ tests are presented.

## Table C3. Randomization check (Zhuhai)

| | Control | *BE* | *BEC* | *IBC* | Control vs. *BE* | Control vs. *BEC* | Control vs. *IBC* | *BE* vs. *BEC* | *BE* vs. *IBC* | *BEC* vs. *IBC* |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| *Panel 1: Type-1 households* | | | | | | | | | | |
| Monthly income | 5,458.59 | 5,977.78 | 5,894.44 | | 0.620 | 0.663 | | 0.946 | | |
| | (3,146.92) | (5,086.03) | (4,774.48) | | | | | | | |
| Consumption amount | 4,472.28 | 4,992.65 | 4,947.00 | | 0.534 | 0.604 | | 0.957 | | |
| | (3,527.95) | (3,078.84) | (3,626.97) | | | | | | | |
| Household size | 3.39 | 3.42 | 3.48 | | 0.925 | 0.736 | | 0.829 | | |
| | (1.27) | (1.35) | (0.87) | | | | | | | |
| Rate of pension enrollment | 85.51% | 80.82% | 85.07% | | 0.457 | 0.943 | | 0.505 | | |
| | (0.355) | (0.396) | (0.359) | | | | | | | |
| Male | 47.83% | 54.79% | 53.73% | | 0.406 | 0.491 | | 0.900 | | |
| | (0.50) | (0.50) | (0.50) | | | | | | | |
| Education level | | | | | 0.989 | 0.902 | | 0.836 | | |
| Below high school | 46.38% | 45.21% | 49.25% | | | | | | | |
| High school | 31.88% | 32.88% | 28.36% | | | | | | | |
| Above high school | 21.74% | 21.92% | 22.39% | | | | | | | |
| Age group | | | | | 1.000 | 0.630 | | 0.860 | | |
| <35 | 43.48% | 41.10% | 31.34% | | | | | | | |
| [35, 45] | 20.29% | 24.66% | 26.87% | | | | | | | |
| [45, 55] | 28.99% | 20.55% | 32.84% | | | | | | | |
| [55, 60] | 7.25% | 13.70% | 8.96% | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of households | 33 | 33 | 33 | | | | | | | |
| Number of subjects | 69 | 73 | 67 | | | | | | | |
| *Panel 2: Type-2 households* | | | | | | | | | | |
| Monthly income | 6,883.70 | 6,780.00 | 6,745.67 | 9,013.89 | 0.931 | 0.914 | 0.223 | 0.980 | 0.217 | 0.220 |
| | (4,967.74) | (5,738.04) | (6,391.66) | (9,747.85) | | | | | | |
| Consumption amount | 5,325.85 | 4,973.75 | 5,213.04 | 4,742.83 | 0.682 | 0.900 | 0.489 | 0.767 | 0.754 | 0.550 |
| | (4,224.07) | (3,398.38) | (3,822.63) | (3,131.09) | | | | | | |
| Household size | 3.83 | 4.20 | 4.00 | 3.90 | 0.211 | 0.481 | 0.763 | 0.519 | 0.325 | 0.689 |
| | (1.03) | (1.57) | (1.18) | (1.10) | | | | | | |
| Rate of pension enrollment | 95.45% | 93.48% | 91.01% | 91.67% | 0.563 | 0.240 | 0.310 | 0.535 | 0.646 | 0.878 |
| | (0.209) | (0.248) | (0.288) | (0.278) | | | | | | |
| Male | 47.73% | 54.35% | 50.56% | 55.95% | 0.374 | 0.706 | 0.281 | 0.610 | 0.831 | 0.478 |
| | (0.50) | (0.50) | (0.50) | (0.50) | | | | | | |
| Education level | | | | | 0.908 | 0.122 | 0.592 | 0.260 | 0.827 | 0.539 |
| Below high school | 48.86% | 45.65% | 33.71% | 41.67% | | | | | | |
| High school | 26.14% | 28.26% | 34.83% | 32.14% | | | | | | |
| Above high school | 25.00% | 26.09% | 31.46% | 26.19% | | | | | | |
| Age group | | | | | 1.000 | 0.390 | 1.00 | 0.390 | 0.990 | 0.370 |
| <35 | 38.64% | 39.13% | 49.44% | 39.29% | | | | | | |
| [35, 45] | 31.82% | 30.43% | 23.60% | 32.14% | | | | | | |
| [45, 55] | 22.73% | 23.91% | 17.98% | 22.62% | | | | | | |
| [55, 60] | 6.82% | 6.52% | 8.99% | 5.95% | | | | | | |
| Number of households | 40 | 40 | 41 | 39 | | | | | | |
| Number of subjects | 88 | 92 | 89 | 84 | | | | | | |

