

GUK administrative files

August 4, 2018
19:49

Seiro Ito

Contents

I	Read files	1
II	Individual level outcomes	1
III	Within group outcomes	8

I Read files

Read Administrative data.

- Corrected: typos, erroneous date entries (12512 is guessed as 12/12),
- Reshaped: X1.date, X2.date variables to long (date, X1, X2, ...) format, with dates following POSIX.ct. Used dcast of data.table.

Save admin files.

```
saveRDS(adl, paste0(path1234, "admin_data.rds"))
fwrite(adl, 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

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 :=
CumRepaid/(125*45*3) or, CumRepaid/(190*45*2), CumPlannedInstallment := 125 *
floor(WeeksElapsed) or 190 * floor(WeeksElapsed).

PlannedInstallment 125 or 190 * 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, Cu-

mOtherRepaidRate, OtherCost, OtherRevenue.

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
cow	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
cow	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.

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.

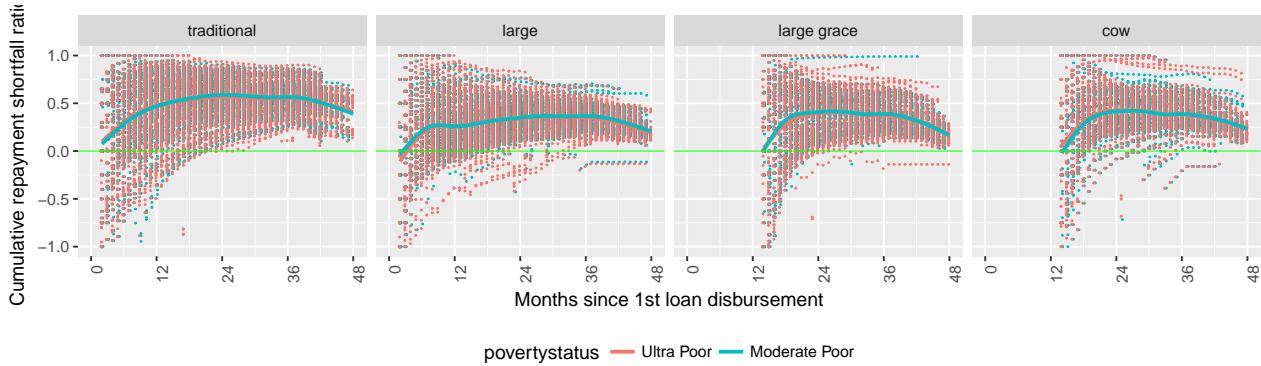


Figure 1: Monthly cumulative repayment shortfall ratios

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

	TradGroup	DisDate1	DisDate2	DisDate3	Maturity12	Maturity23	N
