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Nudging self-employed women to contribute to social security

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WORKING PAPER N° IDB-WP-1633

Nudging Self-employed Women To Contribute to Social Security

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Inter-American Development Bank
Gender and Diversity Division

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Nudging Self-employed Women To Contribute to Social Security

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Abstract*

Over 30 percent of female workers are self-employed across Latin America, relying on this mode of work for subsistence. Self-employment in the region is regularly marked by the absence of health insurance and lack of pension benefits. Despite the aspirations of many women to gain access to these benefits, they are persistently overrepresented among the socially unprotected part of the workforce. To address this issue and explore potential solutions, we conducted a laboratory experiment in Bolivia to assess the efficacy of nudges to influence the behavior of self-employed women. Participants were randomly assigned to one of six groups, each receiving either an informative message highlighting the benefits of contributing to a long-term pension system, a message emphasizing the advantages of health insurance, or a nudge aimed at reducing the effort and costs associated with enrolling in a savings or retirement plan. Our findings indicate that informative messages alone were effective in increasing voluntary contributions to experimental pension and health insurance schemes. Reductions in time and effort required for enrollment did not lead to a significant increase of voluntary contributions. Moreover, we found that the effectiveness of these interventions varied depending on the type of worker, with high-effort workers being the most responsive.

JEL classifications: C91, J16, J20, J70

Keywords: Self-employment, Pension system, Health insurance, Laboratory experiment

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1. Introduction

In 2022, self-employment accounted for 28.2 percent of the total remunerated workforce across Latin America (CEPALSTAT, 2022). Compared to employees, self-employed workers experience lower job quality (European Commission, 2008); one of the most marked differences is the lack of essential benefits such as health insurance and social security contributions, leading to increased financial vulnerability, especially during health emergencies and old age (Fachinger & Frankus, 2017; Karjalainen & Crawford, 2020). The recent COVID-19 pandemic has underscored the vulnerabilities faced by self-employed individuals during economic downturns, as their income tends to significantly decrease due to the unstable nature of their job (Qian & Fan, 2020; Putra et al., 2023). Vast evidence shows that lack of health insurance coverage during the pandemic has resulted in considerable medical expenses for many self-employed workers (Berkowitz & Basu, 2021).

In this paper, we aim to identify effective interventions for increasing contributions to health insurance and pension systems among self-employed women in Bolivia. To achieve this, we conducted a laboratory experiment in two Bolivian cities, La Paz and Cochabamba, to assess the impact of various nudges on encouraging women to voluntarily enroll in these systems. Specifically, we investigated whether increasing awareness about the benefits of health insurance and pension affiliation would enhance willingness to contribute to social security. Additionally, we examined the effects of reducing the effort required to contribute.

Our decision to focus on self-employed Bolivian women stems from the fact that many women opt for self-employment due to its flexibility, which allows them to balance work and household responsibilities. However, this choice often exposes them to greater income volatility. García Salas (2020) underscores this vulnerability, stressing that women in Latin America who were self-employed before the pandemic were approximately one-third more likely to experience income losses compared to their male counterparts. The overrepresentation of women in unstable jobs is widespread across Latin America, but it is a particular challenge in Bolivia, where a staggering 55.2 percent of the female workforce is self-employed (CEPALSTAT, 2021).

We recruited self-employed women to participate in experimental sessions. Each session was randomly assigned to one of six possible treatments. For the treatments, we followed a 2*3

factorial design.¹ The first arm includes an informative message about the benefits of contributing to a pension system and the advantages of having health insurance. We designed informative messages using elements of behavioral economics to make them as effective as possible. The second arm is related to a nudge that reduces the effort cost of enrolling in a savings or retirement plan, called “Active Decision Nudge” as proposed by Thaler & Sunstein (2008). This type of nudge incentivizes the decision to contribute but promotes a conscious and intentional selection of options.

To emulate real-world scenarios faced by the self-employed, we followed the design of the decision space in Train & Weeks (2005) and the decision scheme in Douglas & Shepherd (2002). To replicate the dynamics of self-employment, we employed an effort elicitation task, which allowed us to observe how self-employed women allocate their resources when their monetary rewards are contingent upon their efforts. To simulate the vulnerability of self-employed income, participants could randomly experience a healthy or unhealthy state. Besides, each participant could enroll in a health insurance plan to reduce possible losses in an unhealthy state and/or could contribute to the pension system. If participants contributed to the latter, they were paid their reward plus interest rates four months after the day of the experiment.

To design effective nudges, we conducted a focus group² in La Paz before the experiment. We found that most self-employed women are interested in having health insurance and retirement benefits. One possible explanation for lacking these benefits could be a lack of resources to afford them. However, our experimental post survey showed that most women have enough additional resources after covering their household expenses. On average, the women’s household savings are 40.6 percent of their household monthly income.³ While this percentage appears higher than

¹ A factorial design is an approach where multiple independent variables are employed simultaneously to examine their individual and combined effects on the dependent variable. For more details on the methodology, read Chapter 2 of *Experimentals: Econometrics for Experimental Economics* (Moffatt, 2016).

² Before the experiment's implementation, we carried out a focus group on self-employed women to gain a deeper understanding of women’s beliefs and preferences. We implemented two focus groups, one with unemployed women and the other with self-employed women. Appendix 7 contains a report on the two focus groups.

³ The savings percentage was determined by subtracting the average household monthly expenses from the average household monthly income. To accurately compute this, we collected detailed data on respondents’ household total income and comprehensive expenses. This information was gathered as part of the survey and is available for reference in the Appendices. In addition, participants were directly asked about their savings. The resulting values displayed negligible differences. It is worth emphasizing that these figures do not reflect the amounts held in bank accounts.

the 24.2 percent reported in the 2021 National Household Survey, it is important to note that in the National Household Survey, households with a self-employed women member have an average savings of 39.0 percent, while households without self-employed women have average savings of 25.9 percent. This difference can be attributed to the additional income that self-employed women bring to their households. This aligns with studies that analyze informal savings in developing countries, such as Anderson & Baland (2002) and Dupas & Robinson, (2013), showing the importance of women's income in household savings.

Despite aspiring to receive social benefits and possessing the financial resources to afford them independently, the majority of self-employed women refrain from contributing to pension systems and health insurance. Our focus group discussions revealed that most participants were unaware of their option to contribute to either scheme, mistakenly believing that such benefits are exclusive to employees. Additionally, among those women who were aware of their eligibility to contribute voluntarily, a common assertion was the perceived lack of time to navigate the contribution process or to pay visit to the corresponding offices. These insights suggest that the prevalence of women lacking social benefits may, in part, stem from a combination of asymmetric information and behavioral biases. This assertion is widely supported by the literature. Thaler & Benartzi (2004) have identified several behavioral explanations for individuals' failure to enroll in pension plans or to be only partly involved in them. These include procrastination, lack of self-control, status quo bias, loss aversion, or the inability of households to compute the correct savings rate. In addition, Beshears et al. (2018) argue that individuals often delay confronting these decisions due to the mental costs involved or because they feel unqualified to make them. When it comes to health insurance, similar behavioral biases are observed, such as present bias (Baicker et al., 2012) and status quo bias (Boonen et al., 2011). Furthermore, individuals may not contribute optimally to health insurance due to choice overload (Baicker et al., 2012), optimism bias (Siegelman & Baker, 2010), framing effects (Baicker et al., 2012), and inattention (Domurat et al., 2021). Given the prevalence of these biases, we designed our messages as decision-support tools, providing valuable information tailored to this specific group of workers and serving as constant reminders throughout the experiment.

Among some of our most salient results, we find that female workers have a limited response to interventions aimed at increasing experimental pension and health insurance contributions by reducing the cost of time and effort. However, women exposed to information highlighting the benefits of contributing to social security increased their contributions by 5.9 percent for pensions and 2.8 percent for health insurance. When both nudges were combined, there was a positive effect on pension contributions, although the magnitude was similar to just delivering the informative message. On health insurance, the addition of the active decision nudge to the informative message nullified the treatment effect. Our results further show that while providing information alone led to increased contributions to pension and health insurance plans, the impact of these interventions is significantly shaped by individual heterogeneity. Specifically, we observe that the effectiveness of these treatments is driven by high-effort workers. Furthermore, it is noteworthy that the informative treatment notably enhances contributions from individuals characterized by traits such as impatience and risk-seeking behavior, who initially may not recognize the benefits of social security.

The remainder of the paper proceeds as follows. In the next section, we present the literature review. In Section 3 we describe the Bolivian labor market context and the procedure to register for health insurance and the pension system. Section 4 presents the conceptual framework and econometric model. In Section 5 we discuss the details of the design and implementation of the laboratory experiment. Section 6 presents the main results from the lab experiment. The last section concludes.

2. Literature Review

This paper contributes to three areas of social science research. First, it examines the literature on labor market decisions and provides insights into the main factors that influence them. Most of the literature has focused on the decision to enter the labor market (Flinn & Heckman, 1982; Goldin, 1989) and the decision to be a dependent worker or self-employed (Bates & Bradford, 1995). However, little research has been done on the decisions regarding preferences and attitudes in the workplace, such as the amount of effort to exert or the decision to contribute to social security. By

analyzing self-employed workers, we can understand decisions that are not restricted to those made by employers and are completely autonomous.

