Shared-ownership Microfinance:
Pre-Analysis Plan

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Fieldwork location:	Lahore, Pakistan
Fieldwork dates:	Dec 2016 to Feb 2018 (rolling baseline);
	Feb 2018 to May 2019 (12-month treatment follow-up).
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1   Introduction

This document outlines our pre-analysis plan for an experiment on shared-ownership microfinance in Lahore, Pakistan. The document summarises our experiment, our data and our plan of regressions. We intend to submit this Pre-Analysis Plan to the AEA RCT Registry.

2   Sampling

2.1   Study context

This study was conducted with clients of Akhuwat, one of the fastest growing microfinance institutions in Pakistan. Akhuwat is based in Lahore and operates in 775 branches across the country, with over 930,000 active borrowers and an outstanding loan portfolio of PKR 15.6 billion (approximately $135 million).[1]   We sampled from microenterprises that had passed the relatively

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[1] Information is correct as of 03 April 2018.

simple screening process of Akhuwat, by having 'graduated' from being small-scale borrowers to financing larger amounts. Specifically, the sample consisted of microenterprise owners who had successfully completed at least one loan cycle with Akhuwat, had reached the maximum permitted borrowing amount (approximately \$450), and had expressed an interest in expanding their business by purchasing a fixed asset.

2.2   Baseline workshop structure

Eligible clients were invited to a workshop, where they completed a comprehensive survey, which included questions asking about individual and household characteristics, household finances (loans, savings, incomes, and expenditures), business revenues, profits, expenditures and assets, and business management practices. Following the survey, all microenterprise owners participated in a set of detailed behavioural games, designed to measure risk preferences, loss aversion, time preferences, and cognitive ability. There were two risk preference elicitation activities; the first was a survey-based measure, using a series of questions that sought to gauge respondents' risk-taking in their occupation, financial matters, and faith in others.[2] The second measure of risk preferences was incentivised, where respondents were posed a series of 30 questions that required them to choose between a certain amount of money or an uncertain investment option, which had two possible outcomes: (i) a 'bad' outcome, with a payoff of zero; or (ii) a 'good' outcome, with a payoff of PKR 1,000.[3] In the loss aversion activity, respondents were offered a series of binary-outcome investment choices that involved a large positive outcome or a (gradually increasing) negative outcome, which they could accept or reject. If they accepted the investments and the loss aversion

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[2] Specifically, the questions were: *(i) "How would you rate your willingness to take risks in financial matters?"; (ii) "How would you rate your willingness to take risks in your occupation?"; (iii) "How would you rate your willingness to take risks when it comes to having faith in other people?"; and (iv) "How do you see yourself? Are you generally a person who is fully willing to take risks or do you try to avoid taking risks?".* Responses were given on a scale of 1 to 10, with 0 representing 'risk-averse' and 10 representing 'fully prepared to take risks'. The questions were adapted from Dohmen et al. (2011), have been used by other researchers in a number of settings and have demonstrated a reasonably strong correlation with incentivised measures of risk preferences.

[3] We adapted the measures used by Barr and Packard (2002) and Vieider et al. (2015).

activity was chosen for payment at the end of the workshop,[4] then a realised loss would be taken out of their guaranteed workshop participation fee; as such, this represented a potential real loss.[5] In the time-preference elicitation activity, individuals were offered a series of choices between an amount of money paid on the same day as the workshop or (gradually increasing) amounts of money one month from the workshop.[6]

3 Contract structure

We implemented two types of shared-ownership contract. Both were 18-month contracts that allowed clients to finance the purchase of a fixed asset up to the value of PKR 200,000 (approximately $1,800). The client was obligated to initially purchase 10% of the asset, with Akhuwat purchasing the remaining 90%. The difference in the contracts was in how clients were required to purchase Akhuwat's share:

(1) Fixed-repayment contract: The client was required to purchase 5% of Akhuwat's ownership share each month. At the end of the 18 months, the client would fully own the asset.

(2) Flexible-repayment contract: The client was only obliged to purchase 2.5% of Akhuwat's ownership share each month. The client also had the option to pay *more* than what was required in any given month. If the client purchased all of Akhuwat's share before the 18-month period was over, the contract would terminate. If the client had not fully purchased Akhuwat's share at the end of 18 months, the asset would be sold in the market and proceeds disbursed in proportion to the ownership shares at time of sale (reflecting the shared-ownership structure).

