

GUK administrative files

April 30, 2022

15:10

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I Read files

Read Administrative data.

- Arm is defined using `rand_arm` in `c:/data/GUK/received/cleaned_by_RA/GUKAdministrativeData.dta`, stored in `admin_data_wide2.rds`.
- Corrected: typos, erroneous date entries (12512 is guessed as 12/12), `hhid == 8169303, 8169305, 8169306, 8169316` are pure savers (value.repay in 48th month is set to zero),
- Reshaped: X1.date, X2.date variables to long (date, X1, X2, ...) format, with dates following `POSIX.ct`. Used `dcast` of `data.table`.

```
used      (Mb)  gc trigger      (Mb)  max used      (Mb)
Ncells    2458232  131.3     4270784   228.1    4270784   228.1
Vcells   122798959  936.9    195553110  1492.0  195553110  1492.0
```

```
[1] "C"
```

```
[1] "Japanese_Japan.932"
```

Save admin files.

```
saveRDS(ad1, paste0(path1234, "admin_data.rds"))
fwrite(ad1, paste0(path1234, "admin_data.prn"), sep = "\t", quote = F)
saveRDS(adw, paste0(path1234, "admin_data_wide.rds"))
fwrite(adw, paste0(path1234, "admin_data_wide.prn"), sep = "\t", quote = F)
```

II Individual level outcomes

```
used      (Mb)  gc trigger      (Mb)  max used      (Mb)
Ncells    2457775  131.3     4270784   228.1    4270784   228.1
Vcells   88683609  676.7    195553110  1492.0  195553110  1492.0
```

I created following variables (names of derived-variables start with upper scale characters.)

individual totals TotalRepaid, TotalSaved, TotalWithdrawn, TotalNetSaving, FullyRepaid.

group totals GroupSaving, GroupNetSaving, MeanGroupShortfall,
 cumulatives CumSaving, CumNetSaving, CumWithdrawal, CumRepaid, CumRepaidRate :=
 $\text{CumRepaid}/(125*45*3)$ or, $\text{CumRepaid}/(190*45*2)$, CumPlannedInstallment := $125 * \text{floor}(\text{WeeksElapsed})$ or $190 * \text{floor}(\text{WeeksElapsed})$.
 PlannedInstallment 125 or $190 * \text{NumberOfWeeks}$.
 repayment shortfall Shortfall := (planned installments)-(amount repaid), ShortfallRate := Shortfall/PlannedInstallment, value.Paid = repayment + net saving.
 normalised repayments NormRepaid := value.repay/NumberOfWeeks, NormNetDeficit := (plannedInstallment - value.Paid)/NumberOfWeeks. There are so many members who do not repay in full. To guard against classification errors in data, compute the total amount paid in, including saving.
 mean values of other members in a group OtherShortfall, OtherRepaid, CumOtherRepaid, CumOtherRepaidRate, OtherCost, OtherRevenue.

There are errors in admin data: Only repaid at month 48 and not receiving a loan. These households creditstatus are recorded as No. These are classified as pure savers in ID information in c:/data/GUK/received/cleaned_by_RA/clean_panel_data_by_section/. Change value.repay in 48th month as zero. This will make

	hhid	creditstatus	missing_followup	loanamount_1st				
1:	8169303	No	None missing	0				
2:	8169305	No	None missing	0				
3:	8169306	No	None missing	0				
4:	8169316	No	None missing	0				

	hhid	creditstatus	Tee	totalloan	value.repay	totalrepayment	totalsaving	
1:	8169303	No	48	0	16300	16300	360	
2:	8169305	No	48	0	16800	16800	-140	
3:	8169306	No	48	0	16300	16300	320	
4:	8169316	No	48	0	16424	16424	176	

	loanamount1st	DisDate1						
1:	0	<NA>						
2:	0	<NA>						
3:	0	<NA>						
4:	0	<NA>						

Finding II.1 Repayments are insufficient and late. Very few are on schedule. FIGURE 1 shows mean cumulative shortfall rates are 30%-50%. Full repayment is rare even at the end of 4th year. FIGURE 7 shows repayment shortfall is lower for arms without a grace period, shortfall is still being paid back after the loan matures in all arms, while FIGURE 8 shows shortfall and positive net saving coexist.

- Why does GUK accept saving from members with repayment shortfall (on monthly basis)?

Finding II.2 Almost no difference in repayment between ultra poor and moderately poor.

Repaid amount in 3 years \geq due amount. FullyRepaid: Sum of repayment \geq due amount.

	FullyRepaid		
Arm	0	1	

traditional	422	9
large	419	41
large grace	414	46
cattle	417	23

EffectivelyFullyRepaid: Sum of repayment + net saving \geq due amount.

EffectivelyFullyRepaid		
Arm	0	1
traditional	339	92
large	141	319
large grace	215	245
cattle	194	246

Types of membershipstatus:

continued original participants, “continuing”

replaced replacing the individual rejecters, “individual replacing”

new replacing the group rejecters, “group replacing”

dropouts individual rejecters (so Σ rejecters == Σ dropouts, for all arms), “dropped out”

group rejecters missing from admin data.

Borrowing patterns among the traditional arm:

planned Original traditional loan of 5600*3.

double Second loan is double of the first, 5600, 11200.

twice Two loans (roughly) equally split, 7840, 8960, or two disbursement dates are recorded.

EverRepaid		
membershipstatus	FALSE	
Continued	1248	
New member	960	
Replaced member	144	
Drop-out member	2544	

loanamount1st		
DisDate1	0	
<NA>	4896	

TradGroup2		
TradGroup	NotReceivedLoan	<NA>
planned	0	4608
twice	0	13680
double	0	0
<NA>	2208	0

Check how many of traditional arm subjects are receiving double sized loans.

loanamount2nd					
loanamount1st	0	5600	8960	11200	
	0	102	0	0	0
	5600	0	126	0	114
	7840	0	0	191	0

planned have their disbursement made by Dec, 2013, and attrition patterns.

TradGroup	DisDate1	DisDate2	DisDate3	Maturity12	Maturity23	N
1:	planned	2013-05-01	2014-04-01	2015-03-01	335 days	334 days 47

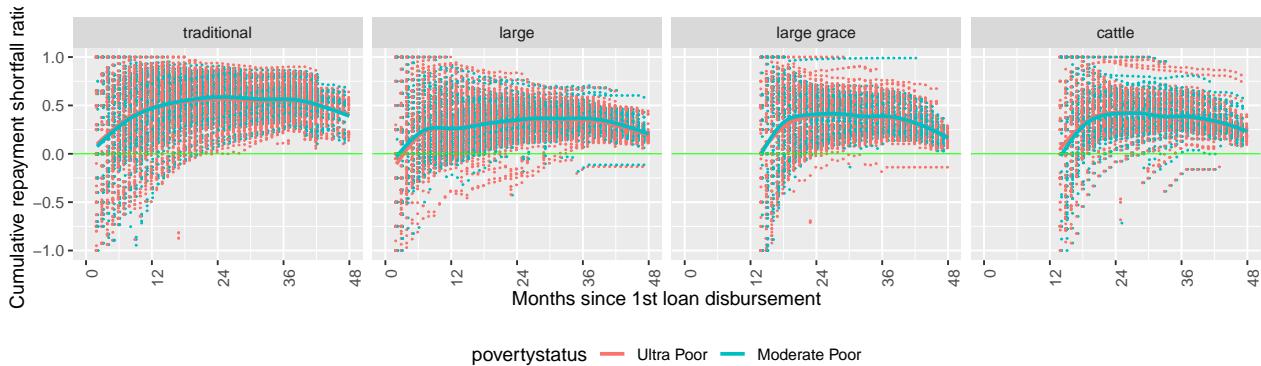


Figure 1: Monthly cumulative repayment shortfall ratios

Cumulative repayment shortfall ratio = (cumulative shortfall) / (cumulative planned installment). Dots indicate individuals.

	planned	2013-06-01	2014-04-01	2015-03-01	304	days	334	days	20
3:	planned	2013-06-01	2014-05-01	2015-04-01	334	days	335	days	10
4:	planned	2013-10-01	2014-10-01	2015-09-01	365	days	335	days	18
5:	planned	2013-11-01	2014-04-01	2015-03-01	151	days	334	days	2
6:	planned	2013-11-01	2014-10-01	2015-09-01	334	days	335	days	23
7:	planned	2013-12-01	2014-10-01	2015-09-01	304	days	335	days	6
8:	twice	2013-08-01	2014-09-01	<NA>	396	days	NA	days	9
9:	twice	2013-10-01	2014-09-01	<NA>	335	days	NA	days	11
10:	twice	2013-11-01	2014-10-01	<NA>	334	days	NA	days	104
11:	twice	2014-03-01	2015-02-01	<NA>	337	days	NA	days	1
12:	twice	2014-03-01	2015-04-01	<NA>	396	days	NA	days	2
13:	twice	2014-04-01	2015-02-01	<NA>	306	days	NA	days	14
14:	twice	2014-04-01	2015-04-01	<NA>	365	days	NA	days	3
15:	twice	2014-05-01	2015-02-01	<NA>	276	days	NA	days	13
16:	twice	2014-05-01	2015-04-01	<NA>	335	days	NA	days	12
17:	twice	2015-01-01	2015-02-01	<NA>	31	days	NA	days	7
18:	twice	2015-01-01	2015-12-01	<NA>	334	days	NA	days	74
19:	twice	2015-03-01	2015-02-01	<NA>	-28	days	NA	days	5
20:	twice	2015-09-01	2016-09-01	<NA>	366	days	NA	days	25
21:	twice	2015-12-01	2016-09-01	<NA>	275	days	NA	days	25
	TradGroup	DisDate1	DisDate2	DisDate3	Maturity12	Maturity23	N		

Save.

```
saveRDS(adw2, paste0(path1234, "admin_data_wide2.rds"))
fwrite(adw2, paste0(path1234, "admin_data_wide2.prn"), sep = "\t", quote = F)
```

Plots.