Second, the literature has explored the relationship between certain preferences and behavioral traits, and the likelihood of working as a self-employed individual. Previous research has consistently highlighted factors such as lower risk aversion, stronger future orientation, and specific personality traits like commitment and self-confidence (Cook et al., 2015; Shtudiner, 2018; Simoes et al., 2016; Baker et al., 2019; Nobre et al., 2022) as being associated with self-employment. For instance, a Danish field experiment conducted by Andersen et al. (2014) found that entrepreneurs are more inclined to endure long waiting periods in pursuit of specific rewards. This finding aligns with Petrakis (2007) research, which found that countries with populations inclined towards risk-seeking behavior and immediate rewards tend to have higher levels of entrepreneurship. It is true that biases such as lower risk aversion, perseverance, resolution and self-confidence may initially appear to be beneficial, as they motivate self-employed individuals to become more productive workers. However, these biases have a detrimental effect on the overall quality of employment, making them work more hours and postpone important personal decisions. Our study builds upon these findings by demonstrating that self-employed women, despite their determination and perseverance, struggle to mitigate the consequences of not having future resources.

Third, our research focuses on analyzing the impact of nudges in mitigating behavioral biases. In recent years, nudges have been used in policies to guide individuals towards more optimal choices and away from less optimal ones (Thaler & Sunstein, 2008). Specifically, research on increasing savings with nudges has yielded significant results, demonstrating the effectiveness of various nudges (Madrian et al., 2000; Thaler & Benartzi, 2004). Similarly, in Latin America, there has been a growing trend in utilizing nudges to promote savings (Karlan et al., 2016). Research has also focused on analyzing nudges aimed at increasing participation and contributions in the pension system (Beshears et al., 2015, 2021). Also, there are various interventions designed to enhance the uptake of health insurance (Baicker et al., 2012; Hanoch, 2019).

Effective interventions include establishing default contribution rates and automatic enrollment to reduce cognitive and transactional costs (Madrian et al., 2000). These are most

effective when combined with commitments to allocate a proportion of future salary towards retirement savings, addressing the lack of self-control to prioritize future consumption over current consumption (Thaler & Benartzi, 2004). Other effective interventions include targeting the inattention bias by focusing on reminders (Domurat et al., 2021) and providing repeated opportunities (Beshears et al., 2006) to the potential contributors. However, most of these interventions primarily target formal employees, often overlooking the behavioral biases displayed by self-employed individuals. Furthermore, due to their characteristics, such interventions may be impractical for implementation among self-employed workers. Therefore, our research aims to shed light on the effectiveness of interventions specifically tailored to our target audience, informing future policies and interventions geared towards addressing the needs and behavioral biases of self-employed individuals.

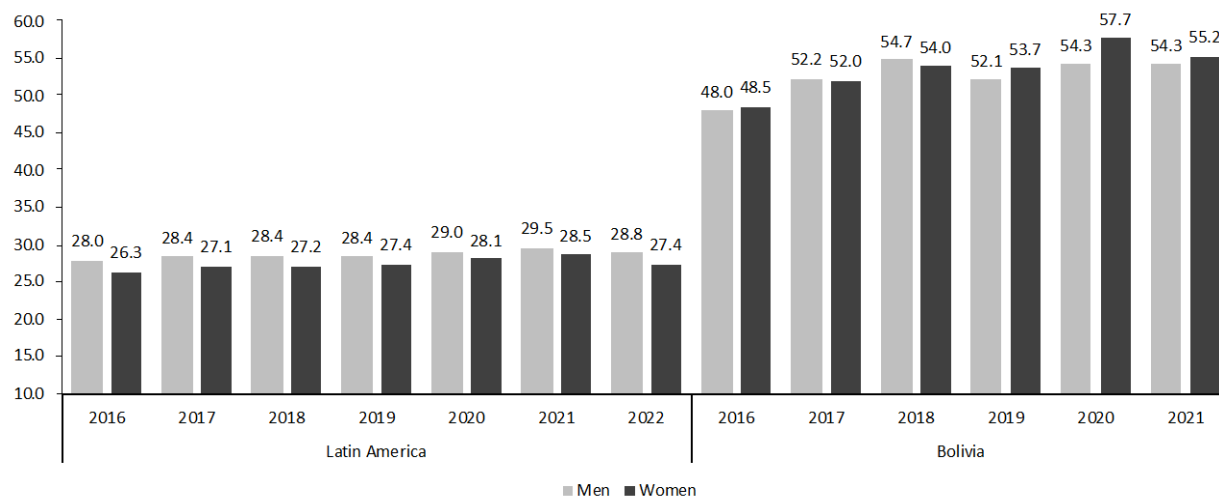
3. Context

3.1 Self-employment and Employment Quality in Bolivia

Bolivia has had one of the most consistently high levels of self-employment over the recent decades in the region, and dependent employment further declined by more than 4pp between 2019 and 2020 (CEPALSTAT, 2021, see Figure 1). Since 2020, the labor market structure has undergone significant changes due to various policies aimed at mitigating the impact of the COVID-19 pandemic. A strict nationwide quarantine was enforced in Bolivia, leading to an increase in women's self-employment in Bolivia.

Bolivian workers face the lowest job quality in Latin America, characterized by low incomes, limited career advancement opportunities, and a lack of social security (OIT, 2022). In fact, more than 50 percent of workers in Latin America lack social security, with the figure rising over 76 percent in Bolivia (Sehnbruch et al., 2020). According to the 2022 Continuous Employment Survey, only 12.4 percent of female Bolivian workers contribute to the social security system, and just over half (55.9 percent) of dependent employees have a formal contract. Similarly, only 15.4 percent of male workers contribute to the Social Security system, and 45 percent have a formal contract.

Figure 1. Self-employment Rate by Gender in Latin America and Bolivia
(In percentage of total paid workers, 2016-2022)



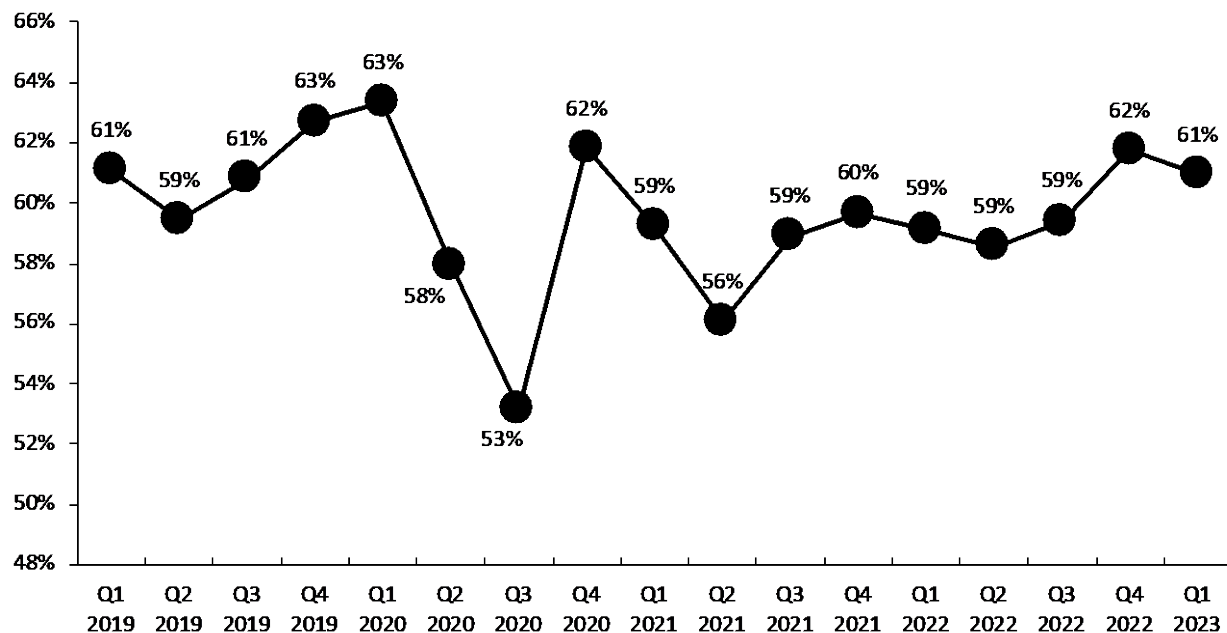
Source: CEPALSTAT, 2023

Notes: The self-employment rates exclude individuals classified as unpaid family workers. The self-employment rate for Latin America is calculated as a weighted average of individual country rates from national statistical agencies.

Even before the COVID-19 pandemic, self-employed women earned lower incomes compared to their dependent counterparts. This income disparity reached its peak in the third quarter of 2020, with self-employed women's monthly earnings being only 53 percent that of dependent workers (see Figure 2).

Dependent workers typically experience higher job quality compared to the self-employed. Employers have the legal responsibility to ensure that their employees are enrolled in the pension system, and that they receive health insurance coverage. In that sense, it is much easier for dependent workers to access employment benefits. Indeed, self-employed individuals must navigate complex administrative procedures on their own to voluntarily participate in these social benefit programs.

