

Pre-Analysis Plan for “Does Matching Contribution incentivize informal workers to participate in retirement saving plans? A Randomized Evaluation in Peru”

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1. Introduction

1.1. Background

Low pension systems coverage. In the world, the percentage of the labor force accruing pension rights is only about 25 percent (Forteza et al., 2009). The lack of coverage of pension systems is particularly severe for workers from smaller firms in Latin America, whose coverage can be nearly zero (Rofman and Oliveri, 2011 and Bosch et al., 2013). Such is the case of Peru, where less than 5% of workers from small firms was covered by the pension system in 2010. This is related to the huge informality² observed in the Peruvian labor market; about 73.2% of the labor force (INEI, 2017).

Matching Defined Contributions (MDC). MDC schemes are transfers (made by the government or another institution) into a worker's individual retirement account, conditional on her contributions. According to Ribe, Robalino and Walker (2010), these transfers should incentivize individual's saving behavior and might be less costly than ex-post interventions such as non-contributive pensions. International evidence suggests that MDC are a relatively effective tool to rise coverage (Madrian, 2012). However, most of the impact assessments are set in the developed world (Duflo et al. 2006, Mills et al. 2008 and Börsch-Supan et al. 2008), where it has been implemented for a much longer time in comparison to the very recent experience among developing countries. Blumenstock et al. (2016) evaluate the MDC for savings in Afghanistan and find positive impacts, but they use automatic enrollment for formal employees from the largest Telecom company, leaving a gap over effects on informal contexts.

While there is some evidence that MDC has a positive effect on take-up rates, the relationship between the size of the match and the amount of voluntary contributions is less clear (Duflo et al. 2006, Engelhardt and Kumar 2007). In this regard, Robalino and Palacios (2009) stress the importance of setting a correct level of MDC, but also recognize the difficulty of doing so, considering the lack of evidence on the elasticity of take-up to different levels of matching.

Information interventions. Evidence from information interventions suggest that they help to modify worker's saving behavior for retirement. Duflo et al. (2006) and Saez (2009) show that information and counseling influence the choice of whether to enroll in their matching contributions programs. The work of Fajnzylber et al. (2009) exploits a natural experiment in Chile to analyze the impact of sending information on pension projections on worker's savings decisions. Their results show that the information causes an increase in the probability of making voluntary contributions of approximately 1.4 percentage points, for individuals in the 40-50 age group. The effect on a younger group was smaller, and the impact on women was significantly larger than on men. Antolin and Harrison (2012) mention that the behavioral literature suggests using pension amounts projections (instead of replacement rates or ranges) to modify worker's saving decisions for retirement. However, most of these evidence is focused on providing information to workers who are already enrolled to the pension system (formal workers), so there is a lack of knowledge on the effect of information interventions regarding saving for retirement for informal workers.

² We consider informal workers to all those who do not have a formal labor contract with their employer and, hence, do not have the obligation to contribute to any pension system.

1.2. Aims

The aim of this study is to analyze whether matching contributions is an effective incentive to increase participation and contributions to voluntary retirement saving accounts. We will estimate the effect of offering MDC to informal workers of micro firms on the enrollment rates to private pension funds and on the probability to contribute to the saving account.

1.3. Interventions

The MDC scheme is applied between three different groups of workers, two of them receive a monthly matching incentive of 100% (full match) or 50% (partial match), and a third one, which is the control group, receives 0% (no match). The minimum amount that the workers need to contribute to a pension fund is about USD 32 per month³. We match 100% of the contribution or 50% of it up to a monthly maximum amount of USD 42 and six months after enrollment. This means that we provide a potential maximum incentive of USD 252 for each individual during the whole intervention period. All groups receive detailed information about the importance of saving for retirement, the peruvian pension system and the benefits of enrolling to the Private Pension System. Since all three groups receive the same kind of information, we are able to estimate the effect of the matching incentive.

One important requirement that workers need to comply in order to be eligible is that they cannot be enrolled to the pension system prior to the intervention⁴, since one of our objectives is to assess the impact of MDC on participation. Due to our randomization, this information is unknown to us until the baseline is collected. For that reason, all the workers that comprise the baseline need to be filtered⁵ to know whether they are eligible or not. In that process, near half of the workers that were surveyed in the baseline were dropped because of non-eligibility.