Plot weekly repayments, monthly total normalised by number of weeks in each month.

Finding II.3 FIGURE 4 shows revenues are not reported after 1 year. Some members stopped reporting nonzero cost after 3 years. Revenues are not informative throughout the period and costs are not informative after 3 years.

Weekly net saving.

- Net saving is almost always nonnegative (it does not have to be). Is there a rule for monthly overdraft?

Finding II.4 FIGURE 5 shows that members accumulate saving during the grace period, followed by lower saving after repayment begins. FIGURE 6 shows mean cumulative saving is

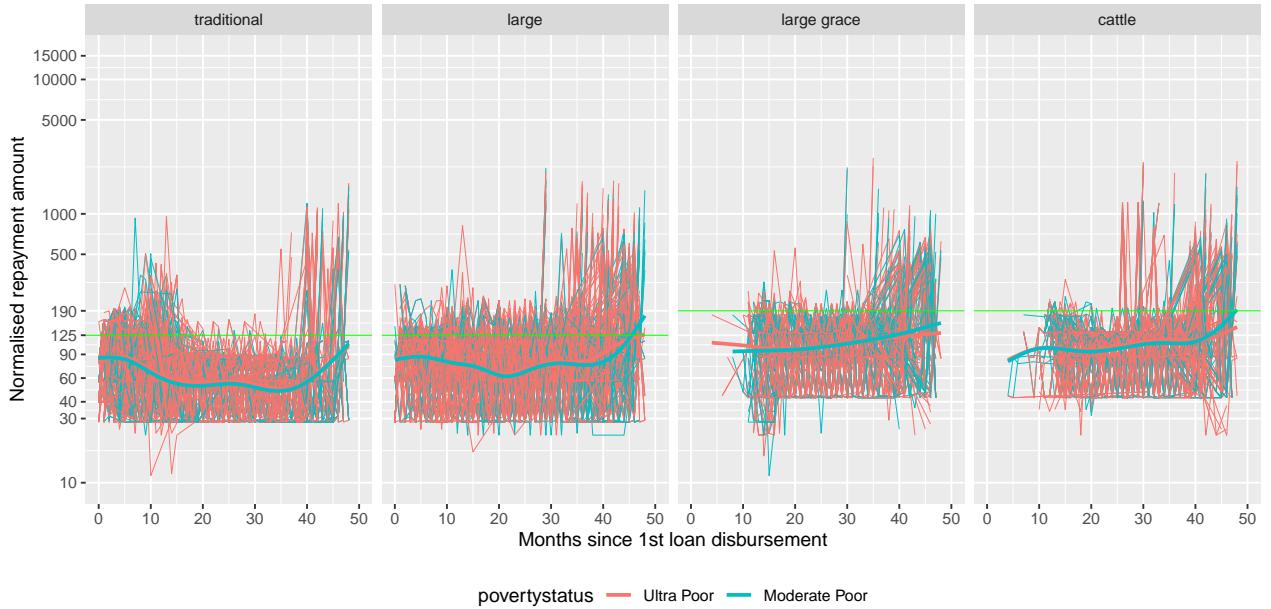


Figure 2: Normalised weekly repayment by elapsed months of members receiving loans by Nov, 2014

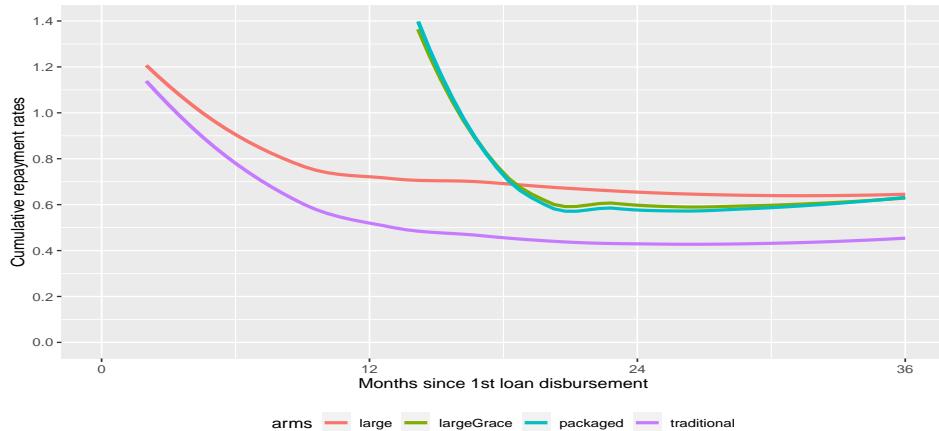


Figure 3: Nonparametric mean estimation of cumulative repayment rates by elapsed months

smallest with traditional loans (note also they have the lowest mean repayment rates) but it is most steady as other arms plateau after 36 months, possibly due to repaying the past shortfalls. Saving is positive prior to disbursement, more so for large scale loans. Given revenues are rarely reported, net saving is more informative than revenue.

Number of missed repayments.

Finding II.5 A significant fraction of members are missing repayment (zero repayment) in a month. FIGURE 9 shows that traditional loan arm has more misses, while loans with a grace period (larger installments) have more number of one-misses. More missed repayments in first 12 months of repayment in all arms.

- Net saving is almost always nonnegative (it does not have to be). Is there a rule for monthly overdraft?

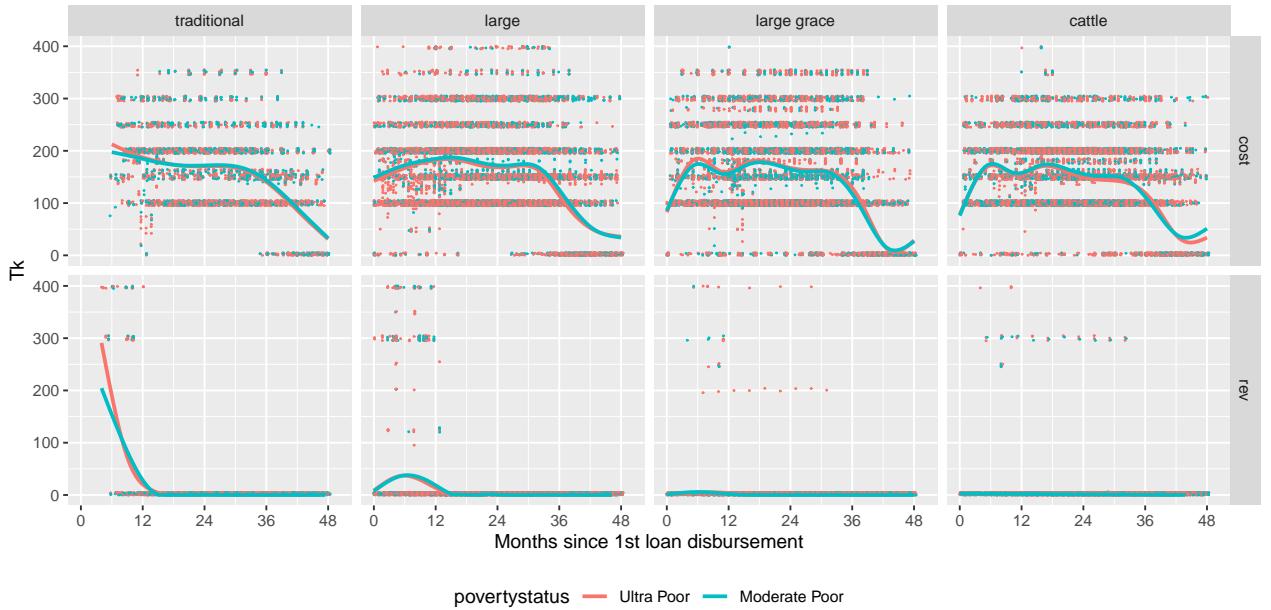


Figure 4: Revenues and costs
Dots indicate individuals. Dots are jittered to avoid plot overlap.