**Figure 2. Proportion of Self-employed Women's Monthly Income
Relative to Dependent Workers
(In percentage, 2019-2023)**



Source: Continuous Employment Survey of Bolivia, 2022.

3.2 Voluntary Enrollment in the Pension System and Health Insurance in Bolivia

The Bolivian regulation stipulates that every employee must benefit from long-term and short-term insurance (Supreme Decree No. 21637). The short-term insurance covers dependent workers for short-term illnesses, maternity, and professional risks. This insurance is financed by the employer's contribution, set at 10 percent of the total earnings of insured dependents. Furthermore, Article 5 of Administrative Resolution ASUSS 065/2018, dated November 20, 2016, stipulates that all employers must register and affiliate their workers with the managing entity.

Concerning long-term insurance, all companies in Bolivia are mandated to register with the Comprehensive Pension System and provide coverage for their dependents. This system includes several benefits, such as old age pension, pension for disability due to occupational risk, and pension for death due to occupational risk, among others. Employers are designated as withholding agents for labor contributions, which amount to 12.71 percent of workers' income, and are also required to contribute 6.71 percent of employees' salaries from their own resources.

Contributions are due by the last business day of each month, and failure to meet this deadline results in sanction and interest payments for employers.

Even though current regulations focus on dependent workers, and they clearly establish that employers are responsible for registering their employees and making the required monthly contributions, any self-employed worker who wishes to contribute voluntarily to either system can do so. To register in the Integral Pension System, voluntary contributors must comply with mandatory paperwork⁴ and commit to paying 14.42 percent⁵ of their declared income, which must be at least equivalent to a current National Minimum Wage (USD 326 in 2022).

Similarly, insurance companies and health institutions offer voluntary insurance for self-employed workers. For example, Caja Nacional de Salud (CNS),⁶ one of the main health institutions in the country, allows self-employed workers to enroll provided that they have a guarantor affiliated with the CNS.⁷ Voluntarily insured workers must report a monthly income of at least 500 USD, from which they must pay 20 percent every two months. In return, their legal spouse and children under the age of 19 can also be covered by health insurance.

Clearly, self-employed individuals have the option to contribute to either the pension system or a health insurance plan, yet reality shows that most of them choose not to do so. One reason may be that the process of enrolling is complex and time-consuming. Insufficient income is another possible cause. Indeed, the average monthly income in our sample of self-employed women is Bs 2,181.41 (USD 313.42), indicating that a majority of them fell below the required threshold to become enrolled in these systems. Moreover, for the 28.2 percent of women who have sufficient income, their average disposable monthly income for the months they contribute to the

⁴ The procedure is identical for every pension fund managing company. First, contributors must go to the offices of the Public Manager and fill out the Registration and Declaration of Right-holders Form. Subsequently, they must pay the first contribution to one of the authorized financial entities.

⁵ The percentage contributions break into 10 percent Monthly Quote, 1.71 percent Common Risk Premium, 1.71 percent Labor Risk Premium, 0.5 percent Solidarity Contribution, and 0.5 percent Commission for the Administrator.

⁶ The National Health Fund was established as a decentralized, non-profit public entity with the responsibility of administering, implementing, and executing the short-term Social Security program. This program covers various aspects including illness, maternity, and professional risks. As a result, the premiums should be designed to operate on a non-profit basis, ensuring that the institution provide benefits that are fair and in line with the premiums charged.

⁷ Guarantors must fill in and sign up a form and present their identity card, electricity bill, and their last two payment slips. In addition, more than half a dozen forms must be filled out by the contributor.

pension system and health insurance would be Bs 1417.92 (USD 203.72), on average, due to the high premium rates (i.e., 35 percent when they pay both contributions).

Besides administrative complexity and lack of personal income, we argue that information and behavioral biases also play a crucial role in the decision to make voluntary contributions to the systems that we study here. Thus, our experimental setting is based on the fact that, even if many self-employed women indeed earn a lower income than the official minimum for enrollment, our pre-experiment focus group revealed most women may have enough resources to make voluntary contributions after covering their household expenses. The requirement of a minimum income level is primarily set to define the minimum contribution that individuals must make to enroll in the health insurance plan and the pension system. Yet, for voluntary contributors, the effective amount of their contribution is self-declared in the official forms (after all, they are self-employed). Thus women can simply contribute the minimum amount that they are capable of affording, even not having the income level required. In these circumstances, we posit that enrollment is chiefly defined by workers' willingness to pay at least the minimum contribution amount, which is in turn largely shaped by the behavioral biases that we have described, as well as the type/amount of information these women possess. In our experimental setting, we will go on to show that 95 percent of non-contributors were unaware that self-employed individuals can contribute to health insurance plans.

4. Experimental Design

We designed a laboratory experiment to evaluate the implementation of nudges that modify the behavior of self-employed women to increase their job quality. The following subsections describe in detail the design and implementation of the experiment.

4.1 Subject Recruitment

We implemented a multifaceted recruitment approach consisting of three distinct strategies. Our first strategy involved leveraging union affiliations to gather a diverse group of participants from various sectors. In Bolivia, there are over 500 unions in different economic sectors and activities (Lazar, 2009), many of which include self-employed women. Through a previous collaboration

with the “Confederación de Mujeres Trabajadoras por Cuenta Propia,” we obtained a contact list with phone numbers. We reached out to these women to coordinate suitable dates and times for their participation in a laboratory session. Our second strategy focused on recruiting participants at their places of work, such as markets and small shops. Similarly, our recruiters collected contact details and made subsequent phone calls to coordinate participation schedules. Finally, we recruited entrepreneurs through Facebook Marketplace. Recruiters browsed the profiles of vendors on this platform and contacted them to inquire about their interest in participating.

Following this strategy, we recruited 424 self-employed women.⁸ Generally, results found in the experiment may present limitations in scalability because they depend on behavioral preferences that are conditioned to the environment in which the participants were born, raised, and lived. To account for this, our sample includes women from two different cities in Bolivia: La Paz and Cochabamba.

4.2 Experimental Procedure

We followed the decision space design in Train & Weeks (2005) and the decision scheme in Douglas & Shepherd (2002), where each participant chose a work scheme. To reflect the actual employment decisions, we used an effort elicitation task. Effort tasks are commonly used to assess individual investment and performance in an experimental setting. We used the “Pairs to 100” task, which consists of finding in a set of numbers a pair that sum up to 100.⁹ Each participant had the option to select their preferred level of difficulty (i.e., easy, medium, and hard). The size of the number sets on which they must find the pairs defined the difficulty (see Figure 3). For an exercise to be considered correct, participants needed to identify four pairs of numbers that added up to one hundred, regardless of the chosen difficulty level. Once they chose their desired difficulty level, they were provided with a booklet containing six exercises of the same level. In each round, they had three minutes to solve one booklet.

⁸ Appendix 6 contains the power calculation. We used a power of 0.8 and a Minimum Detectable Effect (MDE) of 0.4 standard deviation units for our two variables of interest.

⁹ In the pilot test, we tried two different types of exercises, “Pairs to 100” and “How many triangles.” We decided to follow the “Pairs to 100” because participants understood it better. The pilot test also determined the difficulty of the exercises.

Figure 3. Example of Effort Task by Difficulty

Easy			Medium				Hard				
15	30	49	22	26	23	6	20	33	96	94	51
60	51	40	30	20	46	14	13	47	78	65	32
70	41	59	61	58	75	70	21	14	97	73	69
			81	78	54	86	48	34	84	61	79
							27	44	52	86	4

Note: Each participant had the option to select their preferred level of difficulty. For an exercise to be considered correct, participants needed to identify four pairs of numbers that added up to one hundred, regardless of the chosen difficulty level.

The monetary reward they could obtain depended on the number of correct exercises and the level of the task. For each correct answer in the easiest level, they received a reward of Bs 20 (USD 2.87). In the middle level, the reward was Bs 30 (USD 4.31), and in the hard level, it was Bs 40 (USD 5.74). If all the exercises were correct in the easiest level the maximum reward that the participant could receive was Bs 120 (USD 17.24), Bs 180 (USD 25.86) for the medium difficulty, and Bs 240 (USD 34.48) for the hardest. On average, participants received Bs 75.72 (USD 10.88) as monetary reward.

Self-employment income is often characterized by its instability and dependence on external factors. In our experiment, we aimed to simulate this unpredictable nature by introducing two random states of nature: i) healthy and ii) unhealthy. In the healthy state, participants received the full reward, while in the unhealthy state they would lose 80 percent of the reward. To determine the state of nature, participants threw a die that had three faces which meant good health, while the other three faces meant bad health, implying a 50 percent chance of having a negative shock.¹⁰ However, each participant had the opportunity to mitigate this risk by enrolling in a health insurance plan. Depending on the chosen plan, participants would either incur a smaller loss or maintain the full reward (as shown in Table 1).

¹⁰ A 50 percent probability of experiencing poor health does not accurately reflect the complexities of the real world. While informal self-employed female workers face higher health risks compared to other types of workers, their risk does not reach the 50 percent threshold. Considering this is a controlled laboratory experiment with limited observation rounds to evaluate treatment effects, a risk lower than 50 percent may result in them not experiencing any negative shock in health during the experiment. Consequently, the decision to not invest in health insurance could seem rational in this context, even though it might not be the case in the real world.