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[4] Before conducting all activities, participants were informed that, at the end of the behavioural games session, one of the incentivised activities would be selected for payment by physically drawing a ball from a bag. Within the selected activity, balls would be drawn to select the one final question that would be used for payment. As such, participants were required to answer all questions attentively, because any question could have been selected. This method also allowed the use of payment amounts that were relatively large, with the average payment being approximately three times as large as median daily business profits for microenterprises in the sample. From a methodological perspective, Charness et al. (2016) show that paying for only a (randomly selected) subset of all activities is at least as effective as paying for all of them, and can actually be more effective in terms of helping to avoid wealth effects and hedging within the behavioural games session.

[5] We adapted the loss aversion measure used by Bartling et al. (2014).

[6] The time-preference activity was also conducted using a 'far frame', where money was offered one month forward versus two months forward.

Both contracts were designed to be consistent with locally accepted financial norms. The contract structure was that of *'diminishing musharakah'*, which is a declining-balance partnership agreement that is commonly used to finance the purchase of an asset where both parties share the risk and returns. This type of arrangement combines two distinct Islamic legal contracts under one product: a partnership contract (*'musharakah'*) and a rental contract (*'ijarah'*). It is important to note that, when communicating with participants, neither the Arabic words nor any terms with religious connotations were used; instead the local equivalents for joint ownership (*'shirakat'*) and rent (*'kirayah'*) were employed.

Since the asset is solely used by the client, clients are also obliged to make monthly rental payments based on the proportional ownership of the asset at the start of the month. The rental amount was based on a nominal annual rate of 12%. Table 1 provides an example of the required payment structure under the fixed-repayment contract for an asset costing PKR 100,000, where the client has paid PKR 10,000 to initially purchase 10% of the asset. A nominal annual rental rate of 12% implies monthly rent of 1% of the asset's value, which is PKR 1,000. The final rental payment due at the end of the first month is PKR 900, reflecting the fact that Akhuwat initially owns 90% of the asset. In addition to the rent, the client is also obliged to purchase 5% of Akhuwat's ownership share each month, based on the initial asset value of PKR 100,000, which implies an amount of PKR 5,000. At the start of the second month, Akhuwat's ownership share is 85%, and a reduced rent of PKR 850 is required at the end of the month, as well as the regular requirement of PKR 5,000 to purchase 5% of Akhuwat's share. The contract continues in this manner until the 18th month, when the client purchases the final 5% of Akhuwat's ownership share, and the contract ends. Over the 18-month duration of the contract, total rental payments are PKR 8,550, which is 9.5% of the initial financing amount of PKR 90,000.

Table 1: CONTRACT STRUCTURE: FIXED-REPAYMENT CONTRACT

MONTH	AKHUWAT OWNERSHIP	PAYMENT		TOTAL PAYMENT
		RENT	OWNERSHIP	
1	90.0%	900	5,000	5,900
2	85.0%	850	5,000	5,850
3	80.0%	800	5,000	5,800
4	75.0%	750	5,000	5,750
5	70.0%	700	5,000	5,700
6	65.0%	650	5,000	5,650
7	60.0%	600	5,000	5,600
8	55.0%	550	5,000	5,550
9	50.0%	500	5,000	5,500
10	45.0%	450	5,000	5,450
11	40.0%	400	5,000	5,400
12	35.0%	350	5,000	5,350
13	30.0%	300	5,000	5,300
14	25.0%	250	5,000	5,250
15	20.0%	200	5,000	5,200
16	15.0%	150	5,000	5,150
17	10.0%	100	5,000	5,100
18	5.0%	50	5,000	5,050
TOTAL		8,550	90,000	98,550

Table 2 provides two examples for the required payment structure under the flexible-repayment contract, again using an initial asset value of PKR 100,000. The first example illustrates the absolute minimum repayment requirement for the client, which is PKR 2,500 per month. Since Akhuwat's ownership share decreases more gradually than it does under the fixed-repayment contract, the cumulative rental payments to Akhuwat are 45% higher in the flexible-repayment contract. The second example presents a case where the client repays PKR 10,000 every month, which results in a more rapidly decreasing ownership share for Akhuwat (and lower rental payments), and the contract ending at the end of the ninth month. The default procedure for both contracts is identical, and reflects the shared-ownership nature of the contracts. Specifically, if a client misses a payment, they are given a one-month grace period. If they still do not pay, this triggers a default procedure whereby the asset would be repossessed and sold in the market. Proceeds would then be disbursed proportional to the ownership shares at the time of the default, reflecting the shared-ownership structure.