*Note*. Monthly income (RMB) is household gross income in 2013. The amount of consumption (RMB) is the average monthly consumption amount from March to July 2014. Standard deviations are in parentheses. For continuous variables, *p*-values from two-sided t-test are presented; for categorical variables, *p*-values from Pearson $\chi^2$ tests are presented.

## Table C4. Randomization check (all three cities)

| | Control | *BE* | *BEC* | *IBC* | Control vs. *BE* | Control vs. *BEC* | Control vs. *IBC* | *BE* vs. *BEC* | *BE* vs. *IBC* | *BEC* vs. *IBC* |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| *Panel 1: Type-1 households* | | | | | | | | | | |
| Monthly income | 3,648.61 | 3,967.18 | 3,803.29 | | 0.247 | 0.611 | | 0.633 | | |
| | (2,266.39) | (3,381.13) | (3,868.44) | | | | | | | |
| Consumption amount | 3,097.70 | 3,395.58 | 3,189.65 | | 0.198 | 0.645 | | 0.382 | | |
| | (1,978.79) | (2,743.14) | (2,151.61) | | | | | | | |
| Household size | 4.25 | 4.34 | 4.24 | | 0.558 | 0.894 | | 0.460 | | |
| | (1.55) | (1.54) | (1.47) | | | | | | | |
| Rate of pension enrollment | 70.47% | 70.48% | 71.21% | | 0.998 | 0.793 | | 0.792 | | |
| | (0.457) | (0.457) | (0.453) | | | | | | | |
| Male | 53.94% | 54.14% | 54.36% | | 0.946 | 0.892 | | 0.944 | | |
| | (0.50) | (0.50) | (0.50) | | | | | | | |
| Education level | | | | | 0.970 | 0.941 | | 0.897 | | |
| Below high school | 65.75% | 65.38% | 64.96% | | | | | | | |
| High school | 24.80% | 25.41% | 25.00% | | | | | | | |
| Above high school | 9.45% | 9.21% | 10.04% | | | | | | | |
| Age group | | | | | 0.770 | 0.710 | | 0.780 | | |
| <35 | 45.28% | 45.86% | 44.70% | | | | | | | |
| [35, 45] | 17.91% | 19.71% | 20.45% | | | | | | | |
| [45, 55] | 28.74% | 27.62% | 26.52% | | | | | | | |
| [55, 60] | 8.07% | 6.81% | 8.33% | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of households | 216 | 226 | 221 | | | | | | | |
| Number of subjects | 508 | 543 | 528 | | | | | | | |
| *Panel 2: Type-2 households* | | | | | | | | | | |
| Monthly income | 4,657.49 | 4,755.28 | 4,417.05 | 5,526.98 | 0.874 | 0.705 | 0.277 | 0.603 | 0.345 | 0.180 |
| | (4,260.28) | (4,421.49) | (4,737.79) | (6,797.30) | | | | | | |
| Consumption amount | 4,443.56 | 3,954.37 | 4,190.68 | 3,663.64 | 0.500 | 0.727 | 0.255 | 0.616 | 0.477 | 0.205 |
| | (6,418.38) | (3,252.70) | (3,358.43) | (2,458.49) | | | | | | |
| Household size | 4.36 | 4.59 | 4.40 | 4.29 | 0.245 | 0.839 | 0.715 | 0.299 | 0.098 | 0.535 |
| | (1.47) | (1.37) | (1.28) | (1.21) | | | | | | |
| Rate of pension enrollment | 91.67% | 91.53% | 90.91% | 88.43% | 0.956 | 0.768 | 0.235 | 0.812 | 0.260 | 0.370 |
| | (0.277) | (0.279) | (0.288) | (0.321) | | | | | | |
| Male | 49.58% | 54.24% | 53.72% | 54.55% | 0.310 | 0.364 | 0.276 | 0.910 | 0.946 | 0.855 |
| | (0.50) | (0.50) | (0.50) | (0.50) | | | | | | |
| Education level | | | | | 0.908 | 0.122 | 0.592 | 0.260 | 0.827 | 0.539 |
| Below high school | 62.08% | 65.25% | 59.50% | 62.40% | | | | | | |
| High school | 24.17% | 21.19% | 26.45% | 23.55% | | | | | | |
| Above high school | 13.75% | 13.56% | 14.05% | 14.05% | | | | | | |
| Age group | | | | | 0.140 | 0.160 | 0.460 | 0.180 | 0.240 | 0.930 |
| <35 | 38.33% | 36.02% | 43.39% | 42.15% | | | | | | |
| [35, 45] | 30.83% | 39.41% | 30.58% | 30.58% | | | | | | |
| [45, 55] | 27.92% | 20.76% | 20.66% | 22.73% | | | | | | |
| [55, 60] | 2.92% | 3.81% | 5.37% | 4.55% | | | | | | |
| Number of households | 101 | 98 | 101 | 101 | | | | | | |
| Number of subjects | 240 | 236 | 242 | 242 | | | | | | |