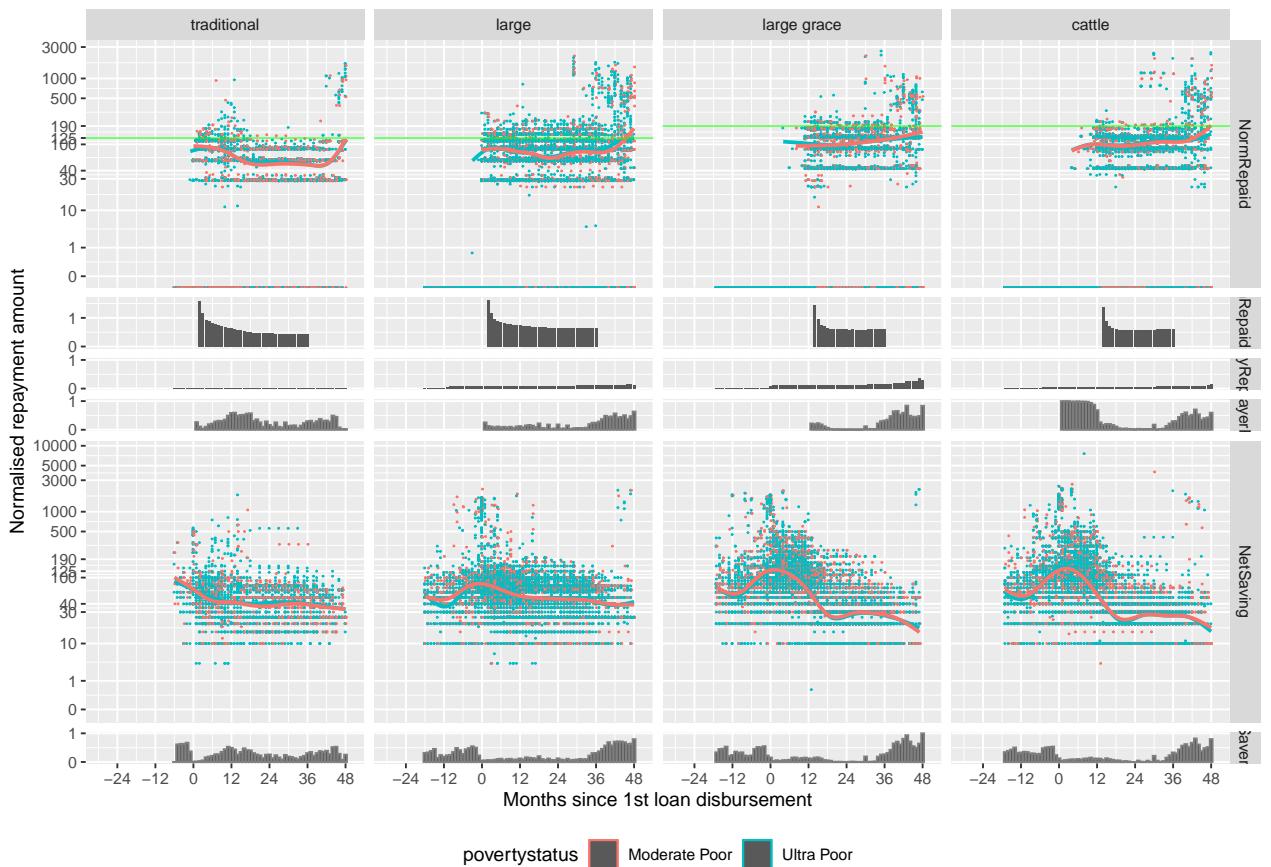


Figure 5: Weekly net saving

From top: Normalised repayment amount, cumulative repayment to cumulative scheduled installment ratio, mean fully repaid member ratio, mean zero-repayer ratio, net saving amount, mean zero-saver ratio

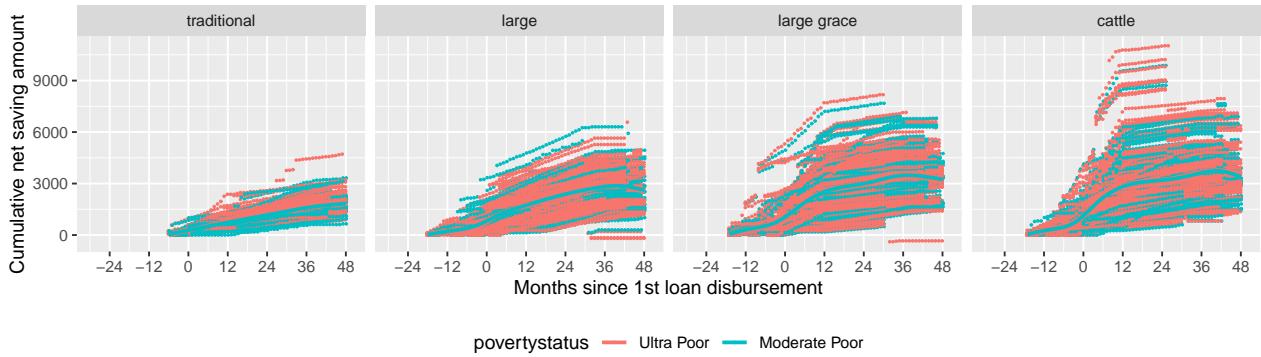


Figure 6: Cumulative net saving

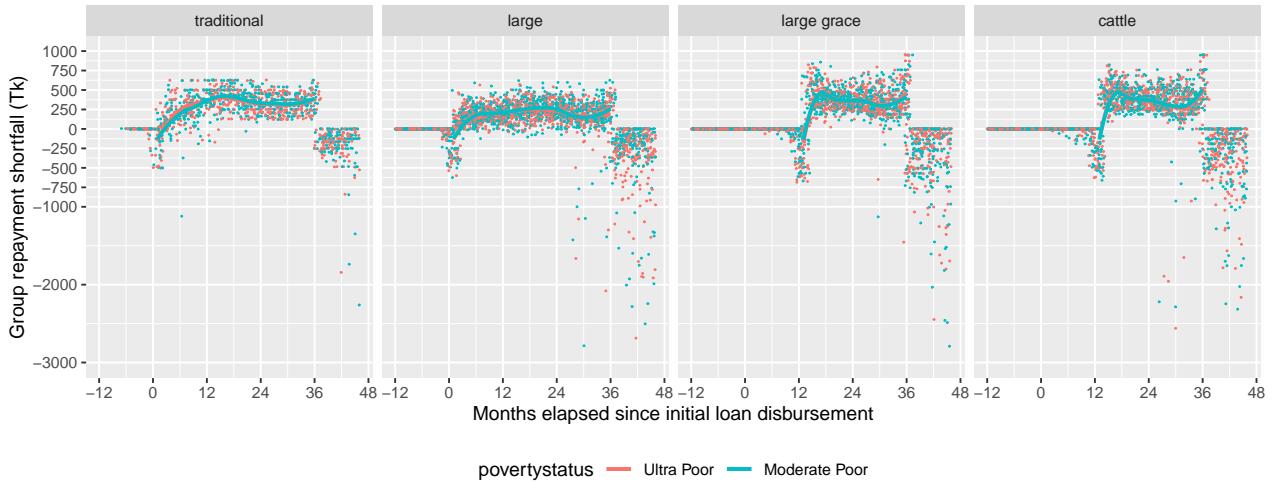


Figure 7: Repayment shortfall by group

Dots indicate group means. Dots are jittered to avoid plot overlap. Observations below -3000 Tk shortfall are omitted.

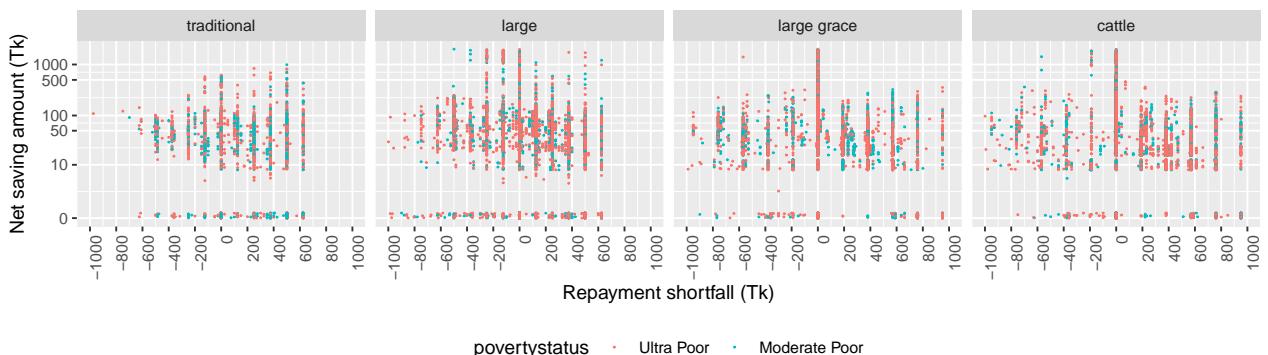


Figure 8: Repayment shortfall and net saving

Dots indicate individuals. Dots are jittered to avoid plot overlap. Observations below -1000 Tk shortfall (28, minimum and median values -6542, -2960, respectively) are omitted.

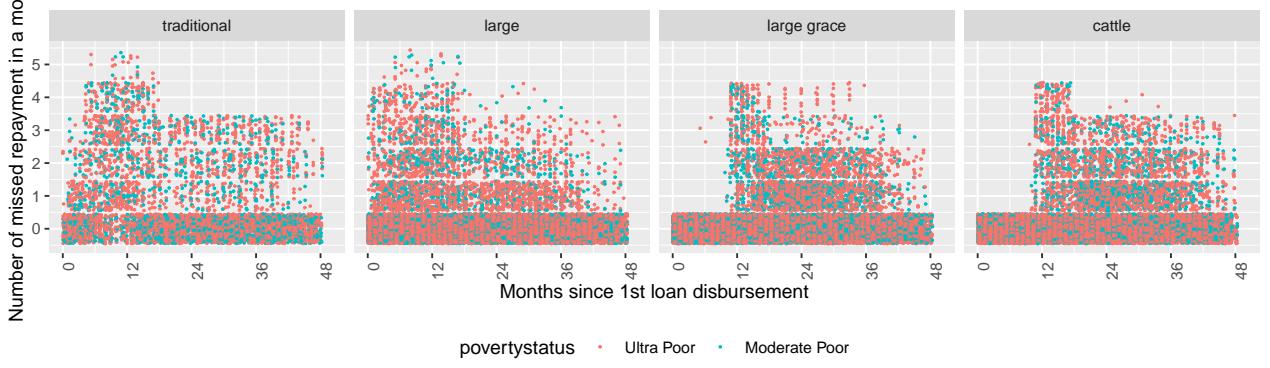


Figure 9: Number of missed repayment in a month
Dots indicate individuals. Dots are jittered to avoid plot overlap.