For workers who are eligible, the intervention proceeds as follows. First, they are visited in their job (or in the place where the worker prefers) by a sales agent. The agents of our intervention are people who are selected after a two-day training session in which we give them information on the peruvian pension system and the importance of saving for retirement, as well as on the MDC incentive (if they are assigned to workers from treated firms). They are in charge of providing the information to all groups of workers, and, in the case of the treated ones, they must also offer the matching incentive, and answer any question that the worker might have. In the first visit of the sales agent, the worker decides whether to enroll to the pension fund or not. If he or she wants to enroll, the sales agent carries out the enrollment process. The affiliation to the pension fund is fast, simple and can be done through the Internet (the sales agents are provided with tablets and Internet connection for this purpose). When the workers become affiliated, a unique code of

³ The minimum legal contribution to the pension fund is 10% of the minimum wage, which is 930 PEN (USD 278) by 2020. The management fee for the AFP and the premium for the disability insurance are added. The exchange rate considered is 3.35 soles per dollar (December 2018).

⁴ In Peru, when workers enter to the formal labor force, they have to enroll to one of the following systems: the public pension system named “Sistema Nacional de Pensiones” administrated by the “Oficina de Normalización Previsional” (ONP) or the private one named “Sistema Privado de Pensiones”, administrated by the “Administradoras Privadas de Fondos de Pensiones” (AFP).

⁵ Using the worker’s id number (which is gathered in the baseline survey), we can verify whether they are enrolled to the private pension system or the public one.

identification for the private pension system (CUSPP) is created. Unenrollment to the pension system is not possible. In case the worker does not wish to participate, the sales agent has to visit this worker two more times before being considered as “rejection”. Sales agents are assigned to firms by geographic zones, and they have to carry out at least three visits per day for them to be considered as active agents. They work from Monday to Friday.

On the second working day of the month following the enrollment, workers receive a Whatsapp message which communicates them that they are enabled to save into their pension fund, and remind them how to save. The saving channel depends on the pension fund the worker is affiliated to. Every two years, all of the pension fund administrators in Peru compete following an auction scheme in which they bid their (administrative) fees. The one which offers the lowest fee gains the right to receive all the new affiliations until the next auction. Pension fund named “AFP Prima” held that right from June, 2017 to May, 2019 and from June, 2019 until May, 2021, pension fund “AFP Integra” holds that right. Because of this change in the holding of rights to enroll new workers, we work with both pension fund administrators, and we had to extend our period of implementation for about a year and the registration of this Pre-analysis plan (PAP). The intervention with AFP Prima has already finished, while the one with AFP Integra is ongoing.

The standard saving channel in the Private Pension System is through AFPnet, which is a virtual platform managed by the pension fund administrators. In this website, the worker has to fix the monthly amount⁶ she desires to save and obtain a voucher that she has to hand over at the bank agency. All pension fund administrators in Peru allow this payment channel. Additionally, AFP Prima allowed its affiliates to use another saving channel, in which workers contributed through branchless-banking agents. In Lima, these agents are commercial properties affiliated to banks such as grocery stores or drug stores. They are much more widespread across the city than bank agencies, making it easier for those affiliates to make their contributions through them. Hence, workers in our experiment have two possible saving channels: the one offered by AFP Integra (AFPnet), which we will call a high transaction cost channel, and the one offered by AFP Prima (branchless-banking agents), which we will call a low transaction cost saving channel.

On the first Monday of each month, all enrolled workers receive another message, which reminds them of saving and the matching incentive, for the case of treated workers. If the worker decides to contribute to her pension fund, she receives another message five days after the matching is deposited, which lets her know that the incentive has already been transferred to her account (if she is a control group worker, the message only thanks her for saving). In the case of workers who do not contribute, they receive a message next month that reminds them that they are not taking advantage of the matching incentive (for treated workers) or that they should be saving for retirement (for control workers).

The intervention began on November, 2018 and continues until September, 2020. At the moment of the registration of this PAP, the research team had not analyzed any outcome data. Besides, it is important to acknowledge that the Coronavirus pandemic is taking place at the moment of the registration of this PAP, which might have implications for some of the outcomes such as contribution. Our target population is mainly composed by workers with relatively low and unstable incomes (due to informal labor contracts), so

⁶ This amount cannot be lower than the minimum legal contribution.

they might have difficulties to finance consumption during the pandemic and simultaneously saving for retirement.