Table 1. Health Insurance Plan Options

Plan	Contribution (h_i)	Coverage (c_i)
Basic	Bs5 (USD 0.72)	40%
Medium low	Bs10 (USD 1.44)	60%
Medium high	Bs15 (USD 2.16)	80%
Full insurance	Bs20 (USD 2.88)	100%

In each round, when participants selected the level of difficulty for the task and completed the exercises, the facilitators informed them of the amount of the monetary reward they would receive given their performance in the task. Given this information, we asked participants if they wanted to contribute to the pension system and a health insurance plan (see Table 2). Therefore, the decision for the pension system and health insurance was made simultaneously at the end of the previous round, without prior knowledge of whether they would experience a health shock. If they decided to contribute, their final reward in the healthy state (y_d^h) would be their initial reward (y_0) minus the amount contributed to the pension system (p) and the health insurance (h_i) contribution due to the plan selected (i). In the unhealthy state, their final reward (y_d^u) would be the coverage level of the health insurance (c_i) if they have opted to contribute minus the contribution they provided; if they did not contribute it would be 20 percent of their initial reward.

Table 2. Final Reward Due to State of Nature and Contribution to Health Insurance

State of Nature	Contribution to health insurance	Final reward
Healthy	Yes	$y_d^h = y_0 - p - h_i$
	No	$y_d^h = y_0 - p$
Unhealthy	Yes	$y_d^u = y_0 \cdot c_i - p - h_i$
	No	$y_d^u = 0.2 \cdot y_0 - p$

If participants decided to contribute to either the pension system or health insurance, they would have to stand up from their seats and deposit a form in a savings container outside the room.¹¹ At the end of the game, they received their reward, and four months¹² after the experiment implementation, they collected their social security contribution plus their interest rate earnings. The interest rate was set at 50 percent. We drew inspiration from Holmes (2011), who employed a discounted value after 10 years resulting in an estimated interest rate of around 41 percent. Based on this precedent and motivated by our aim to make the payment structure more appealing, we chose a 50 percent interest rate for our experiment. Furthermore, our pilot test indicated that the 50 percent interest rate was not only simple to explain but also easily understood by the participants.

¹¹ The saving container contained images to help participants distinguish where to put their health insurance and pension contributions. Images of the containers are provided in Appendix 2. When designing the experiment, we failed to consider the potential negative impact that a hunched man/woman with a cane could have on pension contributions.

¹² This reward was delivered to individuals by cellphone credit transfer. We made the waiting period long to reflect the decisions of enrollment in a pension system more real.

Table 3. Decision Space

Work intensity	Contributions to the pension system	Health insurance
Easy	Contributes	Without plan
		Basic plan
Medium		Medium low plan
		Medium high plan
Difficult	Does not contribute	Full insurance

Note: Each participant has three distinct choices: (1) determining their work intensity by selecting the level of difficulty, (2) deciding on their contributions to the pension system by choosing any amount they want, and (3) opting to contribute to a health insurance plan, with four options available for participants to select from or choose not to have a plan at all.

4.3 Treatment Design

Treatments were assigned on a session-by-session basis, with a total of 106 sessions. On average, each session had 4 participants who received identical explanations and nudges. This design minimized the Hawthorne effect,¹³ as participants were unaware of the differing treatments. Each treatment involved a nudge aimed at motivating workers to prioritize enhancing their employment quality. Additionally, the design also addressed the time-of-day effect by randomizing treatments across morning and afternoon sessions within each session.

Treatments were conducted using a 2*3 factorial design, as outlined in Table 4. The first dimension involved an informative message that emphasized the benefits of participating in a long-term pension system and the advantages of having health insurance. The second dimension focused on reducing the costs associated with enrolling in a savings or retirement plan. Following the

¹³ This effect is generally defined as the problem in experiments when subjects know they are being studied, and their behavior changes from a situation where they would not know they are being studied.

approach suggested by Thaler & Sunstein (2008), we employed an active decision nudge,¹⁴ but we made modifications specific to our experiment's characteristics.

Table 4. Factorial Treatment Design

	Control	Cost reduction
Default option to not contribute	Baseline	T1
Pension system informative message	T2	T3
Health insurance informative message	T4	T5

If participants were assigned to Treatment 1, they received a nudge that reduced the effort in contributing. We framed the nudge by bringing the saving container closer to the participants, so they did not have to stand up from their seats. Although the nudge did not involve monetary expenses, it aimed to minimize effort. While the time allocated for solving the exercises remained unaffected, the overall duration of the experiment could be reduced.

If the session was assigned to Treatment 2, participants received an informative message that aimed to incentivize their contribution to the pension system. Likewise, participants assigned to Treatment 4 received an informative message encouraging them to contribute to health insurance. Participants assigned to Treatments 3 or 5 received a combination of the Informative Message and the cost reduction nudge. These participants received the informative message as a printed infographic and a recorded audio.¹⁵

¹⁴ An active decision nudge presents both options by removing the default option.

¹⁵ During the focus groups, participants indicated that they prefer using WhatsApp as their preferred application for receiving messages, noting its popularity as the most frequently used social networking application. Additionally, they expressed a greater inclination to pay attention to audio messages compared to written ones, and they believed that the inclusion of images alongside concise messages could generate more interest for them. The findings from the focus groups can be found in Appendix 7, while the informative message with the printed infographic is provided in Appendix 8.

4.4 Experiment Procedure

The experiment consisted of 9 rounds as shown in Figure 4. The initial three rounds served as a baseline. We followed a sequential process to improve the quality of the results. The first stage of the experiment allowed us to capture the work scheme pattern of the subjects and know the initial preferences of the female self-employed workers. Thus, changes in decisions after treatment are not associated with differences in these preferences.

In round 4, participants were randomly assigned to either receive an informative message (represented by diagonal lines in Figure 4) or to the effort reduction nudge (represented by a gray shade in Figure 4). It is worth noting that the effort reduction remained in place for the subsequent rounds, with the savings containers positioned near the participants until the end of the experiment. On the other hand, the informative messages were provided during three specific rounds (round 4, 6 and 8). For treatments 3 and 5, which involved a combination of both treatments, the container was first moved closer, followed by the delivery of the informative message. It is important to note that both interventions were provided in the same round.

Figure 4. Treatments by Rounds

	Rounds						
	1 - 3	4	5	6	7	8	9
Default option							
T1. Effort reduction (ER)							
T2. Informative Message Pension System (IM Pension)							
T3. IM Pension + ER							
T4. Informative Message Health Insurance (IM Health)							
T5. IM Health + ER							

Note: The experiment comprised of 9 rounds. The initial three rounds were used for baseline comparison. Starting from round 4, participants were given either one or two treatments. The light grey square symbolizes the Active Decision nudge, while the dark grey square represents the pension informative message. The black square signifies the health insurance informative message.

If participants were assigned to an informative message (Treatment 2, 3, 4 or 5), participants received the message referred to as the 'guide to a solution in an audiovisual format in round 4. Subsequently, during round 6, a second message was presented in the same format, which not only included the text from the previous message but also incorporated “status quo information” comprising contextualized data specific to the Bolivian situation regarding the pension system or health insurance enrollment. Finally, during round 8, a new message was introduced that encompassed the “guide to a solution” along with additional information regarding the negative consequences of non-contributory health insurance or pension system participation. Table 5 summarizes this assignment.

Table 5. Message Content Structure by Rounds

Rounds	Behavioral Tool	Content for pension enrolment	Content for health insurance
4	Guide to a solution	“Retirement will be safe money when you can no longer work.”	“Contributing to health insurance can improve your quality of life.”
6	Guide to a solution and status quo information	“Retirement will be safe money when you can no longer work.” “In Bolivia, less than half of women workers contribute to retirement.”	“Contributing to health insurance can improve your quality of life.” “In Bolivia, 2 out of 10 people do not have health insurance.”
8	Guide to a solution and consequences of not contributing	“Retirement will be safe money when you can no longer work.” “Not contributing to retirement leads many people to poverty in their old age.”	“Contributing to health insurance can improve your quality of life.” “Foregoing health insurance exposes individuals to substantial expenses that can be challenging to afford.”

4.5 Informative Messages

To construct messages, we use elements of behavioral economics to guarantee a greater effect. We first carried out a literature review to find out the behavioral determinants that prevent women from improving their job quality. Then, we implemented a focus group of self-employed women

and individual interviews¹⁶ with unemployed women based on the variables studied in the literature review. In addition to the behavioral determinants of women's decisions, we investigated their knowledge of financial systems and use of technology, variables that allowed us to know the optimal way to implement the nudges. From this process, we obtained a list of attributes that affect women's decisions when opting for self-employment and factors that do not allow them to acquire employment benefits. With the information collected, we could design more effective nudges using elements of behavioral economics¹⁷ focused on loss aversion, emotions, confirmation bias, and availability bias.

The structure for all treatments was consistently followed. In round 4, participants received a message aimed at guiding them towards a solution. This message was designed to address the rational inattention bias, which is when individuals fail to consider all possible options for action (Maćkowiak et al., 2023). In this case, self-employed women may not have considered the possibility of enrolling in these benefits. To address this, we used salience to make the opt-in option more noticeable. By presenting information about the benefits of enrolling and contributing, we aimed to make the enrollment decision more automatic and implicit. This message remained in subsequent rounds.