*Note*. Monthly income (RMB) is household gross income in 2013. The amount of consumption (RMB) is the average monthly consumption amount from March to July 2014. Standard deviations are in parentheses. For continuous variables, *p*-values from two-sided t-test are presented; for categorical variables, *p*-values from Pearson $\chi^2$ tests are presented.

## Appendix D. Supplementary Analyses for Treatment Effects

### Table D1. Multinomial Probit regressions for pension enrollment for Type-1 households

| | 1 = Employee pension enrollment | 2 = Resident pension enrollment |
|---|---|---|
| | (1) | (2) |
| *After* | -0.018 | 0.051 |
| | (0.034) | (0.042) |
| *BE* | 0.001 | -0.004 |
| | (0.033) | (0.041) |
| *BEC* | -0.012 | -0.033 |
| | (0.034) | (0.041) |
| *BE*After* | 0.017 | 0.022 |
| | (0.047) | (0.059) |
| *BEC*After* | 0.026 | 0.045 |
| | (0.047) | (0.059) |
| *N* | 1,675 | 1,675 |
| *Log likelihood* | -1487.7842 | -1487.7842 |

*Notes*. 1. Standard errors are in parentheses. 2.*** $p<0.01$, ** $p<0.05$, * $p<0.1$. 3. Marginal effects are reported.

### Table D2. Probit regressions for pension enrollment by age and gender for Type-1 households

| | Dependent variable: *overall pension enrollment* | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| *After* | 0.033 | 0.032 | 0.032 |
| | (0.034) | (0.032) | (0.033) |
| *BE* | -0.003 | | |
| | (0.033) | | |
| *BEC* | -0.045 | | |
| | (0.032) | | |
| *BE*After* | 0.039 | | |
| | (0.048) | | |
| *BEC*After* | 0.070 | | |
| | (0.047) | | |
| *BE_Age16-35* | | -0.156*** | |
| | | (0.055) | |
| *BE_Age35-45* | | 0.030 | |
| | | (0.051) | |