Table 2: CONTRACT STRUCTURE: FLEXIBLE-REPAYMENT CONTRACT

MONTH	AKHUWAT OWNERSHIP	PAYMENT EXAMPLE 1			AKHUWAT OWNERSHIP	PAYMENT EXAMPLE 2		
		RENT	SHARE	TOTAL		RENT	SHARE	TOTAL
1	90.0%	900	2,500	3,400	90.0%	900	10,000	10,900
2	87.5%	875	2,500	3,375	80.0%	800	10,000	10,800
3	85.0%	850	2,500	3,350	70.0%	700	10,000	10,700
4	82.0%	825	2,500	3,325	60.0%	600	10,000	10,600
5	80.0%	800	2,500	3,300	50.0%	500	10,000	10,500
6	77.5%	775	2,500	3,275	40.0%	400	10,000	10,400
7	75.0%	750	2,500	3,250	30.0%	300	10,000	10,300
8	72.5%	725	2,500	3,225	20.0%	200	10,000	10,200
9	70.0%	700	2,500	3,200	10.0%	100	10,000	10,100
10	67.5%	675	2,500	3,175	.	.	.	.
11	65.0%	650	2,500	3,150	.	.	.	.
12	62.5%	625	2,500	3,125	.	.	.	.
13	60.0%	600	2,500	3,100	.	.	.	.
14	57.5%	575	2,500	3,075	.	.	.	.
15	55.0%	550	2,500	3,050	.	.	.	.
16	52.5%	525	2,500	3,025	.	.	.	.
17	50.0%	500	2,500	3,000	.	.	.	.
18	47.5%	475	2,500	2,975	.	.	.	.
TOTAL		12,375	45,000	57,375		4,500	90,000	94,500

4 Description of the interventions and randomisation

During the workshops, after clients had completed their surveys and behavioural games, the fixed-repayment contract was described to them using a vignette and example calculations. The flexible-repayment contract was not demonstrated, based on insights from an earlier pilot that some microenterprise owners found it slightly overwhelming to be introduced to the relatively unfamiliar concepts of joint ownership and a changing rental amount as well as the flexible-repayment option in the same session. By only initially explaining the fixed-repayment contract, clients were gradually introduced to the idea of shared-ownership and rent calculations based on ownership shares. All participants were subsequently given a one-page information sheet and allowed a few days to

consider the contract and discuss it with their families, before a visit to their home to elicit their decision on whether they would take the fixed-repayment contract if it was offered to them. Clients were informed that contract offers would be made randomly, and that those not offered contracts would still be eligible for a zero-interest loan of up to PKR 50,000 ($450) from Akhuwat.

Following the collection of workshop data, and before the visits were conducted, all clients were randomised into three different groups:

   (i) A control group, who had access to an interest-free loan of up to PKR 50,000;

  (ii) Treatment group 1 (T1), who were only offered the fixed-repayment contract; and

 (iii) Treatment group 2 (T2), who were offered the flexible-repayment contract, which would subsequently be explained to them.

Randomisation was stratified on microenterprise type, performance and gender, using matched sextuplets following Athey and Imbens (2017), who recommend stratifying as much as possible so that each stratum contains at least two treated and two control units. Once all participants were allocated their treatment status, they were individually visited by Akhuwat field officers and research assistants, who were given a tablet computer, with a pre-programmed survey form that contained the treatment status of all participants tagged by a unique ID. Field officers were not informed of the treatment status of the client that they were visiting. They were required to ask all clients the following question: *"If the computer selects you for the contract that we explained to you at the workshop, would you take it?"*. Participants were reminded that this was a binding decision, as was explained to them at the workshop, and that their randomly generated treatment status would only be revealed after they had made the decision. As such, we obtained a 'yes' or 'no' from each participant for whether they would take the fixed-repayment contract if it was offered to them.