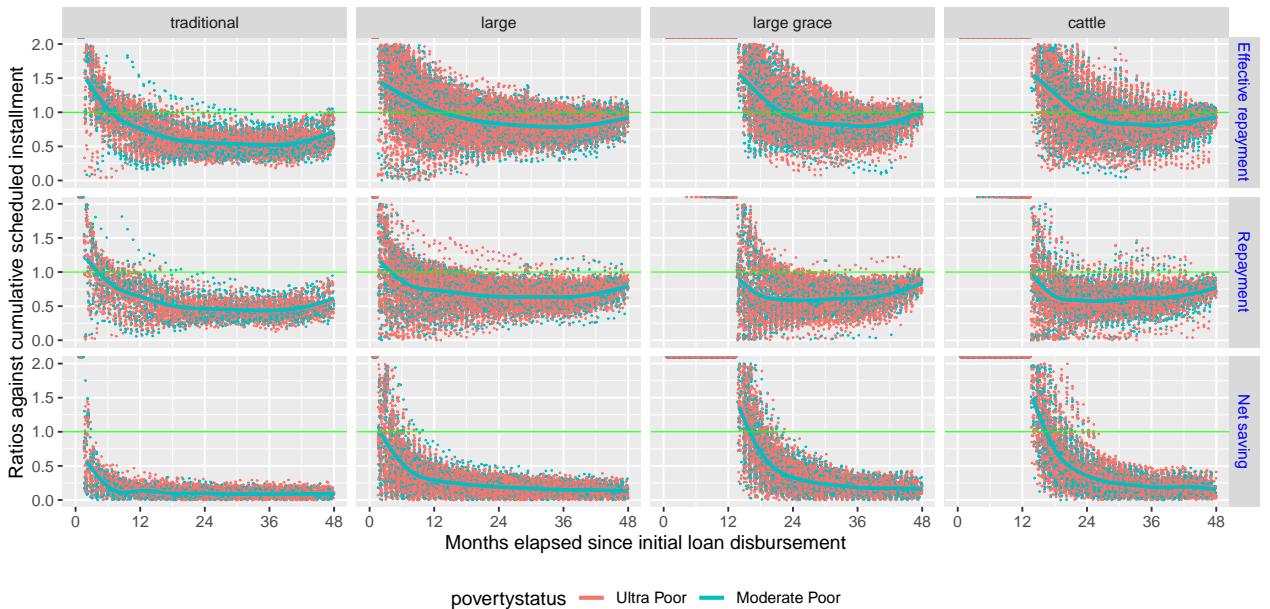


Figure 10: Reported repayment plus net saving as effective repayment

Effective repayment is repayment plus net saving where the latter is forfeit at the end of loan maturity when there is cumulative repayment shortfall. Cumulative effective repayment shortfall ratio = (cumulative repayment) / (cumulative scheduled installment). Cumulative net saving ratio = (cumulative net saving) / (cumulative scheduled installment). Dots indicate individuals.

Finding II.6 FIGURE 5 shows that members accumulate saving during the grace period, followed by lower saving after repayment begins. FIGURE 6 shows mean cumulative saving is smallest with traditional loans (note also they have the lowest mean repayment rates) but it is most steady as other arms plateau after 36 months, possibly due to repaying the past shortfalls. Saving is positive prior to disbursement, more so for large scale loans. Given revenues are rarely reported, net saving is more informative than revenue.

Finding II.7 It has been reported that lenders resort to forfeiting defaulter's saving in an effort to collect loans. FIGURE 10 shows, in the top panel, cumulative effective repayment rate, a ratio of cash flows into the lender divided by the cumulative planned installment. Mean cumulative effective repayment rate is lowest for the traditional arm. The bottom panel shows cumulative repayment rate (not including net saving).

III Within group outcomes

The aim here is to find dynamic patterns in repayment among group members. Rudimentary hypotheses:

positive dynamic covariance of group repayment shortfall/misses Informal sanctions are costly, so, larger the group repayment shortfall $h_{g,t}$, smaller the size of sanctions for each members with repayment shortfall, leading to moral hazard in the future hence greater future group repayment shortfall. Group repayment shortfall is dynamically positively correlated for the groups with large group repayment shortfall. Shortfalls are: sum of individual shortfall.

negative covariance with past saving and group repayment shortfall/misses Rather than accepting costs of sanctions, it may be cheaper for members to extend a credit to the member with shortfall. Feasibility of such an action is greater if the members have more saving. Greater per member group saving $s_{g,t}$ or per member cumulative group saving $S_{g,t}$ leads to smaller future shortfall.

negative covariance of repayment/misses between group members Free riding on other's repayment capacity induces negative covariance of repayments within a group, or negative covariance between other mamber's net saving $\bar{s}_{g,t}^{-i}$ and repayment $r_{g,t}$.

I choose the sample as:

- MonthsElapsed > 0 & MonthsElapsed ≤ 36, and,
- grepl("es", creditstatus), and,
- !grepl("twice|double", TradGroup), and,
- FullyRepaid == 0, and,
- as.Date(DisDate1) ≤ as.Date(2015-01-01).

Group fixed effect estimator estimating equations:

$$x_{g,i,t} = a_{11}x_{g,i,t-1} + a_{12}\bar{x}_{g,-i,t-1} + a_{21}s_{g,i,t-1} + a_{22}\bar{s}_{g,-i,t-1} + a_{31}S_{g,i,t-1} + a_{32}\bar{S}_{g,-i,t-1} + Arms*year + \delta_g + e_{g,i,t}, \quad x = h, r.$$

What is the effect of having other members outcomes as a covariate?

$$\begin{aligned} x_{g,i,t} &= d_{10} + d_{11}x_{g,-i,t} + d_{12}s_{g,i,t} + e_{g,i,t}. \\ x_{g,-i,t} &= d_{20} + d_{21}x_{g,i,t} + d_{22}s_{g,-i,t} + e_{g,-i,t}. \end{aligned}$$

Solving the system gives:

$$\begin{aligned} x_{g,i,t} &= d_{10} + d_{11}(d_{20} + d_{21}x_{g,i,t} + d_{22}s_{g,-i,t} + e_{g,-i,t}) + d_{12}s_{g,i,t} + e_{g,i,t}, \\ &= \frac{1}{1 - d_{11}d_{21}} \left\{ d_{10} + d_{11}(d_{20} + d_{22}s_{g,-i,t} + e_{g,-i,t}) + d_{12}s_{g,i,t} + e_{g,i,t} \right\}. \end{aligned}$$

So

$$\begin{aligned} \text{plim } d_{11} &= \frac{d_{11}d_{22}}{1 - d_{11}d_{21}} \frac{\text{cov}[s_{g,-i,t}, e_{g,i,t}]}{\mathcal{V}[s_{g,-i,t}]} + \frac{d_{11}}{1 - d_{11}d_{21}} \frac{\text{cov}[e_{g,-i,t}, e_{g,i,t}]}{\mathcal{V}[e_{g,-i,t}]}, \\ &= \frac{d_{11}}{1 - d_{11}d_{21}} \left(d_{22} \frac{\text{cov}[s_{g,-i,t}, e_{g,i,t}]}{\mathcal{V}[s_{g,-i,t}]} + \frac{\text{cov}[e_{g,-i,t}, e_{g,i,t}]}{\mathcal{V}[e_{g,-i,t}]} \right). \end{aligned}$$

Assuming $\text{cov}[s_{g,-i,t}, e_{g,i,t}] = 0$, we have:

$$\text{plim } d_{11} = d_{11} \frac{1}{1 - d_{11}d_{21}} \frac{\text{cov}[e_{g,-i,t}, e_{g,i,t}]}{\mathcal{V}[e_{g,-i,t}]}.$$

If we further assume $\mathcal{V}[e_{g,i,t}] = \mathcal{V}[e_{g,-i,t}]$, then

$$\text{plim } \hat{d}_{11} = d_{11} \frac{1}{1 - d_{11}d_{21}} \rho(e_{g,-i,t}, e_{g,i,t}).$$

If we impose symmetry that $d_{ij} = d_{-ij}$, the above becomes

$$\text{plim } \hat{d}_1 = d_1 \frac{1}{1 - d_1^2} \rho(e_{g,-i,t}, e_{g,i,t}).$$

If we impose a ‘stability’ condition in the sense that repurcussions between $x_{g,i,t}, x_{g,-i,t}$ converge to a finite value $|d_1| < 1$, the sign of $\rho(e_{g,-i,t}, e_{g,i,t})$ is likely to be positive hence we can presume $\text{sign}(\hat{d}_1) = \text{sign}(d_1)$. This conclusion will hold when we have other covariates than s provided that their covariances with error terms are zero. Moreover, this conclusion also holds under multiple other members provided that their respective zero covariances assumptions hold. If we have an averaged term $\bar{x}_{g,-i,t}$ in place of $x_{g,-i,t}$, we have an average of all ρ ’s as terms in the curly bracket. What we want to note from this consideration is that while $\text{plim } \hat{d}_1 \neq d_1$, there is no reason to expect $\text{plim } \hat{d}_1 \simeq 1$.

Create other member’s mean cumulative shortfall ratio.

☞ There are 2 ways: (<https://github.com/Rdatatable/data.table/issues/1363>)

- Use .BY and specify the leave-one-out conditions.
- Use algebraic expressions that follow leave-one-out conditions.

2nd way is way much faster, but the code is more undestandable with the 1st way. Median can only be coded in the 1st way.

If I take village*Date fixed effects, mean of Arm*Date becomes zero hence changes by Arm*Year are eliminated. So I will take village fixed effects and date (=year-month) fixed effects (not their interaction).