2. Experimental design

2.1. Unit of analysis and site selection

Our unit of analysis are the workers from the micro firms located in Lima. Lima, with around 10 million inhabitants, is the capital of Peru, where nearly half of the total of Peruvian firms operate (INEI, 2017)⁷. The unit of randomization is the micro firm, since it was the only mean we could use to reach the worker. These firms need to be registered in two administrative databases. The first one is the Micro and Small Firms Directory⁸, which was provided by the National Institute of Statistics and Informatics (INEI). It contains information on a total of 1,022,325 micro firms for the city of Lima, updated to the year 2017. The second is the taxpayer database from the National Superintendence of Tax Administration (SUNAT), which contains information on 1,691,462 firms in 2015.

Before doing the randomization, we applied some criteria of selection. First, we kept observations with annual sales level reported, with an active Unique Taxpayer Registry (RUC)⁹ status (according to SUNAT) and we dropped outliers based on the annual sales level¹⁰. Second, we restricted our sample according to the definition of micro firm¹¹: a firm with less than ten workers and with annual sale's level less than 150 taxation units. Finally, we preserved micro firms with a lifetime longer than five years, to guarantee their current functioning¹². At the end, we had a sample of 259,574 microenterprises.

2.2. Randomization

The unit of randomization is the firm since there is a very high probability of contamination between workers from the same firm. The randomization method involves dividing the sample into groups (strata) of similar observable characteristics, and then randomize observations preserving the similarities within observations from the same strata. The stratification prevents possible imbalances between the treatment and control groups for observable variables used in the stratification, since possible differences between groups are eliminated (Box et al., 2005). Micro firms were stratified as follows:

- Sales level stratification: micro-firms were classified into quintiles considering their annual sales level because there is a high probability of conglomeration in specific quintiles related to legal boundaries.

⁷According to the INEI, in 2016, 95% of Peruvian firms were micro firms.

⁸ The Micro and Small Enterprises Directory presents two types of firms: microenterprises and small enterprises. It can identify firms through their RUC and their fiscal addresses. The latter can be used to georeference each firm and create maps for an easier applying of the survey and the efficient distribution of routes for surveyors.

⁹ The RUC is the number that identifies a Legal or Natural Person as a taxpayer.

¹⁰ It is important to mention that we cannot analyze the impact of MDC on workers who are working in firms with an inactive RUC. Our hypothesis is that such firms are relatively new or out of the market, and therefore their workers might face more instability and are less prone to save.

¹¹ We restricted the sample to micro firms because they represent more than 90% of the total sample and the few small firms could generate a bias since this kind of firm possess a much larger number of workers.

¹² It is important to mention that a proxy indicator for the stability of a micro firm is if it survives after the first five years of functioning. There is a high probability to not find firms with shorter lifetimes.

- Geographic location stratification: micro-firms were historically conglomerated on specific locations in the city of Lima. Hence, we divided Lima in North Lima, South Lima, East Lima, Center Lima, and Callao¹³.
- Economic sector stratification: we compare firms which are in the same economic sector, and for this, we use the Uniform International Industrial Classification (CIU).

29,251 micro firms were selected from this process of randomization. We verified the addresses of these firms and visited them. An important number were excluded from the experiment due to different reasons¹⁴. We kept the 6,504 micro firms which could effectively be located and surveyed. We verified that these firms still preserve the characteristics of our stratified randomization. Table 1 shows some descriptive statistics of the micro firms and workers using information from the pilot subsample. As it can be seen, on average, micro firms tend to be constituted by very few workers (around two) whose contract is mainly informal (95% of them). Moreover, less than half of them reported having ever contributed to a pension system and only half of them have health insurance.

Table 1: Descriptive statistics from eligible micro firms and workers (pilot baseline)

Variable	Mean	Median	Sd.
Micro firms (N=314)			
Number of workers	2.44	2	2.68
Workers (N=385)			
First job's age	17.22	17	4.38
Informal contract	0.95		
Labor days per week	5.72	6	1.01
Labor hours per day	9.36	9	2.75
Ever contributed to a pension system	0.27		
Expected retirement age	63.43	65	10.55
Expected survival age	77.52	80	9.62
Health insurance	0.51		

3. Baseline data

3.1. Survey

The baseline survey was effectively conducted at 6,504 randomly selected micro firms (7,789 workers) from November 2018 to July 2019. Part of the baseline survey had to be executed at the same time of the intervention, since there is a high job rotation in micro firms, and we needed to locate the same workers in both phases. Workers younger than 18 years and those who were not present at the day of the visit were not surveyed.

¹³ Callao is the constitutional province which is extremely economically related to Lima.

¹⁴ We updated some addresses with administrative data from SUNAT for 2017 in order to prevent non-location of firms. However, we still found that 7,232 firms could not be located, 6,012 were closed all the times we visited them, 7,464 refused to participate in the baseline, and 2,039 had workers that were already enrolled to a pension system.