After entering participants' responses into tablets, the final treatment status was revealed. Individuals randomised into the control group were informed that they would not be offered the contract, but that they would be eligible for the zero-interest loan of up to PKR 50,000 from Akhuwat. Individuals who were randomised into T1 were either told that they would not receive the contract (if they pre-committed to reject the fixed-repayment contract) or that they would receive it (if they originally accepted it), and that contract signing and asset procurement would begin in due course. Individuals who were randomised into T2 were notified that there was a new contract that the field

officer would explain to them. The new contract was framed as similar to the fixed-repayment contract, but with the added optionality that they would only be required to make a 2.5% ownership payment every month, compared to the required 5% monthly ownership payment for the fixed-repayment contract (which nests the flexible-repayment contract). All other aspects of the contract were identical.[7] Individuals were then given a one-page document with a simple summary of the structure of the flexible-repayment contract, with diagrams and tables to illustrate the repayment schedule. Participants were informed that they would be visited after a few days to take their decision on whether they would accept the flexible-repayment contract. As such, we used the same explanation, waiting period, visit and decision elicitation procedure as for T1. If individuals decided to reject the flexible contract in their follow-up visit, we reverted back to the decision they initially made when offered the fixed-repayment contract; if they pre-committed to reject it, they were given no contract, but if they had accepted it, they would immediately start with the process of contract signing and asset disbursement under the fixed-repayment contract.

5 Data

5.1 Construction of outcome variables

We define the following outcome variables:

DEFINITION	SOURCE (QUESTIONNAIRE CODE)	NEW NAME?
BUSINESS PERFORMANCE		
Dummy: Respondent runs a business	`biz_run`	
Number of businesses owned by household members	`biz_number`	
Business assets (primary business)	`biz_fa1_numb` $\times$ `biz_fa1_val` $+ \ldots +$ `biz_fa5_numb` $\times$ `biz_fa5_val` $+$ `biz_ca_cash` $+$ `biz_ca_debt` $+$ `biz_ca_inv`	`biz_ta`
Revenues in the previous 30 days (primary business)	`biz_rev_m0`	

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[7] This design feature is similar to the ex-post waivers implemented by Karlan and Zinman (2009), who use it to distinguish between moral hazard and adverse selection in the context of conventional microcredit interest rates.

Profits in the previous 30 days (primary business)	`biz_prof_m0`	
Current number of employees/apprentices (primary business, excluding self)	`biz_emps_tot`	

BUSINESS ASSETS

Value of fixed assets (primary business)	`biz_fa1_numb × biz_fa1_val + ...+ biz_fa5_numb × biz_fa5_val`	`biz_tfa`
Cash (primary business)	`biz_ca_cash`	
Receivables (primary business)	`biz_ca_debt`	
Inventory (primary business)	`biz_ca_inv`	

HOUSEHOLD OUTCOMES

Household income (previous 30 days)	`hhincm_biz_m0 + hhincm_privemp_m0 + hhincm_caslab_m0 + hhincm_govemp_m0 + hhincm_rent_m0 + hhincm_govpens_m0 + hhincm_govsup_m0 + hhincm_remitt_m0 + hhincm_agr_m0 + hhincm_other_m0`	`hhincm_total_m0`
Household expenditures (previous 30 days)	`hhexp_clothes_c_m0 + hhexp_clothes_m_m0 + hhexp_clothes_f_m0 + hhexp_food_m0 + hhexp_bills_m0 + hhexp_hhitems_m0 + hhexp_school_m0 + hhexp_health_m0 + hhexp_transport_m0 + hhexp_phone_m0 + hhexp_temptation_m0 + hhexp_specialoccasions_m0 / 3 + hhexp_other_m0`	`hhexp_total_m0`
Household savings[8]	`hh_bank_amt + sav_cash_amt + sav_jewel_amt + sav_mfibank_amt + sav_friend_amt + sav_other_amt`	`hh_sav_tot`
Household debt	`loan_akh_oweamt + loan_family_oweamt + loan_other_oweamt`	`hh_debt_tot`
Value of household assets[9]	`hh_assets1_v + ...+ hh_assets31_v`	`hh_assets_tot`

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[8] This does not include any savings or debts from participation in ROSCAs/'committees'.

[9] This does not include any estimate for the value of land or property.