TABLE 1: GROUP LEVEL EFFECTS OF REPAYMENT SHORTFALL

covariates	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	14.11 (34.8)	39.60 (0.3)	126.04 (0.0)	126.04 (0.0)	73.11 (0.0)	73.11 (0.0)
Large	-19.20 (27.1)	-34.19 (0.0)	-40.93 (3.6)		-16.22 (15.4)	
LargeGrace	-7.65 (72.9)	-14.76 (7.4)	-106.17 (0.0)		-62.09 (0.0)	
Cattle	-18.82 (35.8)	-21.10 (1.7)	-95.74 (0.0)		-42.23 (0.6)	
Upfront				-40.93 (3.6)		-16.22 (15.4)
WithGrace				-65.24 (0.0)		-45.87 (0.0)
InKind				10.43 (44.2)		19.86 (20.5)
UltraPoor					-17.91 (14.7)	-17.91 (14.7)
Large × UltraPoor					-0.28 (98.4)	
LargeGrace × UltraPoor					14.83 (31.7)	
Cattle × UltraPoor					-5.93 (76.5)	
Upfront × UltraPoor						-0.28 (98.4)
WithGrace × UltraPoor						15.11 (20.4)
InKind × UltraPoor						-20.75 (23.9)
LY2		125.57 (0.0)	125.57 (0.0)	42.03 (0.2)	42.03 (0.2)	
Large × LY2		114.68 (0.0)		23.89 (0.6)		
LargeGrace × LY2		161.27 (0.0)		86.34 (0.0)		
Cattle × LY2		124.81 (0.0)		55.29 (0.5)		
Upfront × LY2			-10.89 (60.4)			-18.14 (18.7)
WithGrace × LY2			46.59 (3.5)			62.44 (0.1)
InKind × LY2			-36.46 (5.0)			-31.04 (22.9)
UltraPoor × LY2				-1.48 (91.4)	-1.48 (91.4)	
Large × UltraPoor × LY2				25.31 (4.2)		
LargeGrace × UltraPoor × LY2				-10.53 (54.7)		
Cattle × UltraPoor × LY2				13.37 (52.4)		
Upfront × UltraPoor × LY2					26.79 (13.9)	
WithGrace × UltraPoor × LY2					-35.83 (10.0)	
InKind × UltraPoor × LY2					23.90 (38.7)	

TABLE 1: GROUP LEVEL EFFECTS OF REPAYMENT SHORTFALL (CONTINUED)

covariates	(1)	(2)	(3)	(4)	(5)	(6)
LY3			84.95 (0.9)	84.95 (0.9)	5.79 (86.1)	5.79 (86.1)
Large \times LY3			-21.59 (68.4)		-270.97 (12.5)	
LargeGrace \times LY3			167.79 (0.0)		118.32 (5.1)	
Cattle \times LY3			103.72 (0.2)		14.68 (75.6)	
Upfront \times LY3				-106.54 (8.7)		-276.76 (12.3)
WithGrace \times LY3				189.39 (0.2)		389.29 (3.6)
InKind \times LY3				-64.07 (15.5)		-103.64 (19.1)
UltraPoor \times LY3					11.18 (76.6)	11.18 (76.6)
Large \times UltraPoor \times LY3					256.85 (15.2)	
LargeGrace \times UltraPoor \times LY3					-61.37 (29.6)	
Cattle \times UltraPoor \times LY3					34.00 (52.9)	
Upfront \times UltraPoor \times LY3						245.67 (17.9)
WithGrace \times UltraPoor \times LY3						-318.21 (9.1)
InKind \times UltraPoor \times LY3						95.36 (24.5)
LY4			-191.71 (0.0)	-191.71 (0.0)	-198.72 (0.0)	-198.72 (0.0)
Large \times LY4			-231.88 (0.0)		-184.58 (0.0)	
LargeGrace \times LY4			-54.82 (13.3)		-132.57 (0.0)	
Cattle \times LY4			-33.07 (51.4)		-67.51 (0.0)	
Upfront \times LY4				-40.18 (45.4)		14.14 (77.4)
WithGrace \times LY4				177.06 (0.0)		52.02 (23.5)
InKind \times LY4				21.76 (72.8)		65.06 (0.0)
UltraPoor \times LY4					48.06 (40.3)	48.06 (40.3)
Large \times UltraPoor \times LY4					12.41 (78.6)	
LargeGrace \times UltraPoor \times LY4					67.94 (7.2)	
Cattle \times UltraPoor \times LY4					-13.52 (82.1)	
Upfront \times UltraPoor \times LY4						-35.65 (62.9)
WithGrace \times UltraPoor \times LY4						55.53 (34.8)
InKind \times UltraPoor \times LY4						-81.46 (26.3)

Source: Estimated with GUK administrative data.

Notes: 1. Estimates of repayment shortfall controlling for group/village and year-month fixed effects using 48 month administrative records. The estimated model is $\tilde{y}_{it} = b_1 + \mathbf{b}_1' \mathbf{d}_i + b_2 \text{LY2} + \mathbf{b}_2' \mathbf{d}_i \text{LY2} + b_3 \text{LY3} + \mathbf{b}_3' \mathbf{d}_i \text{LY3} + b_4 \text{LY4} + \mathbf{b}_4' \mathbf{d}_i \text{LY4} + \tilde{e}_{it}$, where \tilde{x}_{it} is group and time demeaned value of variable x , $t = 1, \dots, 48$ is an elapsed month index, \mathbf{d}_i is a three element vector of arms or functional attributes, LY2, LY3, LY4 are indicator variables of loan years 2, 3, 4. Loan years are defined with the elapsed months since the first disbursement date, 13-24 for LY2, 25-36 for LY3, and 37-48 for LY4. Fixed effects are controlled by differencing out respective means from the data matrix. Shortfall y_{it} is (planned installment) - (actual repayment). Group shortfall $_{t-1}$ indicates a one month lagged mean shortfall amount of a group. Per member group net saving $_{t-1}$ and Per member cumulative group net saving (BDT1000) $_{t-1}$ give one month lagged average net saving in a group and their accumulated sums, respectively. Median group repayent shortfall rate is -1.42. 69 groups participated in the lending program.

2. Standard errors are clustered at group (village) level.

TABLE 1: GROUP LEVEL EFFECTS OF REPAYMENT SHORTFALL (CONTINUED)

covariates	(1)	(2)	(3)	(4)	(5)	(6)
GRSRhigh		42.73 (7.0)			63.95 (0.1)	63.95 (0.1)
Group shortfall _{t-1}		0.69 (0.0)			0.59 (0.0)	0.59 (0.0)
GRSRhigh × Group shortfall _{t-1}		-0.07 (33.4)			-0.21 (0.5)	-0.21 (0.5)
Per member group net saving _{t-1}					-0.02 (0.0)	-0.02 (0.0)
Per member cumulative group net saving (BDT1000) _{t-1}					-0.01 (71.7)	-0.01 (71.7)
number of clusters	92	92	92	92	92	92
\bar{R}^2	0	0.208	0.128	0.128	0.254	0.254
N	4204	4178	4204	4204	4178	4178

Source: Estimated with GUK administrative data.

Notes: 1. Estimates of repayment shortfall controlling for group/village and year-month fixed effects using 48 month administrative records. The estimated model is $\tilde{y}_{it} = b_1 + \mathbf{b}'_1 \mathbf{d}_i + b_2 \text{LY2} + \mathbf{b}'_2 \mathbf{d}_i \text{LY2} + b_3 \text{LY3} + \mathbf{b}'_3 \mathbf{d}_i \text{LY3} + b_4 \text{LY4} + \mathbf{b}'_4 \mathbf{d}_i \text{LY4} + \tilde{\epsilon}_{it}$, where \tilde{x}_{it} is group and time demeaned value of variable x , $t = 1, \dots, 48$ is an ellapsed month index, \mathbf{d}_i is a three element vector of arms or functional attributes, LY2, LY3, LY4 are indicator variables of loan years 2, 3, 4. Loan years are defined with the ellapsed months since the first disbursement date, 13-24 for LY2, 25-36 for LY3, and 37-48 for LY4. Fixed effects are controlled by differencing out respective means from the data matrix. Shortfall y_{it} is (planned installment) - (actual repayment). Group shortfall_{t-1} indicates a one month lagged mean shortfall amount of a group. Per member group net saving_{t-1} and Per member cumulative group net saving (BDT1000)_{t-1} give one month lagged average net saving in a group and their accumulated sums, respectively. Median group repayent shortfall rate is -1.42. 69 groups participated in the lending program.