The construction of the questionnaire of the survey was formulated integrating modules from the Social Protection Survey (Chile), the Global Preference Survey (GPS), the German SAVE study (Germany), the National Household Survey (Peru), and the Survey of Financial Capabilities in the Andean countries (Peru). The variables of interest in the survey are divided in four modules.

The first one is about affiliation and contribution to the Private Pension System. It is based on the Social Protection Survey (Chile). It includes the following variables:

- Worker's affiliation and contribution status
- Kind of pension system to which worker belongs
- Other household members' affiliation and contribution status
- Thoughts and expectations about retirement

The second module collects information on savings and net household income. It is also based on the Social Protection Survey (Chile).

- Durable goods kept in the household
- Self-reported economic status
- Savings alternatives hold by the household
- Saving motives hold by the household

The third module consists on time preference, risk aversion and financial literacy. It is based on the survey of financial capabilities in the Andean countries for 2015 (Mejía et al., 2015), the GPS and the SAVE program. It includes the following information:

- Short test about risk aversion
- Short test about money preferences over time
- Short test about basic knowledge of financial literacy (i.e. interest rates, inflation, the value of money over time)

Finally, we also gather the following sociodemographic characteristics, based on the National Household Survey (Peru):

- At the individual level: gender, age, civil status, education level, occupancy, income, income variability, health
- At household level: number of household income providers, number of children, children ages, total household income, household income variability, household expenditures
- At the firm level: firm sales ranges, number of workers, economic sector.

3.2. Sample and assignment

In spite of the fact that we collect information on 7,789 workers from the baseline survey, not all the individuals were part of the design of the experiment. Our design focuses on exploring the effects of MDC on enrollment and saving of workers who do not belong to any pension system. Therefore, we had to filter 2,783 workers already affiliated to a

pension system¹⁵ and keep only 5,006 workers to visit and offer to be part of the experiment.

From the 5,006 workers, 1,968 did not agree to participate in the experiment after being randomized to the arms of the study, but before they knew their treatment status (652 in the control group, 628 in the 50% matching group and 688 in the 100% matching group). Since this happens before treatment status was communicated, we also exclude these individuals from the analysis. We will test that they are statistically comparable among arms in terms of observable variables.

Our final sample comprises 3,038 workers from 2,770 micro firms and it is representative of the informal workers from micro firms located in Lima, who were not previously enrolled in any pension system. Treatment assignment is as follows: 912 workers in the control group, 1,063 in the 50% matching group and 1,063 in the 100% matching group. Section 6.1 details the power calculation for this allocation.

4. Outcomes

We have two principal outcomes of interest: enrollment and contribution to the individual retirement account. The first is a dummy variable which indicates whether the worker decides to enroll into the pension system after she is intervened by one of our sales agents (or later). We have information on the enrollment decision of all workers in our final sample.

The second outcome is contribution to the individual retirement account. This variable is defined in two manners. The first is a dummy that indicates whether the worker decides to contribute in any moment during the period of the intervention (six months after enrollment). The second measure is the total amount of money saved in the pension fund. We will have administrative information about the contribution flow for a year since the worker became affiliated. This information will be provided by the pension fund administrators. It is important to mention that information on these variables is available to us thanks to formal agreements signed with both pension fund administrators¹⁶ and the consent of the workers who decided to participate in the experiment¹⁷.

5. Hypotheses

5.1. Enrollment

We hypothesize that matching incentives (full match of 100% and partial match of 50%) will increase the probability to enroll to the pension fund for treated workers. We will test this hypothesis using the regression described in equation (1) of section 6, where the outcome variable is a dummy that indicates whether the worker was enrolled to the

¹⁵ For that purpose, we employ two sources of information: (i) the website of the Superintendency of Banking, Insurance and AFP (SBS, acronym in Spanish), which allows to check if the worker already belongs to the private pension system, and (ii) the website of the Social Health Insurance of Peru (EsSalud, acronym in Spanish), to verify if the worker already belongs to the public pension system.

¹⁶ We signed a contract with both AFP that allowed us to have access to financial information from workers who participate in the experiment.

¹⁷ Additionally, we ask the workers who decide to enroll to sign a consent letter to give us permission to collect his or her financial information through the AFP.

pension fund. This enrollment can occur right after the sales agent gives the worker the information and explains the saving plan and incentives, or later.

