The Impact of Deferred Wages on Labor Supply: Pre-Analysis Plan

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Abstract

   This document is the first portion of the analysis plan for a randomized controlled trial (RCT) evaluation studying the effects of a deferred wage payment option on workers investments, consumption, well-being and labor supply. Between January and May 2017, the Lujeri Tea Estates will allow randomly selected workers the choice of deferring a portion of their bi-weekly wages into a savings account to be paid out at the end of the agricultural season. The present document outlines the study design, the econometric methods we will use, and the outcome variables of interest for labor supply outcomes, which will be the first data we collect. A later document will contain our analysis plan for survey outcomes, which will be collected starting at a later date.

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1 Introduction

Financial market frictions and behavioral constraints leave many in developing countries struggling to save sufficient funds to purchase durable goods, make profitable investments, or smooth consumption across the year. Savings constraints prevent individuals from making basic investments such as upgrading their dwellings with iron sheet roofs, paying for school fees or having better food options during low income seasons. Barriers to saving may also have an important negative impact on individuals by depressing labor supply. If smaller income streams cannot be easily saved and aggregated to invest in goods and services that people value, this lowers the effective returns from working. Similarly, if funds cannot be easily transferred from high earning potential periods to low earnings potential periods, this reduces the incentives to work during the high earning potential periods.

One method for saving up larger sums is to defer receipt of income, a form of commitment savings that is surprisingly popular in developing countries. For example, Brune and Kerwin (2016) find that 72 percent of low-wage informal workers in Malawi preferred to defer wages and receive one lump sum payment over several smaller installments. In addition, Casaburi and Machiavello (2015) show that dairy farmers in Kenya are willing to forgo revenue to receive some of their sales as monthly rather than as daily payments. Finally, many workers at tea estates in Malawi participate in rotating savings clubs at work, and recent focus groups in the same setting revealed that a great majority of participants would like a deferred payment option for their regular wages during main season.

While this evidence suggests there is demand for deferred payment in developing countries, this topic has been relatively understudied. We are not aware of any study which explicitly studies the impact of deferred payment on labor supply, although there is a small literature studying the impact of savings on labor supply (Callen et al., 2016; Dupas and Robinson, 2013). Deferred payment is a particular form of commitment savings that merits study because it does not rely on access to bank services and, in addition, has low internal

and external transaction costs for savers. This is important since the benefits of a single deposit may be sufficiently small such that transportation, opportunity or attention costs easily discourage the formation of savings. Moreover, ongoing technological and financial innovations such as mobile money make deferred payments and automatic deductions from wages feasible for firms in developing countries.

2   Intervention

The target population for this intervention is a set of workers who pick tea ("pluckers") at the Lujeri Tea Estates in Malawi. Forty percent of the Lujeri workforce are women. Pluckers are paid piece-rate wages and earn $PPP 7 per day on average during the main season which lasts four to five months. Earnings are paid out every two weeks. Over the course of a year, incomes of workers are subject to seasonal variation due to the variation in plant growth wages in the offseason are substantially lower and many workers are essentially laid off and only re-hired for the next season. Thus, the main season is when workers have a relatively higher demand for generating savings, both to smooth consumption across seasons and also to be able to make lumpy purchases of durable goods (such as iron roof sheets and other building materials) and of investments.

In our intervention, we will provide pluckers with the option of receiving a portion of their regular wages as a deferred lump sum payment at the end of the main season in May 2017. Workers are identified as being eligible for treatment based on their responses to a product information survey that we conducted from October 31 to December 29, 2016, with 1,900 workers. Approximately, 65 percent of workers interviewed for the product interest survey indicated that they would be interested in participating in a deferred wages scheme. We targeted all individuals who indicated interest in deferred wages to attempt a baseline survey and interviewed 1,139 of them.

In the deferred wages experiment, we revisit the set of individuals who took part in the baseline survey ($N = 1,139$) and ask if they are still interested in the product. These revisits

will happen in later January and early February 2017. Workers who are still interested are assigned on the spot to either the treatment or control group based on pre-determined random assignments. Treated workers are able to control their deferred savings account by setting two parameters for their bi-weekly earnings: a minimum pay and maximum deferral amount.