WAGE EMPLOYMENT (RESPONDENT)

Dummy: Has a regular wage job	`wagemp_have`	
Number of regular wage jobs	`wagemp_number`	
Number of hours per week in wage work	`wagemp_hours` × `wagemp_days`	`wagemp_hoursweek`
Monthly wage income	`wagemp_income`	

ATTITUDES AND BELIEFS ABOUT SAVING (RESPONDENT)

Finds it hard to save	Dummy: (`bhvrl_1` == 4 or `bhvrl_1` == 5)	`att_diff`
Spends on unnecessary purchases	Dummy: (`bhvrl_2` == 1 or `bhvrl_2` == 2)	`att_unp`
Faces pressure to share	Dummy: (`bhvrl_3` == 4 or `bhvrl_3` == 5)	`att_pressure`
Other decision-maker finds it hard to save	Dummy: (`bhvrl_4` == 4 or `bhvrl_4` == 5)	`att_diff_other`
Other decision-maker spends on unnecessary purchases	Dummy: (`bhvrl_5` == 1 or `bhvrl_5` == 2)	`att_unp_other`
Good at keeping track of own money	Dummy: (`bhvrl_8` == 4 or `bhvrl_8` == 5)	`att_track`
Expect to be financially better off four weeks from now	Dummy: (`bhvrl_14` == 4 or `bhvrl_14` == 5)	`att_expec1`
Expect to be financially better off one year from now	Dummy: (`bhvrl_15` == 4 or `bhvrl_15` == 5)	`att_expec2`

BUSINESS MANAGEMENT PRACTICES

Score for management practices (weighted using covariance matrix from the control group, as in Anderson (2008))	Weighted sum of all variables listed in the following four rows	`mgmt_all`
Score for marketing practices (weighted using covariance matrix from the control group, as in Anderson (2008))	Weighted sum of `bizmp_1` to `bizmp_7`	`mgmt_marketing`

Score for buying and stock control practices (weighted using covariance matrix from the control group, as in Anderson (2008))	Weighted sum of `bizmp_8` to `bizmp_10` (`bizmp_10` recoded so that 1/2/3 is set to 1; 4 is set to 0)	`mgmt_buying`
Score for costing and record-keeping practices (weighted using covariance matrix from the control group, as in Anderson (2008))	Weighted sum of `biz_12`, `biz_13`, and `biz_16` to `biz_21`	`mgmt_records`
Score for financial planning practices (weighted using covariance matrix from the control group, as in Anderson (2008))	Weighted sum of `bizmp_22` to `bizmp_28`, including `bizmp_23a` (`bizmp_23a` recoded so that 4 is set to 1, and set to 0 otherwise)	`mgmt_financial`

5.2 Construction of other variables

For the purpose of testing balance and heterogeneity analysis, we define the following other variables, relating to individual and household characteristics:

DEFINITION	SOURCE (QUESTIONNAIRE CODE)	NEW NAME?
OTHER VARIABLES		
Dummy: Respondent is female	Dummy: (`gender` == 1)	`resp_gender`
Dummy: Respondent is married	Dummy: (`married` == 1)	`resp_married`
Respondent's age	`age`	
Dummy: Respondent can read a newspaper in Urdu	Dummy: (`urdu_read` == 1)	`resp_urdu_read`
Dummy: Respondent can write a letter in Urdu	Dummy: (`urdu_write` == 1)	`resp_urdu_write`
Respondent's highest completed level of education	`educ`	
Number of people in the household (including respondent)	`hh_size`	
Number of people in the household earning any form of income	`hh_earners`	

Walking distance to Akhuwat office (minutes)	`akh_office_dist`	
How many years ago respondent got involved in the current business	`biz_years`	
Index of incentivised risk preference elicitation activity	Unweighted sum of `rp1_25_0` to `rp1_25_10`, `rp1_50_0` to `rp1_50_10` and `rp1_75_0` to `rp1_75_10`.	`rp1`
Index of incentivised loss aversion elicitation activity	Unweighted sum of `loss_1` to `loss_10`	`loss`
Index of incentivised time preference elicitation activity	Unweighted sum of `tp1_1` to `tp1_10` and `tp2_1` to `tp2_10`	`tp`
Index of numeracy skills (weighted using covariance matrix from the control group, as in Anderson (2008))	Weighted sum of `math_1` to `math_8`, `math_9` and `math_10` (with each variable recoded so that a correct response to the mathematical question is coded as 1)	`math`

6   Analysis

6.1   Testing balance

Denote the treatments in the following way:

TREATMENT	DESCRIPTION	DUMMY VARIABLE
treatment 1	assigned to the fixed-repayment contract	`T1`
treatment 2	offered the flexible-repayment contract	`T2`

Note that every respondent assigned to treatment 2 was entitled to refuse the flexible-repayment contract, in which case they were eligible to accept the fixed-repayment contract if (and only if) they had previously agreed to the fixed-repayment contract.