| | | |
|---|---|---|
| *BE_Age45-55* | 0.018 | |
| | (0.040) | |
| *BE_Age55-60* | 0.097 | |
| | (0.077) | |
| *BEC_Age16-35* | -0.209*** | |
| | (0.055) | |
| *BEC_Age35-45* | -0.073 | |
| | (0.046) | |
| *BEC_Age45-55* | 0.005 | |
| | (0.040) | |
| *BEC_Age55-60* | 0.100 | |
| | (0.070) | |
| *BE_Age16-35*After* | -0.004 | |
| | (0.078) | |
| *BE_Age35-45*After* | 0.041 | |
| | (0.074) | |
| *BE_Age45-55*After* | 0.089 | |
| | (0.061) | |
| *BE_Age55-60*After* | -0.032 | |
| | (0.109) | |
| *BEC_Age16-35*After* | -0.002 | |
| | (0.077) | |
| *BEC_Age35-45*After* | 0.040 | |
| | (0.067) | |
| *BEC_Age45-55*After* | 0.171*** | |
| | (0.066) | |
| *BEC_Age55-60*After* | 0.099 | |
| | (0.113) | |
| *BE_Age16-35_Male* | | -0.189** |
| | | (0.089) |
| *BE_Age16-35_Female* | | -0.139** |
| | | (0.068) |
| *BE_Age35-45_Male* | | 0.061 |
| | | (0.074) |
| *BE_Age35-45_Female* | | 0.006 |
| | | (0.064) |
| *BE_Age45-55_Male* | | -0.006 |

| | |
|---|---|
| | (0.052) |
| *BE_Age45-55_Female* | 0.045 |
| | (0.054) |
| *BE_Age55-60_Male* | 0.077 |
| | (0.080) |
| *BE_Age55-60_Female* | - |
| | |
| *BEC_Age16-35_Male* | -0.270*** |
| | (0.085) |
| *BEC_Age16-35_Female* | -0.174** |
| | (0.068) |
| *BEC_Age35-45_Male* | -0.112* |
| | (0.063) |
| *BEC_Age35-45_Female* | -0.038 |
| | (0.062) |
| *BEC_Age45-55_Male* | -0.014 |
| | (0.054) |
| *BEC_Age45-55_Female* | 0.022 |
| | (0.052) |
| *BEC_Age55-60_Male* | 0.071 |
| | (0.073) |
| *BEC_Age55-60_Female* | - |
| | |
| *BE_Age16-35_Male*After* | -0.032 |
| | (0.126) |
| *BE_Age16-35_Female*After* | 0.010 |
| | (0.095) |
| *BE_Age35-45_Male*After* | -0.048 |
| | (0.102) |
| *BE_Age35-45_Female*After* | 0.134 |
| | (0.103) |
| *BE_Age45-55_Male*After* | 0.114 |
| | (0.081) |
| *BE_Age45-55_Female*After* | 0.065 |
| | (0.082) |
| *BE_Age55-60_Male*After* | -0.032 |
| | (0.114) |

| | | | |
|---|---|---|---|
| *BE_Age55-60_Female*After* | | | - |
| *BEC_Age16-35_Male*After* | | | 0.008 |
| | | | (0.119) |
| *BEC_Age16-35_Female*After* | | | -0.007 |
| | | | (0.097) |
| *BEC_Age35-45_Male*After* | | | 0.071 |
| | | | (0.091) |
| *BEC_Age35-45_Female*After* | | | 0.013 |
| | | | (0.089) |
| *BEC_Age45-55_Male*After* | | | 0.199** |
| | | | (0.093) |
| *BEC_Age45-55_Female*After* | | | 0.150* |
| | | | (0.085) |
| *BEC_Age55-60_Male*After* | | | 0.103 |
| | | | (0.119) |
| *BEC_Age55-60_Female*After* | | | - |
| *N* | 1,675 | 1,675 | 1,652 |
| *Log likelihood* | -818.493 | -773.037 | -767.447 |

*Notes*. 1. Standard errors are in parentheses. 2.*** $p<0.01$, ** $p<0.05$, * $p<0.1$. 3. Marginal effects are reported.