3   Evaluation Questions

Our main questions are:

1. What is the impact of deferred wages on individual expenditure, savings, consumption and investment?[1]

2. How does access to deferred wages affect labor supply?

4   Evaluation Design

4.1   Sampling and Identification Strategy

To establish a causal relationship between the deferred wages savings intervention and changes in outcomes, this study uses a Randomized Controlled Trial (RCT). We partnered with the Lujeri Tea Estates in Malawi whose workers have little access to formal savings. The firm typically employs about 8,000 total employees during the main agricultural season.

We randomly assign offers of deferred wages among workers who said they were interested in the product during an earlier survey and who were interviewed during the baseline survey ($N = 1,139$). Our study sample is composed of workers who are still interested when we revisit the workers to make offers in late January and early February 2017 (i.e., just before the main work season). During the same visit, we also conduct a social network survey

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[1]A second document will contain our pre-analysis plan for analyzing these outcomes. The focus of this document is on specifying our plan for analyzing the impact of deferred wages on labor market activity and work performance.

with both control and treatment workers immediately prior to start of the intervention. At the end of this social network survey, we ask everyone if they are still interested in deferred wages. Workers who are interested are then randomized to the treatment or control group on the spot based on pre-specified randomized lists. We offer deferred wages to those assigned to treatment and inform workers assigned to control that there were not chosen at this time.

To randomly assign treatment status, we follow recently recommended best-practices and use a re-randomization procedure to select the treatment and control groups for our intervention (Bruhn and McKenzie, 2009). First, we randomly assign each worker to treatment or control status, with the randomization stratified on the geographic divisions of the tea estate. Then, we use a re-randomization procedure to ensure the random assignment is balanced on relevant baseline variables. Specifically, we repeat random assignment to treatment process 1,000 times in each of the firms geographic (and administrative) field divisions. Within each draw, we test all our baseline variables for balance and obtain the maximum t-statistic across all baseline outcomes. From the sample of 1,000 draws, we select the random assignment which has the minimum maximum t-statistic for each division.
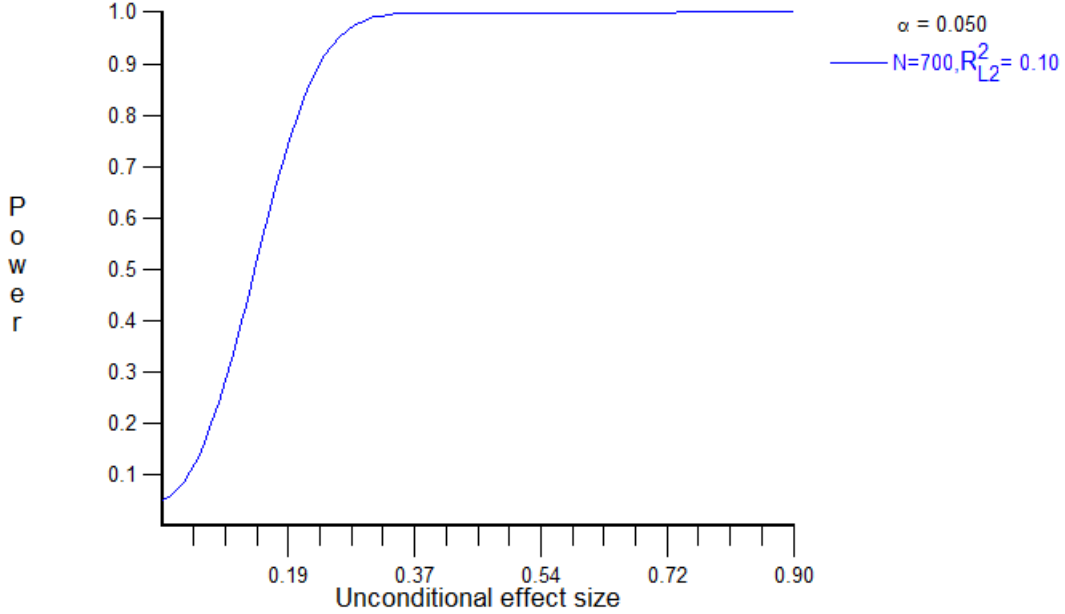
4.2 Data Collection Methods and Instruments

In addition to data collected at baseline, this project will also collect midline and endline survey data. Trained interviewers visited each worker during normal business hours at the Lujeri Tea Estates. Surveys will be administered on tablets using SurveyCTO software.