5.2. Contribution

We hypothesize that MDC will increase the magnitude of the contributions made to the pension funds by the enrolled workers. After becoming enrolled into the pension fund, workers have to contribute into their account in order to receive the matching incentive. As it was mentioned before, we have two definitions for this outcome: the first is a dummy variable that indicates if the worker contributed at least once during the treatment period, while the other is a continuous variable indicating the total amount of contributions made by the worker. We will test this hypothesis by the regression described in equations (1) and (2) of section 6.

5.3. Different effects

We hypothesize that our 100% matching incentive will have a greater effect on enrollment and contribution than our 50% matching incentive.

5.4. Heterogeneity

We plan to examine heterogeneity in enrollment and contribution by the saving channel provided by each pension fund administrator. As it was previously mentioned, of the two pension fund administrators we have worked with, AFP Prima allowed a low transaction cost payment channel, while AFP Integra, the standard payment channel (high transaction cost). We hypothesize that the low-transaction cost payment channel will have a positive effect on enrollment and contribution. We will test this hypothesis by adding a dummy variable which indicates if the worker was enrolled in AFP Prima and an interaction with the treatment variable. If we have sufficient power, we will also measure other possible heterogeneous effects such as gender and age (Duflo et al. 2006, Börsch-Supan et al. 2008).

6. Analysis

For each outcome, enrollment and contribution, we will estimate the following regression function:

$$Y_{i,j} = \alpha_0 + \alpha_1 Z_{1i,j} + \alpha_2 Z_{2i,j} + \alpha_3 M_j + \alpha_4 X_{i,j} + \tilde{v}_j + \tilde{w}_{ij} \quad (1)$$

where $Z_{1i,j}$ is a variable which indicates that the worker was assigned to the 100% match group and $Z_{2i,j}$ is a variable that indicates that the worker was assigned to the 50% match group in our final sample. α_1 and α_2 are the parameters of interest. $Y_{i,j}$ is an indicator for enrollment or contribution, M_j is a vector of the firm-level variables that were used for the stratification, $X_{i,j}$ is a vector of control variables at the individual, household, or firm level; and \tilde{v}_j and \tilde{w}_{ij} represent error terms associated to the firm and the workers, respectively.

When $Y_{i,j}$ measures enrollment, equation (1) recovers Average Treatment Effects (ATEs). When it measures contribution, it identifies Intent-to-treat Effects (ITTs). In this latter case, we also will estimate the following model:

$$Y_{i,j} = \beta_0 + \beta_1 T_{i,j} + \beta_2 M_j + \beta_3 X_{i,j} + \tilde{v}_j + \tilde{w}_{ij} \quad (2)$$

where $T_{i,j}$ is an indicator that actually measures enrollment and that will be instrumented by the randomized intention-to-treat indicators $Z_{1,i,j}$ and $Z_{2,i,j}$.

6.1. Power calculation

The relevant variable for the power calculation is the contribution. The average probability that a worker from a micro firm in Lima is contributing to the private pension system is calculated from a random and representative sample of AFP affiliates from Peru, provided by the SBS and updated up to December 2016. For this calculation, we take the following assumptions: 2 observations per cluster (micro firm), an inter-cluster correlation of 0.17, a standard deviation of 0.227, a significance level of 0.05 and a power of 0.8.

Our result (Table 2) indicates that a sample of 2,181 micro firms is required in order to detect an effect of about 0.03612 pp. on contributions. This implies that each treatment and control groups will be composed of 727 micro firms. The MDE is related to an overall percentage variation of 14% between treatment and control. Specifically, we expect a percentage variation of 12% between the control group and the 50% matching group, and a percentage variation of 16% for the 100% matching.

Table 2: Minimum Detectable Effect on Contributions (in pp.)

MDE	
Average contribution probability (control)	0.258
Average contribution probability (treated)	0.29412
Minimum Detectable Effect in pp.	0.03612
Assumptions	
Intercluster correlation	0.17
Obs. per cluster	2
N clusters/micro firms (per group)	727
N Micro firms (total)	2181
N Workers	3969
Percentage variation (treatment-control)	14.00%

6.2. Pilot

As it was mentioned before, we carried out a pilot intervention, which took place from December 2017 until October 2018. In total, 610 workers from 462 micro firms were surveyed, but, after applying the filters, we found that only 385 workers were part of the design of the experiment (314 micro firms). This pilot intervention was useful for the accuracy of our power calculation, since we employed the mean of the number of workers per micro firm for the assumptions, and we found that about 60% of the surveyed workers were not enrolled to any pension system. These workers will be considered for the main analysis of the intervention.

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