## Table D3. OLS regressions for household consumption by age and gender

| | Dependent variable: *Monthly logarithm of household consumption* | | | |
|---|---|---|---|---|
| | Type-1 households | | Type-2 households | |
| | Aug. 2014 – Oct. 2014 | Nov. 2014 – Feb. 2015 | Aug. 2014 – Oct. 2014 | Nov. 2014 – Feb. 2015 |
| *After* | 0.306*** | 0.171*** | 0.158* | 0.133* |
| | (0.061) | (0.059) | (0.081) | (0.079) |
| *BE_Age16-35_Male* | -0.093 | -0.093 | 0.046 | 0.046 |
| | (0.100) | (0.098) | (0.161) | (0.163) |
| *BE_Age16-35_Female* | 0.103 | 0.103 | - | - |
| | (0.104) | (0.102) | | |
| *BE_Age35-45_Male* | 0.240*** | 0.240*** | -0.127* | -0.127* |
| | (0.075) | (0.074) | (0.072) | (0.073) |
| *BE_Age35-45_Female* | 0.758*** | 0.758*** | 0.492*** | 0.492*** |

| | | | | |
|---|---|---|---|---|
| | (0.174) | (0.171) | (0.117) | (0.118) |
| *BE_Age45-55_Male* | 0.000 | 0.000 | -0.048 | -0.048 |
| | (0.049) | (0.048) | (0.071) | (0.072) |
| *BE_Age45-55_Female* | -0.178* | -0.178* | - | - |
| | (0.100) | (0.098) | | |
| *BE_Age55-60_Male* | -0.023 | -0.023 | 0.119 | 0.119 |
| | (0.068) | (0.067) | (0.124) | (0.126) |
| *BE_Age55-60_Female* | - | - | - | - |
| | | | | |
| *BEC_Age16-35_Male* | -0.005 | -0.005 | 0.206 | 0.206 |
| | (0.104) | (0.102) | (0.191) | (0.193) |
| *BEC_Age16-35_Female* | 0.926*** | 0.926*** | 0.736*** | 0.736*** |
| | (0.118) | (0.115) | (0.145) | (0.147) |
| *BEC_Age35-45_Male* | -0.021 | -0.021 | -0.055 | -0.055 |
| | (0.065) | (0.063) | (0.071) | (0.072) |
| *BEC_Age35-45_Female* | 0.216* | 0.216* | 1.422*** | 1.422*** |
| | (0.125) | (0.122) | (0.224) | (0.227) |
| *BEC_Age45-55_Male* | -0.184*** | -0.184*** | 0.178** | 0.178** |
| | (0.053) | (0.052) | (0.087) | (0.088) |
| *BEC_Age45-55_Female* | 0.153 | 0.153 | 0.347* | 0.347* |
| | (0.152) | (0.149) | (0.184) | (0.187) |
| *BEC_Age55-60_Male* | -0.253*** | -0.253*** | 0.118 | 0.118 |
| | (0.067) | (0.065) | (0.111) | (0.112) |
| *BEC_Age55-60_Female* | 0.892*** | 0.892*** | - | - |
| | (0.300) | (0.294) | | |
| *IBC_Age16-35_Male* | | | -0.151 | -0.151 |
| | | | (0.133) | (0.135) |
| *IBC_Age16-35_Female* | | | 1.078*** | 1.078*** |
| | | | (0.315) | (0.319) |
| *IBC_Age35-45_Male* | | | -0.097 | -0.097 |
| | | | (0.080) | (0.081) |
| *IBC_Age35-45_Female* | | | 0.608*** | 0.608*** |
| | | | (0.117) | (0.118) |
| *IBC_Age45-55_Male* | | | 0.022 | 0.022 |
| | | | (0.076) | (0.077) |
| *IBC_Age45-55_Female* | | | 0.164 | 0.164 |
| | | | (0.161) | (0.163) |