4.3 Power Calculations

The sample size of approximately 1,100 individuals in the treatment and control groups was chosen based on power calculations that showed that a sample of 700 individuals is sufficient to detect effect sizes of 0.2SDs with 80 percent power at a significance level of 0.05, assuming the partial R-squared of our control variables is 10 percent (see Figure 1 below). The larger initial sample allows for an expected losses of sample size due to workers

not choosing the product when we make the final offers in late January and early February (about 30 percent expected loss) and due to attrition from the sample (about 10 percent expected loss).

Figure 1: Deferred Wages Impact Power Calculation

Notes: See text for description of power calculation.

4.4 Econometric Specification

Our main specification to capture the impact of deferred wages is:

$$y_{(i)st} = \alpha + \beta Treat_i + \delta_s + \gamma Z_i + y_{(i)sB} + \epsilon \tag{1}$$

where $y_{(i)st}$ is the outcome of interest for individual i measured at time t in strata s. The variable $Treat_i$ is an indicator that takes the value 1 if the individual was treated by offering them the deferred wages intervention. Fixed effects for strata (divisions of the estate) are included as δ_s. We control for the individual covariates Z_i used in the re-randomization exercise. Finally, we also control for the baseline level of the outcome variable $y_{(i)sB}$ as

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recommended in McKenzie (2012), wherever this variable is available. In this specification, estimates of β are the intention-to-treat (ITT) effect from providing access to deferred wages. In addition, we will also estimate treatment-on-the-treated (TOT) effects where the dependent variable in the first-stage equation is an indicator for take-up of deferred wages (D_i).

The sample for this analysis will include measures of work effort $y_{(i)st}$ (e.g., attendance or daily output) for the time period t that begins after the first contribution to deferred wages and continues until the last week of deductions during the main season. To test for dynamic effects of deferred wages, we will augment Equation 1 with indicators for each week in our sample interacted with the dummy $Treat_i$ to allow for treatment effects that vary over time. These analyses will include additional controls for workers pre-experiment performance, to provide increased precision for these analyses. Specifically, we will control for the following variables for the period from 3 October to 13 January: the mean, standard deviation, 25th, 50th, and 75th percentiles of their daily KGs of tea plucked (including days with no tea plucking as zero), as well the share of work days they attended work and the share of work days they plucked tea.

4.5 Spillover Effects

One possibility in this workplace setting is that the deferred wage savings intervention affects members of the control group by altering transfers from social ties within the Lujeri workplace. We use two approaches to quantify spillover effects. First, we measure social networks among employees in order to empirically estimate spillovers stemming from peer effects that arise from the deferred wages intervention. Specifically, we are interested in testing whether an individuals outcomes are affected by the treatment status of their friends and close ties. To address the concern that such peer effects may impact the primary deferred wage effects, we will control for the share of workplace friends that are treated in augmented versions of our main specifications (detailed below). Intuitively, this allows us to control

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for spillovers due to peer effects if these are more likely to appear for workers who have an exogenously larger share of their social network assigned to treatment. Formally, we will implement this test for spillovers using the following specification:

$$y_{(i)st} = \alpha + \beta Treat + \pi Friend_i^{\text{Treat}} + \rho Friend_i + \delta_s + \gamma Z_i + y_{(i)sB} + \epsilon \qquad (2)$$

where $Friend^{\text{Treat}}$ is the number of workplace friends ties that receive the deferred wages treatment and $Friend_i$ is the total number of workplace friends for an individual. In our analysis, our preferred measure of friendship centers on social ties that an individual would conduct financial transactions. All our friend counts will include only those friends who are actually in the experiment those who expressed interest in deferred wages during the final offers in late January and early February. In supplementary analysis, we will also create alternative definitions for friendship based on the intensity of social interaction or whether a co-worker participates in an informal savings group with a given individual.