We will test baseline balance by running the following estimation (where we denote the randomisation strata — that is, the matched sextuplets — using s_i (equivalently, the variable '`StrataID`'),

and where we use robust standard errors; (*i.e.* we cluster at the individual level):

$$y_{i0} = \beta_0 + \beta_1 \cdot \text{T1}_i + \beta_2 \cdot \text{T2}_i + \phi_{s_i} + \varepsilon_{i0} \tag{1}$$

```
reghdfe y_pre T1 T2 if wave == 0, ///
    cluster(IndividualID) absorb(StrataID)
```
(2)

We will run this estimation for all of the variables defined in sections 5.1 and 5.2. We will report a joint test of the null hypothesis $H_0 : \beta_1 = \beta_2 = 0$ for all outcomes. (We have already conducted preliminary analysis of treatment balance, and our initial results suggest that the treatment was well balanced.)

6.2 Effects of the interventions: Pooling treatments

Define a dummy variable $\text{T}_i = \text{T1}_i + \text{T2}_i$ (that is, a dummy for whether individual i was offered *either* of the two contract types — whether through assignment to treatment 1 or to treatment 2).

Denote the outcome of interest for individual i in follow-up period t as y_{it}. Our primary estimating specification is ANCOVA with strata dummies, pooling across treatments and clustering at the respondent level:

$$y_{it} = \beta_0 + \beta_1 \cdot \text{T}_i + \beta_2 \cdot y_{i0} + \phi_{s_i} + \varepsilon_{it} \tag{3}$$

```
reghdfe y T y_pre if wave > 0, ///
    cluster(IndividualID) absorb(StrataID)
```
(4)

In our primary specification, we plan to pool across follow-up waves. (We have follow-up waves at three months, six months and 12 months; at the time of writing, we are completing the 12-month follow-up, and plan to have further follow-ups at 18 and 24 months.) We anticipate also disaggregating the analysis by wave, at least for primary outcomes.

Our coefficient of interest here is β_1, the intent to treat. Denote A1_i as a dummy for respondent i agreeing to sign contract 1 (that is, having an asset financed under the fixed-repayment contract)

and A2_i as a dummy for agreeing to sign contract 2 (that is, having an asset financed under the flexible-repayment contract). Denote A_i as a dummy for having an asset under financed under either contract (that is, $\text{A}_i = \text{A1}_i + \text{A2}_i$).

We will estimate the Local Average Treatment Effect by instrumenting agreement to either contract with assignment to either treatment (again, using ANCOVA with strata dummies):

$$y_{it} = \beta_0 + \beta_1 \cdot \text{A}_i + \beta_2 \cdot y_{i0} + \phi_{s_i} + \varepsilon_{it} \tag{5}$$
$$A_i = \alpha_0 + \alpha_1 \cdot \text{T}_i + \alpha_2 \cdot y_{i0} + \psi_{s_i} + \mu_i \tag{6}$$

```
reghdfe y (A = T) y_pre if wave > 0, ///
    cluster(IndividualID) absorb(StrataID)
```
$$\tag{7}$$

Under this specification, our coefficient of interest is β_1, the Local Average Treatment Effect of agreeing a contract (that is, the average effect for the subgroup of compliers).

6.3 Effects of the interventions: Separating treatments

To test whether the different types of contract have different effects, we will run two regressions. First, to test whether there are different effects by contract offers, we will estimate the following ITT specification:

$$y_{it} = \beta_0 + \beta_1 \cdot \text{T1}_i + \beta_2 \cdot \text{T2}_i + \beta_3 \cdot y_{i0} + \tau_{s_i} + \varepsilon_{it} \tag{8}$$

```
reghdfe y T1 T2 y_pre if wave > 0, ///
    cluster(IndividualID) absorb(StrataID)
```
$$\tag{9}$$

We will then test whether there are different effects by contract offers by testing $H_0 : \beta_1 = \beta_2$.