In rounds 6 and 7, a second message was introduced. This message provided contextualized data specific to the Bolivian situation regarding the pension system or health insurance enrollment, known as “status quo information.” Since it is not mandatory for self-employed women in Bolivia to enroll in health insurance or contribute to the pension system, the default choice for them is to not be enrolled in any of these benefits. In this context, the objective of using this tool is to raise awareness about the non-optimality of the default choice. We wanted individuals to consider whether they truly prefer not being enrolled in the pension system and health insurance, or if it is simply the status quo that keeps them in the non-enrolled option that is why we decided to include status quo information as a behavioral tool in our messages.

During rounds 8 and 9, a new message was introduced. This message included information about the negative consequences of not contributing to health insurance or the pension system,

¹⁶ Appendix 7 contains the results of the focus groups.

¹⁷ Appendix 8 contains the final nudges that had been used in the experiment.

depending on the assigned treatment. By making the future more salient, this tool was useful in combating present bias, which is when individuals prioritize immediate gains over future benefits (Thaler & Sunstein, 2008). In this case, present bias made it more difficult for individuals to contribute to the pension system or health insurance because it meant sacrificing current consumption for future benefits, such as retirement payouts or health coverage. Additionally, this type of message highlighted the negative consequences of not contributing, leveraging loss aversion, which is when individuals are more averse to anticipated losses than they are motivated by similar gains (Walasek et al., 2018). Finally, this tool aimed to counteract mental accounting bias, which is when individuals fail to recognize the fungibility of money (Thaler, 1999). By emphasizing that today's money can enhance their future quality of life, we encouraged individuals to prioritize long-term financial security.

4.6 Post-Experiment Questionnaire

We carried out two questionnaires, one before and the other after implementing the experiment. Participants fill out both questionnaires to widen our understanding of women's characteristics, preferences, and beliefs. We designed the survey in KoboToolbox to collect the information using mobile devices and tablets.¹⁸ The questionnaire was composed of the following sections:

- Socioeconomic characteristics
- Time preferences and risk aversion¹⁹
- Employment
- Quality of employment
- Family income and expenses
- Preferences and beliefs about formalization and its benefits

¹⁸ The questionnaires forms can be seen at this link: <https://ee.humanitarianresponse.info/x/pIfL7yKF> or in Appendixes 3 and 5.

¹⁹ Time preferences and risk aversion is measured by monetary incentivized experimental tasks. Appendix 10 explains the instruments we used for measuring these preferences.

5. Data Analysis

We have two main variables of interest, the proportion of contribution to a pension system (CP) and health insurance (CH) from their total reward. For both cases, we used the monetary reward pre-health shock:

$$CP = \frac{\text{Contribution to pension system}}{\text{Monetary Reward}} \quad (1)$$

$$CH = \frac{\text{Contribution to health insurance}}{\text{Monetary Reward}} \quad (2)$$

Since we use data coming from a careful randomized assignment to treatment, we model outcome y by the following equation to maximize efficiency:

$$y_{ir} = \alpha + \beta Post_r + \sum_{j=1}^5 \gamma^j T_i^j + \sum_{j=1}^5 \delta^j T_i^j \times Post_r + X_i \lambda + \varepsilon_{ir} \quad (3)$$

where α is a constant; y_{ir} is either the value of CP or that of CH for individual i in round r ($r = 1 \dots 9$). $Post_r$ is equal to 1 after round 4 and 0 for the previous rounds. T_i^j is equal to 1 if subject i received treatment j ($j = 1 \dots 5$), which is shown in Figure 4. X_i is the vector of individually varying control variables listed in Table 4, and ε_{ir} is the error term. If there are average differences between the control and treatment groups, they are captured by parameters γ , and any time trend common to control and treatment groups is captured by parameter β . Since membership in each treatment group is exclusive (i.e., each person has been assigned to one group only), parameter δ^j captures the average effect of treatment j (see Figure 4). Empirically, we allowed errors in our model to be clustered at the round level and/or the session level in order to check for robustness of our results to unobserved common effects.

Furthermore, we model outcome y by the following equation to identify heterogeneities in treatment effects:

$$\begin{aligned}
y_{ir} = & \alpha + \beta_1 Post_r + \beta_2 Z_i + \sum_{j=1}^5 \beta_3^j T_i^j + \gamma_1 Z_i \times Post_r + \sum_{j=1}^5 \gamma_2^j T_i^j \times Z_i + \sum_{j=1}^5 \gamma_3^j T_i^j \times Post_r \\
& + \sum_{j=1}^5 \delta^j T_i^j \times Post_r \times Z_i + X_i \lambda + u_{ir}
\end{aligned} \tag{4}$$

where all the variables are defined as above, and Z_i is a binary indicator of membership to one of the following groups of interest:

1. high or low-effort workers,
2. workers with high or low tolerance to risk, and
3. patient or impatient individuals.

We categorized participants into low-effort workers and high-effort workers based on their initial task difficulty selection before any nudges were applied (round 1-4). Low-effort workers chose the easiest task level, while high-effort workers opted for the middle or the most challenging level.

To determine risk tolerance, we adapted the task used by Cardenas & Carpenter (2013), offering participants six lottery options with varying levels of risk and potential payoff.

Additionally, we employed a task introduced by Andreoni et al. (2015), which measured time preferences to classified self-employed workers as patient or impatient. Participants selected a budget from five options, with payments divided between present and future. Across 16 choices, we varied discount rates and waiting times. A patient individual chose the most delayed payment option at least once, while an impatient individual consistently chose the nearest payment option. For further details on the experimental tasks, please refer to Appendix 9.

6. Results

This section describes the sample of participants in more detail, showing that randomization was successful as the control and treatment groups are balanced. Then, we present the econometric specifications and the experiment results for all the variables of interest.

6.1 Descriptive Statistics

Table 6. Sociodemographic Balance Among Treatment Groups

	(1) T1	(2) T1 vs T2	(3) T1 vs T3	(4) T1 vs T4	(5) T1 vs T5	(6) T1 vs T6
Age	35.61 (12.43)	0.88 (2.17)	-2.17 (2.08)	-1.40 (1.96)	-0.09 (2.03)	2.49 (2.00)
College (%)	45.1 (50.1)	-3.9 (8.5)	-4.5 (8.4)	0.1 (8.4)	-7.0 (8.3)	4.9 (8.4)
Single (%)	59.2 (0.495)	0.011 (0.084)	0.061 (0.082)	0.080 (0.081)	0.056 (0.082)	0.033 (0.082)
Number of children	0.746 (0.952)	0.004 (0.164)	-0.167 (0.173)	-0.048 (0.156)	0.000 (0.159)	-0.052 (0.162)
Household income per person	1819.0 (1583.4)	102.5 (275.2)	568.1 (389.2)	-13.6 (253.4)	347.1 (337.8)	102.6 (267.5)
Estimated savings (%) ¹	41.9 (29.3)	0.3 (4.8)	-4.7 (4.9)	0.6 (4.7)	-3.0 (4.8)	-0.8 (4.8)
Commerce activity (%)	40.8 (49.5)	-10.0 (8.2)	-16.2** (7.9)	-9.3 (8.0)	-9.9 (8.1)	-11.7 (8.0)
Years of work experience	12.45 (9.77)	0.98 (1.87)	-1.49 (1.73)	-0.64 (1.66)	-0.94 (1.61)	2.09 (1.73)
Job quality index ²	59.6 (17.6)	4.4 (3.1)	4.0 (2.9)	4.7 (2.8)	2.9 (2.9)	3.1 (3.0)
Business formalization preference ³	4.18 (0.92)	0.02 (0.14)	-0.05 (0.16)	0.01 (0.15)	0.13 (0.15)	-0.11 (0.15)
Health insurance enrollment preference ³	4.3 (0.74)	-0.03 (0.11)	0.10 (0.12)	-0.26* (0.13)	0.00 (0.12)	-0.24* (0.12)
Pension system enrollment preference ³	3.85 (0.92)	0.08 (0.15)	-0.22 (0.16)	-0.02 (0.15)	-0.03 (0.16)	-0.08 (0.15)
Risk preference ⁴	2.59 (1.48)	0.42 (0.27)	0.21 (0.27)	0.27 (0.25)	0.18 (0.25)	0.10 (0.26)
Patience index ⁵	0.62 (0.49)	0.07 (0.08)	0.03 (0.08)	0.01 (0.08)	0.00 (0.08)	-0.02 (0.08)
Joint significance probability		0.000	0.000	0.000	0.000	0.000
Observations	71	68	69	73	71	72

Notes: Figures represent the mean (standard deviation is in parentheses). * p < 0.1, ** p < 0.05, *** p < 0.01.

1. Declared household income minus declared expenses.

2. Job quality index (JQI) was built using Green's (2012) methodology, which can be found in Appendix 9.

3. Index created from a Likert scale from 1 to 5.1 means "I would really dislike" and 5 "I would really like".

4. Constructed by the Risk aversion experimental task in Appendix 10. Index range from 1 to 6, where 1 means the neutral lottery and 6 means the riskiest lottery.