2. Standard errors are clustered at group (village) level.

TABLE 2: INDIVIDUAL LEVEL EFFECTS OF REPAYMENT SHORTFALL, ALL INDIVIDUALS

covariates	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	-0.80 (56.2)	8.18 (33.0)	0.06 (99.7)	144.89 (0.0)	27.42 (4.7)	27.42 (4.7)
Large	1.19 (49.5)	-3.06 (33.3)	57.64 (0.1)		40.19 (0.6)	
LargeGrace	0.73 (69.8)	-3.96 (18.1)	-146.35 (0.0)		-138.38 (0.0)	
Cattle	1.31 (47.9)	-4.24 (24.3)	-140.97 (0.0)		-137.97 (0.0)	
Upfront				-37.79 (0.1)		40.19 (0.6)
WithGrace				-60.86 (0.0)		-178.56 (0.0)
InKind				-0.32 (96.4)		0.41 (97.7)
UltraPoor					2.10 (76.2)	2.10 (76.2)
Large \times UltraPoor					-4.54 (51.2)	
LargeGrace \times UltraPoor					6.07 (4.0)	
Cattle \times UltraPoor					10.02 (1.2)	
Upfront \times UltraPoor						-6.63 (49.9)
WithGrace \times UltraPoor						10.61 (15.8)
InKind \times UltraPoor						3.95 (41.1)
LY2		49.49 (0.2)	103.10 (0.0)	61.78 (0.0)	61.78 (0.0)	
Large \times LY2		-17.02 (12.5)		3.40 (78.2)		
LargeGrace \times LY2		248.71 (0.0)		218.90 (0.0)		
Cattle \times LY2		263.69 (0.0)		231.00 (0.0)		
Upfront \times LY2			-10.22 (44.5)			-58.39 (0.3)
WithGrace \times LY2			45.66 (0.0)			215.50 (0.0)
InKind \times LY2			-25.07 (10.5)			12.11 (54.5)
UltraPoor \times LY2					-14.81 (10.7)	-14.81 (10.7)
Large \times UltraPoor \times LY2					14.16 (27.2)	
LargeGrace \times UltraPoor \times LY2					13.64 (28.1)	
Cattle \times UltraPoor \times LY2					9.32 (46.8)	
Upfront \times UltraPoor \times LY2						14.16 (27.2)
WithGrace \times UltraPoor \times LY2						-0.52 (96.7)
InKind \times UltraPoor \times LY2						-4.32 (72.8)

TABLE 2: INDIVIDUAL LEVEL EFFECTS OF REPAYMENT SHORTFALL, ALL INDIVIDUALS (CONTINUED)

covariates	(1)	(2)	(3)	(4)	(5)	(6)
LY3			98.17 (0.0)	87.29 (0.0)	106.47 (0.0)	106.47 (0.0)
Large \times LY3			-11.29 (39.0)		-15.54 (36.4)	
LargeGrace \times LY3			346.60 (0.0)		285.29 (0.0)	
Cattle \times LY3			344.54 (0.0)		305.07 (0.0)	
Upfront \times LY3				-101.72 (0.0)		-122.01 (0.0)
WithGrace \times LY3				144.31 (0.0)		300.83 (0.0)
InKind \times LY3				-22.12 (30.2)		19.78 (52.7)
UltraPoor \times LY3					-16.74 (1.9)	-16.74 (1.9)
Large \times UltraPoor \times LY3					30.23 (8.2)	
LargeGrace \times UltraPoor \times LY3					24.70 (3.1)	
Cattle \times UltraPoor \times LY3					-11.63 (58.3)	
Upfront \times UltraPoor \times LY3						30.23 (8.2)
WithGrace \times UltraPoor \times LY3						-5.53 (76.2)
InKind \times UltraPoor \times LY3						-36.34 (9.9)
LY4			-307.26 (0.0)	-179.04 (0.0)	-248.37 (0.0)	-248.37 (0.0)
Large \times LY4			-330.16 (0.0)		-268.51 (0.0)	
LargeGrace \times LY4			-119.24 (0.0)		-96.98 (0.4)	
Cattle \times LY4			-172.15 (0.0)		-116.81 (1.8)	
Upfront \times LY4				-120.51 (0.5)		-20.13 (64.8)
WithGrace \times LY4				238.31 (0.0)		171.53 (0.0)
InKind \times LY4				-12.25 (82.1)		-19.83 (73.3)
UltraPoor \times LY4					-18.23 (49.6)	-18.23 (49.6)
Large \times UltraPoor \times LY4					7.94 (82.1)	
LargeGrace \times UltraPoor \times LY4					37.15 (27.6)	
Cattle \times UltraPoor \times LY4					11.59 (74.2)	
Upfront \times UltraPoor \times LY4						7.94 (82.1)
WithGrace \times UltraPoor \times LY4						29.20 (34.7)
InKind \times UltraPoor \times LY4						-25.56 (41.7)

Source: Estimated with GUK administrative data.

Notes: 1. Estimates of repayment shortfall controlling for group/village and year-month fixed effects using 48 month administrative records. The estimated model is $\tilde{y}_{it} = b_1 + \mathbf{b}'_1 \mathbf{d}_i + b_2 \text{LY2} + \mathbf{b}'_2 \mathbf{d}_i \text{LY2} + b_3 \text{LY3} + \mathbf{b}'_3 \mathbf{d}_i \text{LY3} + b_4 \text{LY4} + \mathbf{b}'_4 \mathbf{d}_i \text{LY4} + \tilde{e}_{it}$, where \tilde{x}_{it} is group and time demeaned value of variable x , $t = 1, \dots, 48$ is an elapsed month index, \mathbf{d}_i is a three element vector of arms or functional attributes, LY2, LY3, LY4 are indicator variables of loan years 2, 3, 4. Loan years are defined with the elapsed months since the first disbursement date, 13-24 for LY2, 25-36 for LY3, and 37-48 for LY4. Fixed effects are controlled by differencing out respective means from the data matrix. Shortfall y_{it} is (planned installment) - (actual repayment). Group shortfall_{t-1} indicates a one month lagged mean shortfall amount of a group. Per member group net saving $_{t-1}$ and Per member cumulative group net saving (BDT1000) $_{t-1}$ give one month lagged average net saving in a group and their accumulated sums, respectively. Median group repayent shortfall rate is -1.42. 69 groups participated in the lending program.

2. Standard errors are clustered at group (village) level.

TABLE 2: INDIVIDUAL LEVEL EFFECTS OF REPAYMENT SHORTFALL, ALL INDIVIDUALS (CONTINUED)

covariates	(1)	(2)	(3)	(4)	(5)	(6)
GRSRhigh		113.81 (0.5)			147.95 (0.0)	147.95 (0.0)
Group shortfall _{t-1}		-0.04 (38.3)			-0.18 (0.0)	-0.18 (0.0)
GRSRhigh × Group shortfall _{t-1}		-0.53 (0.0)			-0.68 (0.0)	-0.68 (0.0)
shortfall _{t-1}		0.44 (0.0)			0.30 (0.0)	0.30 (0.0)
Per member group net saving _{t-1}					-0.04 (9.3)	-0.04 (9.3)
Per member cumulative group net saving (BDT1000) _{t-1}					-0.04 (28.7)	-0.04 (28.7)
number of clusters	92	92	92	92	92	92
\bar{R}^2	0	0.098	0.133	0.136	0.173	0.173
<i>N</i>	55352	55170	55352	55352	55170	55170

Source: Estimated with GUK administrative data.

Notes: 1. Estimates of repayment shortfall controlling for group/village and year-month fixed effects using 48 month administrative records. The estimated model is $\tilde{y}_{it} = b_1 + \mathbf{b}'_1 \mathbf{d}_i + b_2 \text{LY2} + \mathbf{b}'_2 \mathbf{d}_i \text{LY2} + b_3 \text{LY3} + \mathbf{b}'_3 \mathbf{d}_i \text{LY3} + b_4 \text{LY4} + \mathbf{b}'_4 \mathbf{d}_i \text{LY4} + \tilde{e}_{it}$, where \tilde{x}_{it} is group and time demeaned value of variable x , $t = 1, \dots, 48$ is an ellapsed month index, \mathbf{d}_i is a three element vector of arms or functional attributes, LY2, LY3, LY4 are indicator variables of loan years 2, 3, 4. Loan years are defined with the ellapsed months since the first disbursement date, 13-24 for LY2, 25-36 for LY3, and 37-48 for LY4. Fixed effects are controlled by differencing out respective means from the data matrix. Shortfall y_{it} is (planned installment) - (actual repayment). Group shortfall_{t-1} indicates a one month lagged mean shortfall amount of a group. Per member group net saving_{t-1} and Per member cumulative group net saving (BDT1000)_{t-1} give one month lagged average net saving in a group and their accumulated sums, respectively. Median group repayent shortfall rate is -1.42. 69 groups participated in the lending program.

2. Standard errors are clustered at group (village) level.

TABLE 3: INDIVIDUAL LEVEL EFFECTS OF REPAYMENT SHORTFALL

covariates	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	3.11 (3.9)	14.20 (12.6)	31.23 (0.8)	131.82 (0.0)	51.21 (0.0)	51.21 (0.0)
Large	-1.13 (53.2)	-4.99 (9.9)	23.71 (9.6)		21.65 (18.2)	
LargeGrace	-1.21 (53.5)	-6.71 (3.6)	-138.02 (0.0)		-148.27 (0.0)	
Cattle	-1.37 (46.8)	-6.65 (5.0)	-140.01 (0.0)		-152.05 (0.0)	
Upfront				-16.99 (9.6)		21.65 (18.2)
WithGrace				-75.48 (0.0)		-169.92 (0.0)
InKind				2.08 (75.4)		-3.78 (80.0)
UltraPoor					-0.07 (99.5)	-0.07 (99.5)
Large \times UltraPoor					-4.07 (75.7)	
LargeGrace \times UltraPoor					7.80 (49.0)	
Cattle \times UltraPoor					10.38 (37.3)	
Upfront \times UltraPoor						-4.07 (75.7)
WithGrace \times UltraPoor						11.87 (14.1)
InKind \times UltraPoor						2.57 (64.3)
LY2		21.94 (7.6)	86.56 (0.0)	53.91 (0.2)	53.91 (0.2)	
Large \times LY2		-20.54 (1.5)		-47.15 (1.7)		
LargeGrace \times LY2		202.85 (0.0)		166.12 (0.0)		
Cattle \times LY2		216.04 (0.0)		182.78 (0.0)		
Upfront \times LY2			-1.51 (91.5)			-47.15 (1.7)
WithGrace \times LY2			54.29 (0.1)			213.27 (0.0)
InKind \times LY2			-15.18 (36.8)			16.65 (46.7)
UltraPoor \times LY2					-7.27 (54.8)	-7.27 (54.8)
Large \times UltraPoor \times LY2					5.27 (70.3)	
LargeGrace \times UltraPoor \times LY2					6.76 (63.9)	
Cattle \times UltraPoor \times LY2					-1.32 (93.3)	
Upfront \times UltraPoor \times LY2						5.27 (70.3)
WithGrace \times UltraPoor \times LY2						1.49 (88.5)
InKind \times UltraPoor \times LY2						-8.09 (53.6)