4.6 Heterogeneous Effects

We will test for heterogeneous effects of deferred wages using an additional treatment that we administered for those who received deferred wages. The information sessions for each worker provide examples of take-home pay under different assumptions about minimum payout and maximum contribution. We randomized varied whether workers received an example where the maximum contribution was MK 3,000 or MK 7,000. Workers had even probability of receiving either of these two values for the example.

Our analysis will test whether receiving the MK 7,000 example has effects on whether individuals opt into the deferred wages treatment (intensive margin) or the amount of contributions to their deferred wage contributions (extensive margin). Formally, we will use the following specification to compare participation and savings for members of the treatment

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group:

$$D_{(i)s} = \alpha + \beta Treat_i^{\text{MK7,000}} + \gamma Z_i + \epsilon \tag{3}$$

where $D_{(i)s}$ is deferred wages outcome such as a dummy for take-up or the deferred wages maximum contribution selected at the beginning of the season. The indicator $Treat_i^{\text{MK7,000}}$ is equal to 1 if the individual received the MK 7,000 version for the example of the maximum contribution for deferred wages example during the information session and is zero otherwise. The omitted group in this case is the set of workers who received the MK 3,000 version for the example of the maximum contribution for deferred wages.

Using the full sample of both treatment and control group individuals, we will augment our main specification to test for heterogeneous effects of deferred wages. Specifically, we will use the following specification:

$$y_{(i)st} = \alpha + \beta_1 Treat_i^{\text{MK3,000}} + \beta_2 \beta Treat_i^{\text{MK7,000}} + \delta_s + \gamma Z_i + y_{(i)sB} + \epsilon \tag{4}$$

where the indicator $Treat_i^{\text{MK3,000}}$ is equal to 1 if the individual received the MK 3,000 version for the example of the maximum contribution for deferred wages example during the information session and is zero otherwise. The omitted group in this case is the set of control group workers.

In additional analysis, we will also examine whether the impact of deferred wages varies with pre-determined worker characteristics, measured at baseline (Z_i). Specifically, we will use the following augmented version of our main specification:

$$y_{(i)st} = \alpha + \beta Treat_i + \nu Treat_i \times Z_i + \delta_s + \gamma Z_i + y_{(i)sB} + \epsilon \tag{5}$$

In particular, we will examine heterogeneity along the following dimensions of baseline characteristics:

- Expected savings via deferred wages (computed from expected typical income and

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preferences over the min payday payment and the max contribution)

- Gender

- Income

- Number of friends

- Baseline value of stored foods

- Baseline value of food security

- Baseline expenditure

- Education

4.7   Risk and Approach to Attrition

We believe attrition is not a significant concern because the sample consists of regularly employed workers whom we survey at their place of employment. We plan to handle any potential attrition from our sample by conducting standard tests of differential attrition across study arms, both overall and by baseline covariates.

4.8   Accounting for Multiple Inference

Given that we measure and estimate effects on a large range of outcomes, we will account for multiple hypotheses testing using outcome variable indices and family-wise p-value adjustment approaches. For the analysis of index measures, we will construct these measures using weights based on Anderson (2008) for each major category of outcomes listed below. We will then test for the impact of deferred wages on each index variable. For within category analysis, we report unadjusted p-values in addition to p-values that adjust for multiple comparisons using the two-step procedure from Benjamini et al. (2006) which controls for the false discovery rate (FDR). We will also explore other multiple hypothesis adjustment correction tests.

4.9 Outcome Variables

This section lists outcome variables for analysis by category. Variables and categories marked by an asterisk (*) will be excluded when applying multiple hypothesis testing adjustments. Note that a second document will contain our pre-analysis plan for analyzing expenditure, consumption, savings and additional measures of financial behavior and economic well-being. The focus of this document is on specifying our plan for analyzing the impact of deferred wages on labor market activity and work performance.

Lujeri Work Performance (Based on Administrative Data):

- Average Daily Output

- Total Income*

- Attendance

Lujeri Financial Outcomes (Based on Administrative Data)

- Program sign up

- Minimum income threshold choice

- Maximum deduction choice

- Deferred wages deductions per fortnight

- Deferred wages sum of deductions*

- Deferred wages share of income net of non-deferred wages deductions*

- Sum of Lujeri financial deductions (e.g., Lujeri deductions for firm-based loans)*

- Deferred wages payouts