5. Using time preferences experimental task in Appendix 10. Patience index is a dummy variable that gives a value of 1 to all the individuals who chose at least once, the most patient option in any of the rounds of the task, and 0 otherwise.

Table 6 contains the average characteristics of the sample by treatment status.²⁰ Almost all sociodemographic characteristics are statistically similar between treatment groups, the exceptions being commercial activity, health insurance enrollment preference, and number of participants per session.

The average age of participants is 35 years old. Almost all of them completed secondary education (97 percent), but only 43 percent have pursued university studies. Around 60 percent of the participants are single, and most have at least one household member under the age of 18. The per-capita household monthly income is Bs 1,819 (USD 261.35), with a significant amount of variation. More than 82 percent of participants have savings; they save an average of 41.9 percent of their household monthly income. Despite being a young population, they have an average of more than 12 years of work experience. However, they generally have unstable jobs, which may explain their high preference for formalizing their business, enrolling in health insurance, and joining a pension system. In terms of time and risk preferences, they tend to value the present more and are generally risk averse.

Table 7. Output Variables Balance on Pre-treatment Rounds (Rounds 1 to 3)

	(1) T1	(2) T1 vs T2	(3) T1 vs T3	(4) T1 vs T4	(5) T1 vs T5	(6) T1 vs T6
Contribution to health insurance (%)	0.182 (0.158)	-0.007 (0.016)	0.015 (0.017)	0.002 (0.016)	-0.006 (0.016)	0.008 (0.015)
Contribution to pension system (%)	0.118 (0.162)	0.025 (0.017)	-0.012 (0.015)	-0.018 (0.015)	-0.031** (0.015)	-0.011 (0.015)
Initial payoff for correct exercises	57.091 (32.792)	58.333 (34.660)	-3.873 (3.306)	-1.039 (3.311)	-0.594 (3.101)	1.174 (3.327)
Final Payoff	31.894 (26.721)	33.144 (28.349)	-3.214 (2.703)	-1.307 (2.709)	-1.234 (2.521)	0.556 (2.793)

*p<0.1, **p<0.05, ***p<0.01.

In Table 7 we show that the randomization process successfully achieved balance in pre-treatment differences concerning our main outcome variables. We observed a balance across all pre-treatments rounds in terms of the percentage of contribution to health insurance. However, when considering the percentage of contribution to the pension system, we find balance in the pre-

²⁰ Appendix 5 includes sociodemographic characteristics by city.

treatment rounds for all treatment groups except Treatment 5 (Health insurance + Active Decision).²¹

6.2 Treatment Effects

Figure 5 illustrates the proportion of contribution in the Pension System across all treatment groups. Notably, women in all groups, including the control group, made contributions to the pension system. However, the treatment groups featuring interventions showed higher average contributions compared to the control group. The Informative Message had an effect of 12.5 percent, which is significantly different from the control group, but the combination of the informative message and the Active Decision did not increase the effect of the informative message alone. Surprisingly, the Active Decision Nudge did not yield a statistically significant difference when compared to the control group.

Figure 5. Proportion of Contribution in the Pension System by Treatment Group

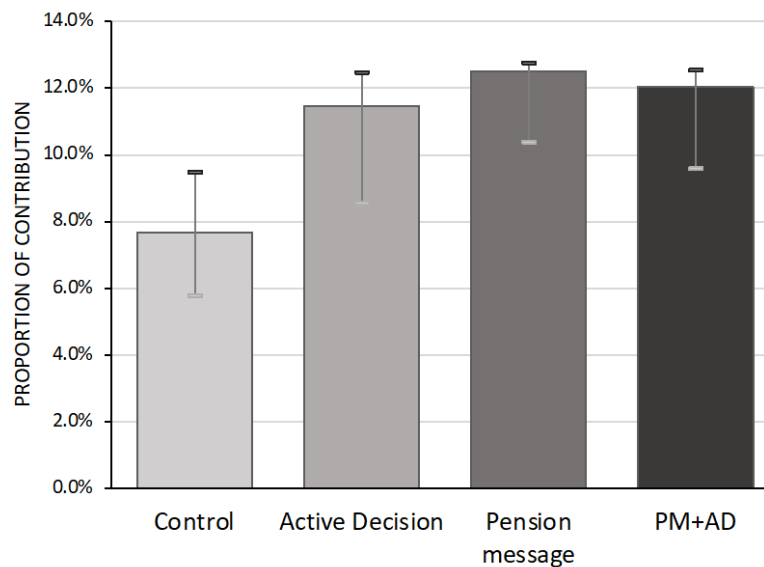


Table 8 presents the treatment effects on the percentage of contribution to the pension system. As previously demonstrated, the Informative Message and the combination of both

²¹ Balance analysis by city can be found in Appendix 5.

treatments are the only ones that have significant effects. However, in the group that received both treatments, the effect is only due to the informative message and not the Active Decision nudge. These results hold even controlling for socio characteristics variables, sessions fixed effects, and round fixed effects.

Table 8. Treatment Effect on Pension System Contribution Rate by Treatment Group

	(1)	(2)	(3)	(4)	(5)
Active Decision (AD)	0.017 (0.015)	0.017 (0.015)	0.017 (0.015)	0.017 (0.016)	0.017 (0.016)
Pension Message (PM)	0.059*** (0.016)	0.059*** (0.016)	0.059*** (0.016)	0.059*** (0.016)	0.059*** (0.016)
PM +AD	0.059*** (0.014)	0.061*** (0.014)	0.061*** (0.014)	0.061*** (0.015)	0.061*** (0.015)
Observations	3816	3816	3816	3816	3816
Individuals	424	424	424	424	424
Controls	No	Yes	Yes	Yes	Yes
Rounds FE	No	No	Yes	No	Yes
Session FE	No	No	No	Yes	Yes

Notes: Estimation of the difference on proportion of pension system contribution over earnings between pretreatment rounds (1-3) and treatment rounds (4-9). Control variables included age, marital status, number of under-18-children, highest schooling level, per-capita household income, percentage of savings, commerce activity, years of work experience, job quality index, preference for business formalization, preference for health insurance, preference for pension system enrollment, risk aversion index and patience index.

*p<0.1, **p<0.05, ***p<0.01.

Figure 6. Proportion of Contribution in Health Insurance by Treatment Group

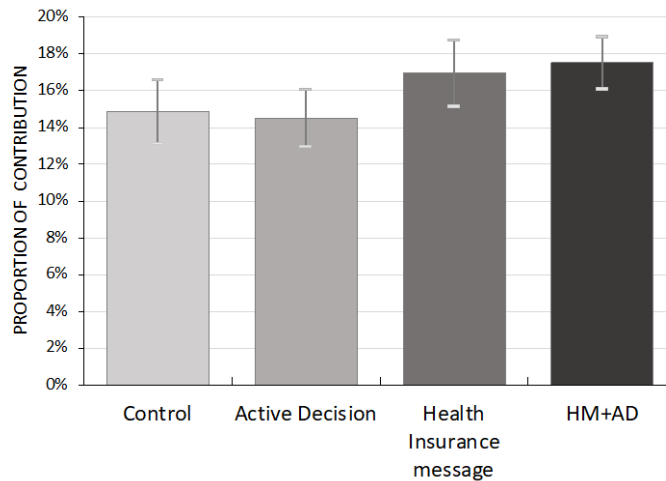


Figure 6 illustrates the proportion of contribution to health insurance. The women in the control group already exhibit significant contribution values around 14.9 percent of their income. This finding is noteworthy, as more than 80 percent of our sample does not contribute to health insurance. We argue that offering the option to contribute could have a significant impact, as evidenced by the fact that 95 percent of non-contributors are unaware that self-employed individuals can contribute to health insurance. The average contributions of women assigned to any one of the treatments do not differ significantly from the control group, except for the Informative Message, which shows an Average Treatment Effect (ATE) of 2.8 percent (Table 9).

Table 9. Treatment Effect on Health Insurance Rate of Contribution by Treatment Group

	(1)	(2)	(3)	(4)	(5)
Active Decision (AD)	0.003 (0.016)	0.003 (0.016)	0.003 (0.016)	0.003 (0.016)	0.003 (0.016)
Health Insurance Message (HIM)	0.028* (0.015)	0.028* (0.015)	0.028* (0.015)	0.028* (0.016)	0.028* (0.015)
HIM +AD	0.017 (0.016)	0.017 (0.016)	0.016 (0.016)	0.016 (0.016)	0.017 (0.016)
Observations	3816	3816	3816	3816	3816
Individuals	424	422	422	422	422
Controls	No	Yes	Yes	Yes	Yes
Round FE	No	No	Yes	No	Yes
Session FE	No	No	No	Yes	Yes

Notes: Estimation of the difference health insurance contribution category between pretreatment rounds (1-3) and treatment rounds (4-9). Control variables included age, marital status, number of under-18-children, highest schooling level, per-capita household income, percentage of savings, activity, years of work experience, job quality index, preference for business formalization, preference for health insurance, preference for pension system enrollment, risk aversion index and patience index.

*p<0.1, **p<0.05, ***p<0.01.