TABLE 3: INDIVIDUAL LEVEL EFFECTS OF REPAYMENT SHORTFALL (CONTINUED)

covariates	(1)	(2)	(3)	(4)	(5)	(6)
LY3			43.46 (0.4)	70.77 (0.0)	76.73 (0.0)	76.73 (0.0)
Large \times LY3			-17.04 (17.2)		-83.16 (0.1)	
LargeGrace \times LY3			242.61 (0.0)		184.25 (0.0)	
Cattle \times LY3			260.48 (0.0)		225.16 (0.0)	
Upfront \times LY3				-89.08 (0.0)		-83.16 (0.1)
WithGrace \times LY3				140.00 (0.0)		267.41 (0.0)
InKind \times LY3				-9.03 (68.9)		40.91 (23.6)
UltraPoor \times LY3					-10.02 (26.8)	-10.02 (26.8)
Large \times UltraPoor \times LY3					17.87 (33.4)	
LargeGrace \times UltraPoor \times LY3					7.12 (60.8)	
Cattle \times UltraPoor \times LY3					-29.52 (20.0)	
Upfront \times UltraPoor \times LY3						17.87 (33.4)
WithGrace \times UltraPoor \times LY3						-10.75 (58.1)
InKind \times UltraPoor \times LY3						-36.64 (12.3)
LY4			-283.74 (0.0)	-168.44 (0.0)	-269.18 (0.0)	-269.18 (0.0)
Large \times LY4			-264.49 (0.0)		-7.66 (87.4)	
LargeGrace \times LY4			-91.78 (0.2)		155.19 (0.1)	
Cattle \times LY4			-136.17 (0.1)		141.55 (2.3)	
Upfront \times LY4				-125.24 (0.8)		-7.66 (87.4)
WithGrace \times LY4				227.68 (0.0)		162.85 (0.2)
InKind \times LY4				-13.03 (83.0)		-13.63 (83.2)
UltraPoor \times LY4					-13.10 (69.5)	-13.10 (69.5)
Large \times UltraPoor \times LY4					17.81 (67.1)	
LargeGrace \times UltraPoor \times LY4					43.79 (27.6)	
Cattle \times UltraPoor \times LY4					13.61 (73.8)	
Upfront \times UltraPoor \times LY4						17.81 (67.1)
WithGrace \times UltraPoor \times LY4						25.98 (44.8)
InKind \times UltraPoor \times LY4						-30.18 (36.6)

Source: Estimated with GUK administrative data.

Notes: 1. Estimates of repayment shortfall controlling for group/village and year-month fixed effects using 48 month administrative records. The estimated model is $\tilde{y}_{it} = b_1 + \mathbf{b}_1' \mathbf{d}_i + b_2 \text{LY2} + \mathbf{b}_2' \mathbf{d}_i \text{LY2} + b_3 \text{LY3} + \mathbf{b}_3' \mathbf{d}_i \text{LY3} + b_4 \text{LY4} + \mathbf{b}_4' \mathbf{d}_i \text{LY4} + \tilde{e}_{it}$, where \tilde{x}_{it} is group and time demeaned value of variable x , $t = 1, \dots, 48$ is an elapsed month index, \mathbf{d}_i is a three element vector of arms or functional attributes, LY2, LY3, LY4 are indicator variables of loan years 2, 3, 4. Loan years are defined with the elapsed months since the first disbursement date, 13-24 for LY2, 25-36 for LY3, and 37-48 for LY4. Fixed effects are controlled by differencing out respective means from the data matrix. Shortfall y_{it} is (planned installment) - (actual repayment). Group shortfall_{t-1} indicates a one month lagged mean shortfall amount of a group. Per member group net saving $_{t-1}$ and Per member cumulative group net saving (BDT1000) $_{t-1}$ give one month lagged average net saving in a group and their accumulated sums, respectively. Median group repayent shortfall rate is -1.42. 69 groups participated in the lending program.

2. Standard errors are clustered at group (village) level.

TABLE 3: INDIVIDUAL LEVEL EFFECTS OF REPAYMENT SHORTFALL (CONTINUED)

covariates	(1)	(2)	(3)	(4)	(5)	(6)
Group shortfall _{t-1}		-0.07 (23.6)			-0.22 (0.0)	-0.22 (0.0)
shortfall _{t-1}	0.45 (0.0)	0.27 (0.0)	-0.05 (0.0)	0.30 (0.0)	0.30 (0.0)	
Per member group net saving _{t-1}				-0.11 (0.0)	-0.11 (0.0)	
Per member cumulative group net saving (BDT1000) _{t-1}				-0.03 (41.0)	-0.03 (41.0)	
number of clusters	69	69	69	69	69	69
\bar{R}^2	0	0.102	0.172	0.121	0.179	0.179
N	41901	41722	41722	41722	41722	41722

Source: Estimated with GUK administrative data.

Notes: 1. Estimates of repayment shortfall controlling for group/village and year-month fixed effects using 48 month administrative records. The estimated model is $\tilde{y}_{it} = b_1 + \mathbf{b}'_1 \mathbf{d}_i + b_2 \text{LY2} + \mathbf{b}'_2 \mathbf{d}_i \text{LY2} + b_3 \text{LY3} + \mathbf{b}'_3 \mathbf{d}_i \text{LY3} + b_4 \text{LY4} + \mathbf{b}'_4 \mathbf{d}_i \text{LY4} + \tilde{\epsilon}_{it}$, where \tilde{x}_{it} is group and time demeaned value of variable x , $t = 1, \dots, 48$ is an elapsed month index, \mathbf{d}_i is a three element vector of arms or functional attributes, LY2, LY3, LY4 are indicator variables of loan years 2, 3, 4. Loan years are defined with the elapsed months since the first disbursement date, 13-24 for LY2, 25-36 for LY3, and 37-48 for LY4. Fixed effects are controlled by differencing out respective means from the data matrix. Shortfall y_{it} is (planned installment) - (actual repayment). Group shortfall_{t-1} indicates a one month lagged mean shortfall amount of a group. Per member group net saving_{t-1} and Per member cumulative group net saving (BDT1000)_{t-1} give one month lagged average net saving in a group and their accumulated sums, respectively. Median group repayment shortfall rate is -1.42. 69 groups participated in the lending program.

2. Standard errors are clustered at group (village) level.

Finding III.1 TABLE 1 shows group level repayment shortfall has a positive autocorrelation hence is persistent. In (1), the coefficient is smaller in groups with high shortfall rates, hinting loan repayment discipline as a group at some intermediate level. In (2) and (3), group level shortfall gets smaller in the third year than in the second year for all arms, indicating stronger efforts in repayment in the final loan year. In (4) and (5), the UltraPoor is found to have no larger repayment shortfall than the moderately poor, except for the Large arm or Upfront attribute in the second loan year. TABLE 2 (1), (4) and (5) also show persistence for individuals, although the magnitude is much smaller. In (1), lagged shortfall of others decreases with own shortfall only in high GRSR group. This confirms the group level repayment discipline that is consistent with a steady state short fall rate at an intermediate level as a group. In (2), shortfall is larger in the second and third year for the arms with a grace period. This reflects that a grace period does not necessarily help the borrowers to prepare repayments, which is against the intention to match the repayment with the cash flow. The ultra poor has smaller shortfall in all arms in year 2 except in the large grace arm in year 3. The results on the ultra poor may indicate the difference with the moderately poor is nominal.

Check correlations between repayment, saving, revenues, costs.