| | | | | |
|---|---|---|---|---|
| *IBC_Age55-60_Male* | | | -0.325** | -0.325** |
| | | | (0.145) | (0.147) |
| *IBC_Age55-60_Female* | | | - | - |
| | | | | |
| *BE_Age16-35_Male*After* | 0.069 | 0.050 | -0.052 | -0.072 |
| | (0.161) | (0.145) | (0.263) | (0.245) |
| *BE_Age16-35_Female*After* | 0.014 | 0.245 | - | - |
| | (0.173) | (0.157) | | |
| *BE_Age35-45_Male*After* | -0.120 | -0.273** | 0.111 | -0.020 |
| | (0.122) | (0.113) | (0.118) | (0.111) |
| *BE_Age35-45_Female*After* | -0.240 | -0.175 | -0.103 | -0.248 |
| | (0.309) | (0.289) | (0.191) | (0.178) |
| *BE_Age45-55_Male*After* | -0.064 | -0.062 | 0.091 | 0.065 |
| | (0.079) | (0.072) | (0.116) | (0.108) |
| *BE_Age45-55_Female*After* | -0.115 | 0.109 | - | - |
| | (0.165) | (0.149) | | |
| *BE_Age55-60_Male*After* | -0.058 | -0.069 | 0.050 | 0.070 |
| | (0.111) | (0.101) | (0.203) | (0.189) |
| *BE_Age55-60_Female*After* | - | - | - | - |
| | | | | |
| *BEC_Age16-35_Male*After* | -0.218 | -0.076 | 0.047 | -0.149 |
| | (0.169) | (0.152) | (0.305) | (0.285) |
| *BEC_Age16-35_Female*After* | -0.101 | -0.116 | -0.129 | -0.048 |
| | (0.190) | (0.177) | (0.236) | (0.230) |
| *BEC_Age35-45_Male*After* | -0.134 | -0.143 | 0.028 | -0.117 |
| | (0.105) | (0.096) | (0.116) | (0.108) |
| *BEC_Age35-45_Female*After* | -0.027 | -0.051 | -0.035 | -0.162 |
| | (0.204) | (0.183) | (0.366) | (0.341) |
| *BEC_Age45-55_Male*After* | 0.024 | 0.025 | 0.032 | 0.019 |
| | (0.086) | (0.078) | (0.142) | (0.134) |
| *BEC_Age45-55_Female*After* | 0.110 | 0.351 | 0.035 | -0.268 |
| | (0.248) | (0.223) | (0.301) | (0.280) |
| *BEC_Age55-60_Male*After* | -0.158 | -0.100 | -0.006 | -0.052 |
| | (0.109) | (0.099) | (0.181) | (0.169) |
| *BEC_Age55-60_Female*After* | -0.664 | -0.275 | - | - |
| | (0.490) | (0.718) | | |
| *IBC_Age16-35_Male*After* | | | 0.206 | 0.038 |

| | | | | |
|---|---|---|---|---|
| | | | (0.217) | (0.202) |
| *IBC_Age16-35_Female*After* | | | 0.039 | -0.291 |
| | | | (0.514) | (0.479) |
| *IBC_Age35-45_Male*After* | | | -0.001 | -0.045 |
| | | | (0.130) | (0.122) |
| *IBC_Age35-45_Female*After* | | | 0.007 | -0.030 |
| | | | (0.191) | (0.178) |
| *IBC_Age45-55_Male*After* | | | 0.187 | 0.074 |
| | | | (0.123) | (0.116) |
| *IBC_Age45-55_Female*After* | | | 0.285 | 0.321 |
| | | | (0.263) | (0.259) |
| *IBC_Age55-60_Male*After* | | | -0.198 | 0.090 |
| | | | (0.236) | (0.220) |
| *IBC_Age55-60_Female*After* | | | - | - |
| *Month dummy* | YES | YES | YES | YES |
| Constant | 7.736*** | 7.736*** | 7.917*** | 7.917*** |
| | (0.042) | (0.041) | (0.054) | (0.055) |
| *N* | 2,979 | 3,294 | 2,171 | 2,420 |
| $R^2$ | 0.091 | 0.112 | 0.111 | 0.125 |

*Notes*. 1. Standard errors are in parentheses. 2.*** $p<0.01$, ** $p<0.05$, * $p<0.1$.