To test whether there are different effects by adoption of the different contracts, we will use a LATE specification, in which we instrument contract agreement with the random variation in contractual

offers:

$$y_{it} = \beta_0 + \beta_1 \cdot \texttt{A1}_i + \beta_2 \cdot \texttt{A2}_i + \beta_3 \cdot y_{i0} + \tau_{s_i} + \varepsilon_{it} \tag{10}$$

$$\texttt{A1}_i = \gamma_0 + \gamma_1 \cdot \texttt{T1}_i + \gamma_2 \cdot \texttt{T2}_i + \gamma_3 \cdot y_{i0} + \phi_{s_i} + \mu_i \tag{11}$$

$$\texttt{A2}_i = \delta_0 + \delta_1 \cdot \texttt{T1}_i + \delta_2 \cdot \texttt{T2}_i + \delta_3 \cdot y_{i0} + \omega_{s_i} + \nu_i \tag{12}$$

```
reghdfe y (A1 A2 = T1 T2) y_pre if wave > 0, ///
    cluster(IndividualID) absorb(StrataID)
```
$$\tag{13}$$

We will then test whether there are different effects by contract offers by testing $H_0 : \beta_1 = \beta_2$.

6.4 Heterogeneiety

We will test for heterogeneity of our results according to several dimensions of baseline heterogeneity, as defined in section 5.2. Specifically, we will test for heterogeneity by baseline measures of:

(i). Risk aversion (as measured through an incentivised risk elicitation exercise: see variable `rp1`);

(ii). Time preference (as measured through an incentivised time preference elicitation exercise: see variable `tp`);

(iii). Loss aversion (as measured through an incentivised loss aversion elicitation exercise: see variable `loss`);

(iv). Management practices within the respondent's business (as measured using the variable `mgmt_all`); and

(v). Numeracy (as measured using a digitspan exercise and several numerical calculation exercises: see variable `math`).

To test for heterogeneous effects along these dimensions, we will interact our treatment dummies (and, where appropriate, our dummies for contract agreement) with baseline measures of these variables. For each of the characteristics listed, we will trichotomize the variable — interacting in

each case with (i) a dummy for whether the baseline value lies at or below the lower tercile, (ii) a dummy for whether the baseline value lies strictly between the two terciles, and (iii) a dummy for whether the baseline values lies at or above the upper tercile. (Note that we prefer to trichotomize in this case — rather than the popular approach of dichotomising — for two related reasons. First, this approach recognises that much of the behaviour in incentivised elicitation tasks is 'extreme', in one direction or the other. Second, this approach follows the recommendation of Gelman (2015), that dichotomising may be valuable to give a clearer sense of a continuous underlying relationship.

7 Structure of analysis and correcting for multiple testing

7.1 Primary outcome: Business performance

Following Olken (2015), we begin by defining our primary outcomes of interest. Our key hypothesis is that our treatments affect the performance of respondents' businesses; our primary outcome family, therefore, is the set of variables earlier labelled as '**BUSINESS PERFORMANCE**'. We hypothesise that the treatments do this by increasing the stock of respondents' business assets; our primary family of mechanisms, therefore, is the set of variables earlier labelled as '**BUSINESS ASSETS**'.

For each of the outcomes in these families, we will run the estimation and hypothesis tests outlined in sections 6.2 and 6.3. For each hypothesis test, we will report two values:

(i). The usual p-value from a Wald test; and

(ii). We will report False Discovery Rate q-values, taken across the family of outcomes (Benjamini et al., 2006).

7.2 Secondary outcomes

We will repeat this same exercise (including within-family calculation of q-values) for our secondary outcome families — namely, for all of the other outcome families listed in section 5.1.

7.3   Further analysis

We anticipate we will run additional analysis to understand the mechanisms by which our contracts operate. We anticipate that this will include:

(i). Analysis of heterogeneity in take-up patterns (this analysis is already partly complete, and therefore not included in this pre-analysis plan);

(ii). Description of the increase in client ownership shares over time (comparing between the fixed-repayment and flexible-repayment contracts); and

(iii). Analysis of the use of repayment flexibility, as a function of both individual behavioural characteristics and observable shocks to the business and to the household.

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