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TABLE 4: GROUP FIXED EFFECTS AND IV ESTIMATION OF REPAYMENT

	Group fixed effects				GFE instrumental variables		
covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
repayment _{t-1}	0.468*** (0.033)	0.297*** (0.029)	0.244*** (0.026)	0.202*** (0.025)	0.972 (1.396)	0.770 (0.952)	0.311** (0.122)
Cumulative net saving _{t-1}		0.034*** (0.004)	0.029*** (0.004)	0.029*** (0.004)		-0.010 (0.066)	0.019** (0.009)
CumOtherNetSaving _{t-1}		-0.056*** (0.017)	-0.053** (0.021)	-0.041** (0.020)		0.050 (0.196)	0.015 (0.125)
Net saving _t	-0.090 (0.137)	-0.043 (0.163)	0.014 (0.167)	0.039 (0.168)	-1.201 (2.413)	-0.129 (2.620)	-1.483*** (0.499)
costs _t	0.140*** (0.041)	0.431*** (0.068)	0.421*** (0.069)	0.424*** (0.069)	-16.099 (40.541)	-13.025 (28.572)	1.700 (1.483)
revenues _t	-0.213*** (0.057)	-0.393*** (0.077)	-0.367*** (0.074)	-0.287*** (0.078)	20.273 (51.066)	16.115 (35.924)	-9.914 (8.977)
OtherRepaid		1.166*** (0.149)	1.156*** (0.152)	1.143*** (0.154)			0.308 (0.476)
OtherNetSaving		0.211 (0.207)	0.224 (0.206)	0.250 (0.193)			4.658 (3.175)
OtherCost		-0.628*** (0.130)	-0.606*** (0.137)	-0.603*** (0.138)			-5.693** (2.357)
OtherRevenue		0.621*** (0.137)	0.626*** (0.120)	0.658*** (0.132)			4.952 (3.088)
traditional × FirstYear				-10.988 (8.235)			
large × FirstYear				8.676 (9.069)			
large grace × FirstYear				-125.975*** (14.508)			
cattle × FirstYear				-106.043*** (12.979)			
traditional × SecondYear			45.655*** (8.686)	-7.387* (4.290)		4.035 (89.123)	
large × SecondYear			49.597*** (9.451)	-2.229 (6.091)		38.697 (70.925)	
large grace × SecondYear			101.044*** (11.321)	55.017*** (10.356)		193.008 (194.969)	
cattle × SecondYear			91.278*** (10.793)	45.360*** (8.310)		199.422 (229.623)	
traditional × ThirdYear			50.152*** (13.397)	-3.338 (9.540)		-69.943 (159.440)	
large × ThirdYear			21.159 (13.828)	-34.511*** (10.378)		90.875 (130.870)	
large grace × ThirdYear			94.258*** (14.178)	50.125*** (11.260)		123.844 (109.644)	
cattle × ThirdYear			89.707*** (10.864)	47.540*** (9.877)		173.814 (205.326)	
UltraPoor	0.546 (1.918)	-0.540 (1.342)	-50.201*** (6.651)		-10.455 (30.333)	-76.708 (88.566)	-3.133 (9.812)
ModeratelyPoor	-0.174 (2.425)	-0.561 (2.162)	-51.361*** (7.056)		13.574 (38.042)	-57.211 (55.182)	-1.824 (10.521)
number of clusters	92	92	92	92	92	92	92
Weak IV: Net saving _t					646.23	482.73	264.86
Weak IV: costs _t					230.44	221.74	103.46
Weak IV: revenues _t					437.44	396.86	38.24
Weak IV: OtherNetSaving							52.94
Weak IV: OtherRepaid							292.14
Weak IV: OtherCost							99.22
Weak IV: OtherRevenue							794.98
Wu-Hausman Sargan					68.97 0	46.37 0	167.74 0
R ²	0.126	0.393	0.405	0.413	-20.635	-13.27	-1.012
N	42145	37725	37725	37725	41199	41199	34661

Source: Estimated with GUK administrative data.

Notes: 1. Group fixed effects are controlled by differencing out respective means from the data matrix. Intercept terms are omitted in estimating equations. Endogenous variables: Net saving, cost, revenue, other costs, other revenue. Instruments are lagged net saving, other member's mean costs, other member's mean revenues. For (7), additional instruments of lagged other member's mean costs, lagged other member's mean revenues are used. For (8), instruments are lagged net saving, lagged costs, lagged revenue, lagged other member's mean costs, lagged other member's mean revenues.

Finding III.2 TABLE 4 shows repayment is strongly positively correlated with others' concurrent repayment. This indicates a strong, positive correlation within a group, which holds even after controlling for costs, revenues, and net saving. Lagged cumulative net saving is positively correlated, indicating solvency is related with saving. IV estimates (=choice of IVs) are poor.

Check correlations between repayment, saving, revenues, costs.

TABLE 5: GROUP FIXED EFFECTS ESTIMATION OF COSTS

covariates	(1)	(2)	(3)	(4)	(5)
costs _{t-1}	0.069*** (0.026)	0.069*** (0.026)		0.099*** (0.015)	0.099*** (0.015)
OtherCost				1.066*** (0.050)	1.066*** (0.050)
traditional × Ultra Poor		1.287 (2.085)			
large × Ultra Poor		-1.412 (1.880)			
large grace × Ultra Poor		-0.322 (3.085)			
cattle × Ultra Poor		-1.981 (1.808)			
traditional × Moderate Poor		1.329 (2.486)			
large × Moderate Poor		4.676 (2.925)			
large grace × Moderate Poor		-1.462 (2.378)			
cattle × Moderate Poor		2.153 (2.691)			
traditional × FirstYear			14.132** (5.486)		
large × FirstYear			-22.777*** (5.648)		
large grace × FirstYear			6.061 (4.278)		
cattle × FirstYear			2.418 (5.284)		
traditional × SecondYear			-1.985 (4.605)	-8.268* (4.330)	-9.995*** (2.797)
large × SecondYear			5.089 (3.141)	6.865** (3.315)	5.067*** (1.680)
large grace × SecondYear			0.810 (3.787)	5.608 (4.201)	3.885 (2.699)
cattle × SecondYear			1.155 (3.199)	4.157 (3.220)	2.396 (1.638)
traditional × ThirdYear			-8.070*** (2.587)	1.334 (3.367)	-0.412 (1.750)
large × ThirdYear			5.895 (3.605)	9.134** (4.446)	7.330** (3.064)
large grace × ThirdYear			-4.078 (4.184)	6.357 (5.791)	4.638 (4.141)
cattle × ThirdYear			-0.867 (3.712)	-5.306 (4.696)	-7.076** (2.979)
Ultra Poor	-0.583 (1.128)			-2.324 (2.588)	
Moderate Poor	1.603 (1.330)			-0.483 (2.774)	
FirstYear					-1.745 (2.585)
number of clusters	92	92	92	92	92
R ²	0.006	0.006	0.01	0.432	0.432
N	41319	41319	42235	36911	36911

Source: Estimated with GUK administrative data.

Notes: 1. Group fixed effects are controlled by differencing out respective means from the data matrix. Intercept terms are omitted in estimating equations.

2. ***, **, * indicate statistical significance at 1%, 5%, 10%, respectively. Standard errors are clustered at group (village) level.

Finding III.3 TABLE 5 shows costs are positively autocorrelated (persistent) and strongly, positively correlated with other members' concurrent costs.

Cumulative profits.

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TABLE 6: GROUP FIXED EFFECTS ESTIMATION OF CUMULATIVE PROFIT

	12 months	24 months		36 months	
covariates	(1)	(2)	(3)	(4)	(5)
traditional × Ultra Poor	232.9*** (82.4)	231.3*** (36.1)	-122.2** (57.1)	-137.4*** (42.8)	-685.5*** (101.7)
large × Ultra Poor	205.0*** (62.9)	163.0*** (33.7)	-236.3*** (48.2)	-121.6*** (40.8)	-700.0*** (79.7)
large grace × Ultra Poor	284.2*** (82.6)	308.7*** (41.2)	-128.0* (76.1)	-127.4*** (48.1)	-733.2*** (132.0)
cattle × Ultra Poor	217.1*** (69.1)	292.3*** (39.7)	-84.0 (55.1)	-126.9*** (31.6)	-594.6*** (104.1)
traditional × Moderate Poor	351.5*** (88.7)	336.2*** (47.2)	35.2 (82.3)	-7.4 (65.7)	-614.5*** (106.5)
large × Moderate Poor	195.6** (81.7)	148.6** (60.2)	-337.4*** (69.5)	-232.9*** (62.6)	-810.8*** (107.5)
large grace × Moderate Poor	299.9*** (84.3)	312.5*** (47.4)	-99.9 (93.8)	-103.1 (67.3)	-720.8*** (162.8)
cattle × Moderate Poor	282.9*** (80.1)	334.2*** (41.2)	-58.7 (70.5)	-114.1** (56.8)	-661.3*** (114.8)
CumOtherProfit		0.8*** (0.1)		0.7*** (0.1)	0.7*** (0.1)
number of clusters	92	92	92	92	92
R ²	0.13	0.345	0.053	0.177	0.541
N	1378	1378	1378	1378	1036
					1036

Source: Estimated with GUK administrative data.

Notes: 1. Group fixed effects are controlled by differencing out respective means from the data matrix. Intercept terms are omitted in estimating equations. Profit is (revenue) - (costs).
2. ***, **, * indicate statistical significance at 1%, 5%, 10%, respectively. Standard errors are clustered at group (village) level.

Finding III.4 TABLE 6 shows cumulative profits are positively only in the first year.

TABLE 7: GROUP FIXED EFFECTS OF MISSED REPAYMENT

covariates	(1)	(2)	(3)
value.missw _{t-1}	0.419*** (0.027)	0.434*** (0.022)	0.404*** (0.022)
OtherMisses _{t-1}		-0.059 (0.071)	-0.428*** (0.036)
OtherMisses			1.309*** (0.048)
traditional × SecondYear		-0.095*** (0.031)	-0.023 (0.015)
large × SecondYear		-0.013 (0.016)	-0.005 (0.011)
large grace × SecondYear		0.125*** (0.027)	0.097*** (0.016)
cattle × SecondYear		0.143*** (0.021)	0.112*** (0.019)
traditional × ThirdYear		-0.119*** (0.028)	-0.024** (0.012)
large × ThirdYear		-0.061*** (0.019)	0.001 (0.008)
large grace × ThirdYear		0.080*** (0.027)	-0.004 (0.015)
cattle × ThirdYear		0.092*** (0.030)	-0.015 (0.015)
number of clusters	92	92	92
R ²	0.175	0.195	0.459
N	46444	43182	41977

Source: Estimated with GUK administrative data.

Notes: 1. Group fixed effects are controlled by differncing out respecive means from the data matrix. Intercept terms are omitted in estimating equations.

2. ***, **, * indicate statistical significance at 1%, 5%, 10%, respetively. Standard errors are clustered at group (village) level.

Finding III.5 TABLE 7 shows number of missed repayments are positively autocorrelated (persistent) and are positively correlated (almost more than proportional) with others' concurrent misses. Other members' lagged misses are negatively correlated, which implies some stability in group repayment. Missed repayment is smaller in the third year.