The lack of a significant effect on the Active Decision nudge in contributions to the Pension System or Health Insurance prompts us to investigate potential causes. One probable reason for this could be that the treatment not only reduces the cost of effort and time but also modifies the participant's behavior by the effect of being observed. In the initial rounds, women's decisions were visible to other participants in the same session because they had to stand up if they wanted to contribute to either the Pension System or Health Insurance. Therefore, when the Active Decision nudge is implemented in the subsequent rounds, there could be conflicting mechanisms

at play. On the one hand, the cost reduction should increase contributions, but on the other hand, making contributions not visible may decrease them due to social desirability. To investigate the role of social desirability, we examined differences between visible and non-visible behavior. If social desirability influenced contribution behavior, we would expect to see a decrease in the decision to contribute (i.e., standing up) in the “Active Decision” group when it shifts from being visible to non-visible. Meanwhile, this decision would remain visible in the control group throughout the whole session. When comparing the treatment effect of the Active Decision and control group in the decision to stand up, we should see a negative effect.

Table 10. Treatment Effect on Probability to Contribute by Treatment Group

	(1) Contribute	(2) Contribute Pension	(3) Contribute Health
Active Decision (AD)	0.091** (0.038)	0.101** (0.047)	0.078** (0.038)
Pension Message (PM)	0.050 (0.035)	0.270*** (0.050)	
PM +AD	0.070** (0.034)	0.223*** (0.044)	
Health Insurance Message (HIM)	0.085** (0.038)		0.063* (0.037)
HIM +AD	0.084** (0.032)		0.081** (0.032)
Observations	3,816	3,816	3,816
Individuals	424	424	424
Controls	Yes	Yes	Yes
Rounds FE	Yes	Yes	Yes
Session FE	Yes	Yes	Yes

Notes: Estimation of the difference on proportion of pension system contribution over earnings between pretreatment rounds (1-3) and treatment rounds (4-9). Control variables included age, marital status, number of under-18-children, highest schooling level, per-capita household income, percentage of savings, commerce activity, years of work experience, job quality index, preference for business formalization, preference for health insurance, preference for pension system enrollment, risk aversion index and patience index.

*p<0.1, **p<0.05, ***p<0.01.

Table 10 shows the treatment effect on the probability to Contribute by Treatment Group. This refers to designating a positive amount in health insurance or pension system, therefore the

dependent variable has a value of 1 if the participant decided to contribute or 0 if they did not. Although shifting from visible to non-visible behavior did not change the amount of contributions (see Table 8 and Table 9), our findings suggest that placing the saving container near the participants increased the probability of making the decision to contribute.

6.3 Heterogenous Effects

In this section, we examined the interaction of the treatments with specific socio-demographic characteristics in a regression model to explore the heterogeneity of treatment effects. Figure 7 illustrates the heterogeneous effects of nudges on contributions to the pension system based on participants' preferences for receiving future pension benefits. We gathered the information about the participants' preferences in a survey implemented at the end of the experiment.

Figure 7. Contribution to the Pension System by Preference on Getting the Benefits of a Pension System

	(1) Upset	(2) Indifferent	(3) Like
Active Decision (AD)	0.059 (0.021) [0.024 - 0.094]	0.092 (0.011) [0.073 - 0.110]	0.125 (0.022) [0.088 - 0.161]
Informative Message (IM)	0.074 (0.026) [0.030 - 0.117]	0.107 (0.014) [0.085 - 0.130]	0.141 (0.018) [0.111 - 0.171]
AD + IM	0.096 (0.041) 0.028 - 0.163	0.111 (0.022) 0.075 - 0.147	0.126 (0.015) 0.101 - 0.151

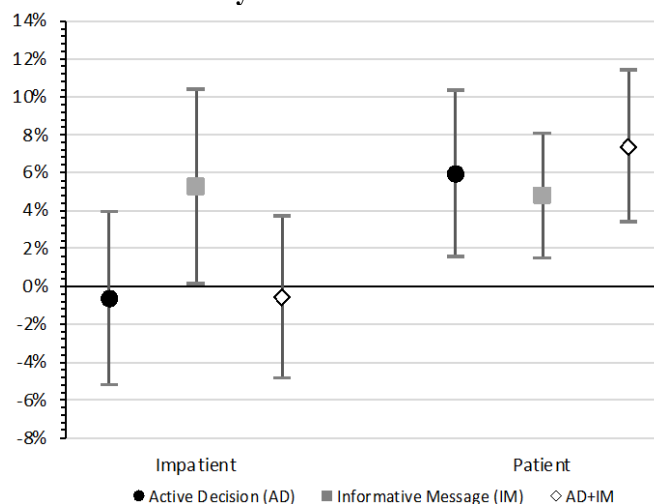
Note: We asked participants their preference on being affiliated to the pension system (PS), and provided 5 options: (i) I would be very upset to be affiliated to the PS, (ii) I would be upset to be affiliated to the pension system, (iii) I wouldn't like it nor would I dislike it, (iv) I would like to be affiliated to the PS, (v) I would like it very much to be affiliated to the PS. Robust standard errors are in parentheses and 90% confidence intervals are in brackets.

Individuals with a strong interest in receiving pension benefits show the most significant treatment effects when presented with either the Active Decision Nudge or the Informative Message Nudge alone. However, when the nudges are combined, there is no clear pattern in

individuals' preferences. The effect on women with strong preferences for receiving pensions is statistically similar across all three treatment groups. However, individuals who dislike receiving pension benefits and received the Active Decision Nudge did not show a significant treatment effect. Therefore, in the other two treatment groups, we can argue that even for individuals who dislike contributing to the pension system, the nudge creates a desire to contribute.

Moreover, the treatment's effects on the decision to participate in the Pension System may be linked to individuals' level of impatience, defined as the preference for immediate rewards over long-term benefits. To explore this further, we classified the participants into two categories based on their patience levels. These were created based on whether individuals chose the most forward-looking option at least once (patient category) or never (impatient category) across all rounds of a time-preference experimental task.²² We found that all our nudges had a significant impact on patient individuals, but only the informative messages were able to enhance the contributions of impatient ones (see Figure 8).

Figure 8. Percentage Change in Participants' Contribution to the Pension System by Patience Level

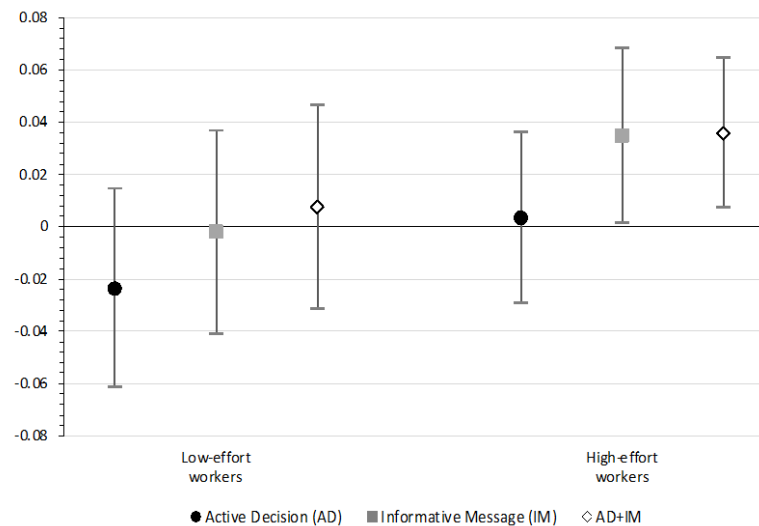


Note: Dots contain the average difference in the percentage change of the contribution after treatment between the other treatments and control group. Whiskers show 90% confidence intervals of those estimates.

²² For the total sample, 63.4 were classified as patient and 36.6 percent as impatient. Appendix 10 explains the experimental-task instruments we used for measuring time preferences.

We also hypothesize that the treatment effects may vary depending on the type of workers. To test this hypothesis and gain insight into the underlying mechanism of our findings, we analyzed the effects on two distinct types of self-employed women based on their level of effort. We categorized self-employed women into two groups: those who put in low effort and those who put in high effort. We identified the low-effort workers as those who chose the easiest level of the task prior to being influenced by the nudge, while the high-effort workers were those who selected the middle or more challenging levels. In both cities, 46.2 percent of women fell into the high-effort category, while 53.7 percent were classified as low-effort workers. With this categorization, we found that all the treatments had a significant effect only for the high-effort workers.

Figure 9. Percentage Change in Participants' Contribution to the Pension System by Type of Worker

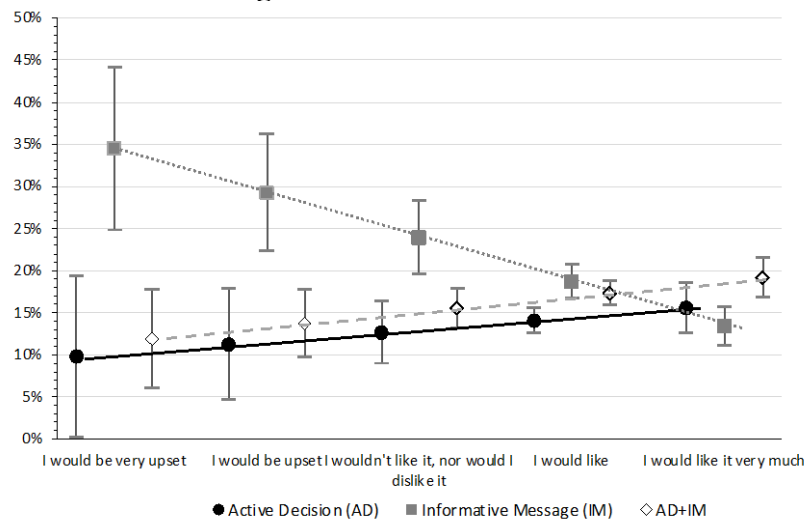


Note: Dots contain the average difference in the percentage change of the contribution after treatment between the other treatments and control group. Whiskers show 90% confidence intervals of that estimates.

We also found highly heterogeneous results regarding the treatment effects on health insurance contributions. Figure 10 illustrates the contribution levels to health insurance for each different treatment, comparing the preferences for health insurance benefits. Individuals who expressed a strong preference for these benefits showed a similar effect in all treatments of 14-20 percent. The Active Decision Nudge had a stronger effect on participants who preferred the

benefits compared to those who did not. Equivalent results were observed for the combination of the Active Decision Nudge with the Informative Message. However, we observed an unexpected effect for the groups that only received the Informative Message. We can argue that the informative message seemed to increase contributions from individuals who had no preference to contribute, possibly by reinforcing the benefits associated with such contributions.

Figure 10. Contribution to the Health Insurance by Preference on Getting the Benefits of Health Insurance

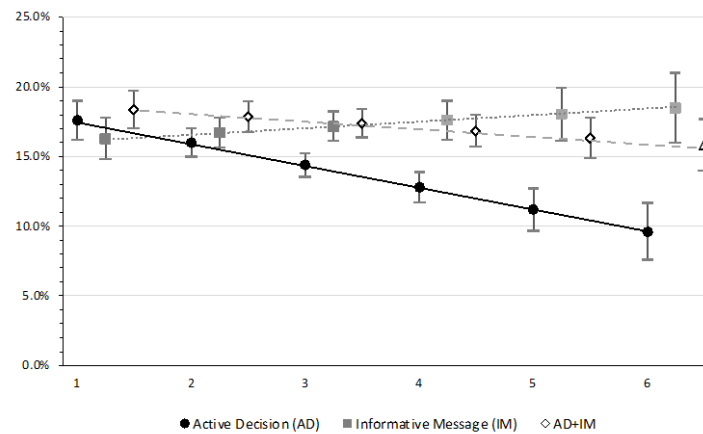


Note: We asked participants their preference on contributing to health insurance (HI), and provided five options: i) I would be very upset to be contribute to HI, ii) I would be upset to contribute to a HI, iii) I wouldn't like it nor would I dislike it, iv) I would like to contribute to a HI, v) I would like it very much to contribute to a HI. The dots contain the average contribution in the treated rounds. Whiskers show 90% confidence intervals of that estimates.

Concerning the decision to enroll in health insurance, it is important to consider the impact on different levels of risk aversion, i.e., individuals' unwillingness to accept greater fluctuations in exchange for higher payoffs. We found that contributions to health insurance increased when women received the Active Decision Nudge alone or a combination of Active Decision Nudges and Informative Messages. This is because individuals with a higher tolerance for risk are more likely to want to minimize the risk of negative health shocks, which could ultimately reduce their monetary reward. However, risk-loving individuals contribute to health insurance to the same extent as those who are risk-averse when only an Informative Message is provided. Therefore, the

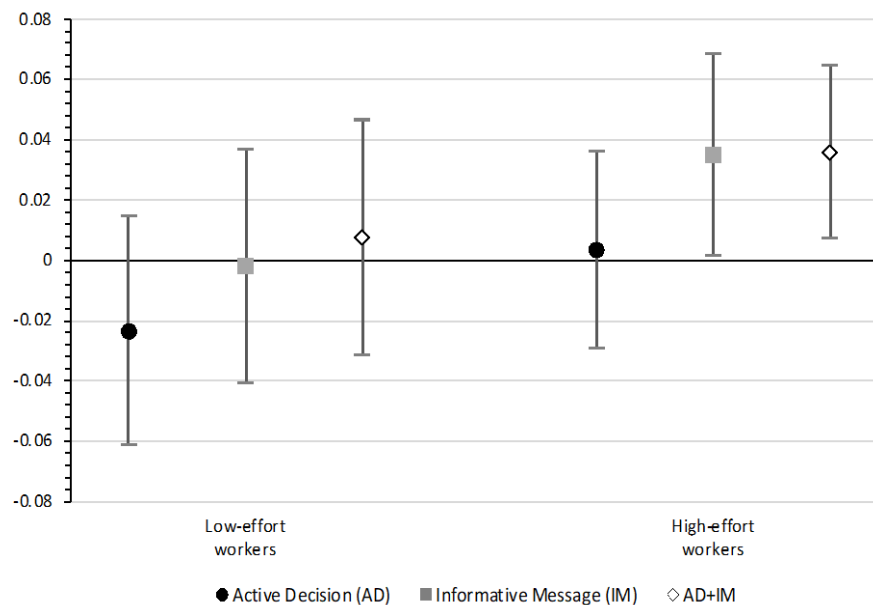
Informative Message treatment appears to be effective, even among risk lovers, i.e., individuals who value higher payoffs more than the risk of having lower ones.

Figure 11. Contribution to Health Insurance by Risk Level



Note: The dots contain the average contribution in the treated rounds. In the horizontal axis 1 represents risk averse individuals while 6 represents risk lovers. Whiskers show 90% confidence intervals of that estimates.

Figure 12. Percentage Change in Participants' Contribution to Health Insurance by Type of Worker



Note: Dots contain the average difference in the percentage change of the contribution after treatment between the other treatments and control group. Whiskers show 90% confidence intervals of that estimates.

Similarly, regarding the effect on the contributions to the pension system, the treatments are ineffective on contributions to health insurance for low-effort participants. However, for high-effort participants, contributions increased by 4 percent of their income when they received Informative Messages. The combination of an Informative Message and an Active Decision also had a positive effect on contributions. However, it is important to note that adding the Active Decision to the Informative Message did not further increase the effect (Figure 12).

We recognize that the definition of effort may be linked to the ability to solve the Pair-100 exercises. Therefore, we have examined the correlation between the effort category and level of education and found almost a null relationship. We acknowledge that considering the level of education alone is not sufficient when assessing the ease of solving exercises. Thus we have also analyzed the number of exercises solved correctly and the initial reward received, based on the categorization of effort. Our analysis revealed a negative relationship, indicating that some participants continued to tackle difficult levels even when making mistakes and receiving lower rewards, compared to those who chose easier levels and solved most of them (see Table 11).

Table 11. Correlation with Effort Categorization and Other Possible Determinants

	Effort	Education Level	Correct exercises
Education Level	-0.084		
Correct exercises	-0.231	0.131	
Initial Reward	-0.139	0.113	0.905

7. Discussion and Conclusions

The results of this laboratory experiment demonstrate the impact of different nudges aimed at increasing the benefits for female self-employed workers and their families. Participants in our experiment were divided into six groups, each receiving a different treatment. One treatment arm involved providing information about the advantages of contributing to a long-term pension system and having health insurance. Another treatment arm focused on encouraging participants to enroll in savings or retirement plans by reducing the associated costs.

As in any experimental setting, we do not purport to fully represent the complexity and nuances of the decision-making process around making voluntary contributions to the real-world health insurance plan and pension system in Bolivia. However, we used experimental evidence to compellingly test if behavioral biases and the information available to self-employed women are crucial determining factors of these decisions in real life.

Our pre-experiment focus group showed that self-employed women are willing to acquire health and pension benefits making out of pocket, voluntary payments. However, it also showed that the current options available to them are not entirely known to them and entail complex administrative processes. Our findings indicate that simply providing accurate information can significantly increase voluntary contributions to our experimental pension and health insurance plans. Notably, contributions to the health insurance plan were higher than contributions to the pension system. Providing information of the benefits of enrolling to the pension system and a health insurance plan increased contributions compared to the control group. Conversely, reducing costs and effort did not result in higher contributions to acquire these benefits. Accordingly, combining the informative message with cost reductions did not increase contributions. Therefore, policies should raise awareness and provide information.

Additionally, we found that the effect of these treatments varied depending on the type of worker. Women who are low-effort workers do not respond to any of our treatments, while voluntary contributions by high-effort workers are found to be significantly increased by informative messages. Indeed, informative messages are found to be effective interventions even for individuals who show a dislike to formalize their business and to contribute to the pension system or a health insurance. Lastly, we discovered that raising awareness can reduce behavioral biases such as excessive risk-taking and present bias (lack of patience). Specifically providing information of the benefits of contributing to pensions system and health insurance were effective even for individuals with a high level of risk tolerance and impatience.

Appendices

1. Experimental protocol guide
2. Experimental materials
3. Pre-experiment questionnaire
4. Post-experiment questionnaire
5. Statistical analysis
6. Power calculation
7. Focal group and interviews report
8. Informative messages used as nudges
9. Construction of indicators
10. Pension Security and health insurance affiliation form

You can find the appendices in this link:

<https://sites.google.com/upb.edu/nudge-qua-self-employed>

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