1:	planned	2013-05-01	2014-04-01	2015-03-01	335 days	334 days	47
2:	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	2015-04-01	<NA>	396 days	NA days	2
12:	twice	2014-04-01	2015-04-01	<NA>	365 days	NA days	3
13:	twice	2014-05-01	2015-04-01	<NA>	335 days	NA days	12
14:	twice	2015-09-01	2016-09-01	<NA>	366 days	NA days	25
15:	twice	2015-12-01	2016-09-01	<NA>	275 days	NA days	25
16:	double	2014-03-01	2015-02-01	<NA>	337 days	NA days	1
17:	double	2014-04-01	2015-02-01	<NA>	306 days	NA days	14
18:	double	2014-05-01	2015-02-01	<NA>	276 days	NA days	13
19:	double	2015-01-01	2015-02-01	<NA>	31 days	NA days	7
20:	double	2015-01-01	2015-12-01	<NA>	334 days	NA days	74
21:	double	2015-03-01	2015-02-01	<NA>	-28 days	NA days	5
	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?

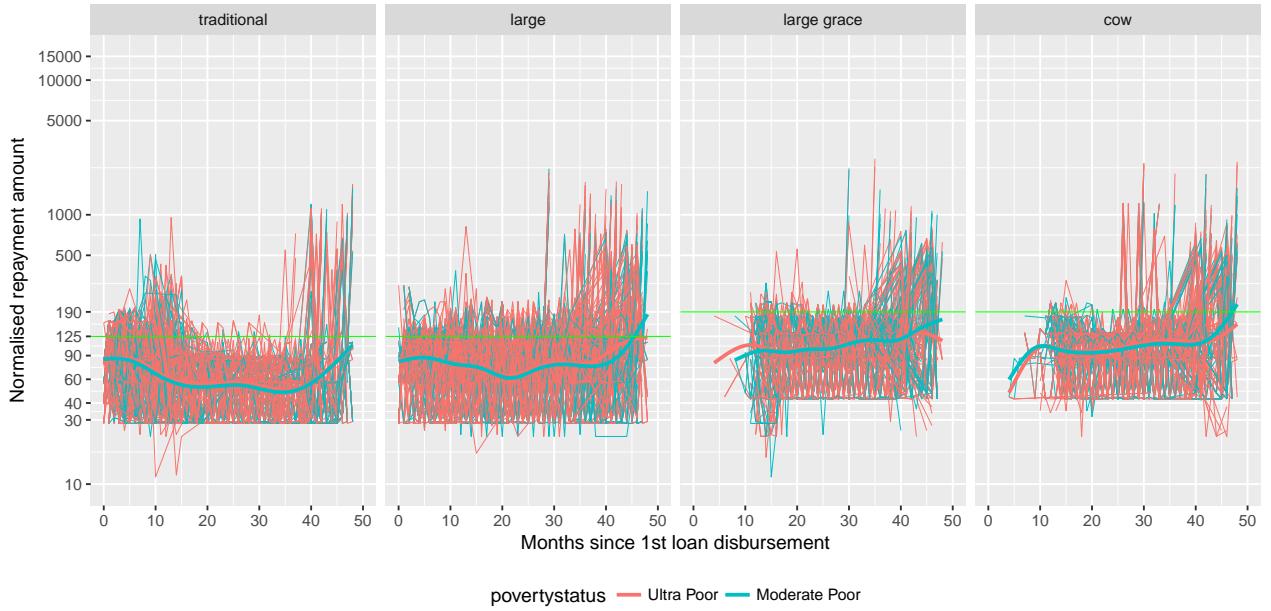


Figure 2: Normalised weekly repayment by elapsed months of members receiving loans by Nov, 2014

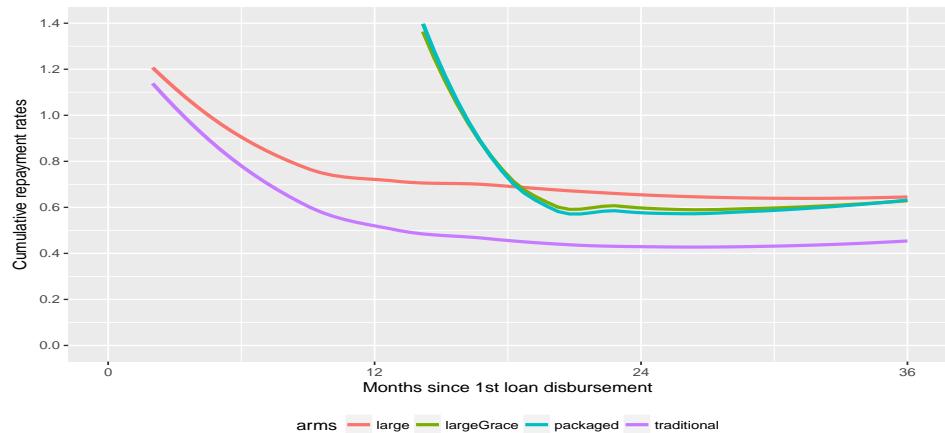


Figure 3: Nonparametric mean estimation of cumulative repayment rates by elapsed months

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 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.

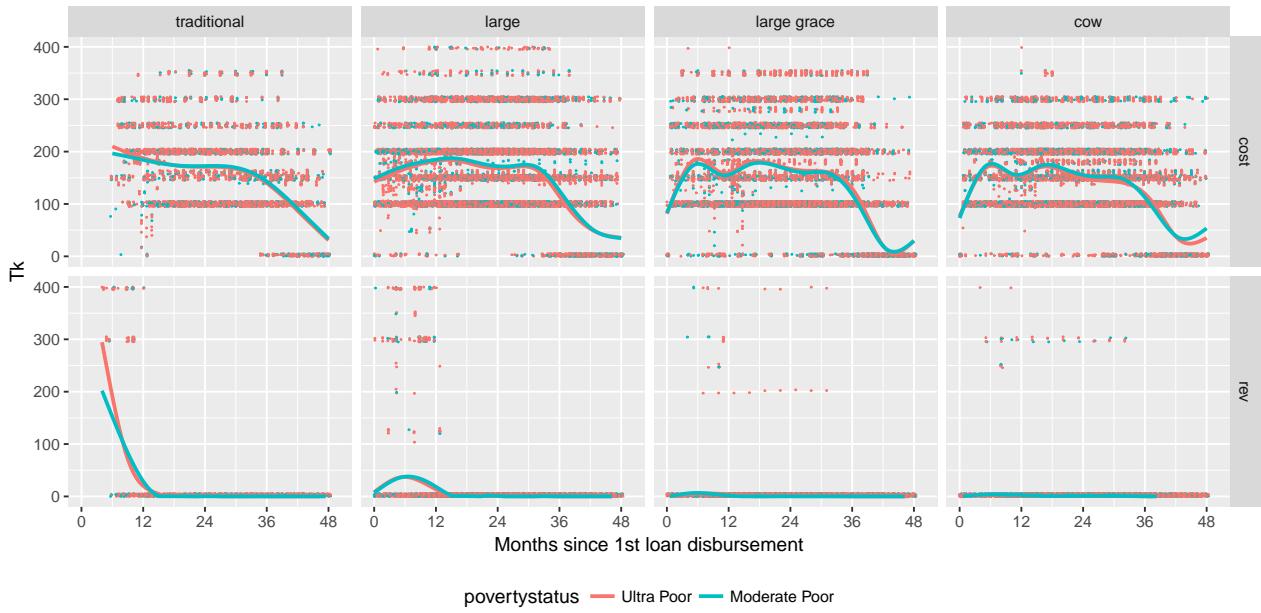


Figure 4: Revenues and costs
Dots indicate individuals. Dots are jittered to avoid plot overlap.

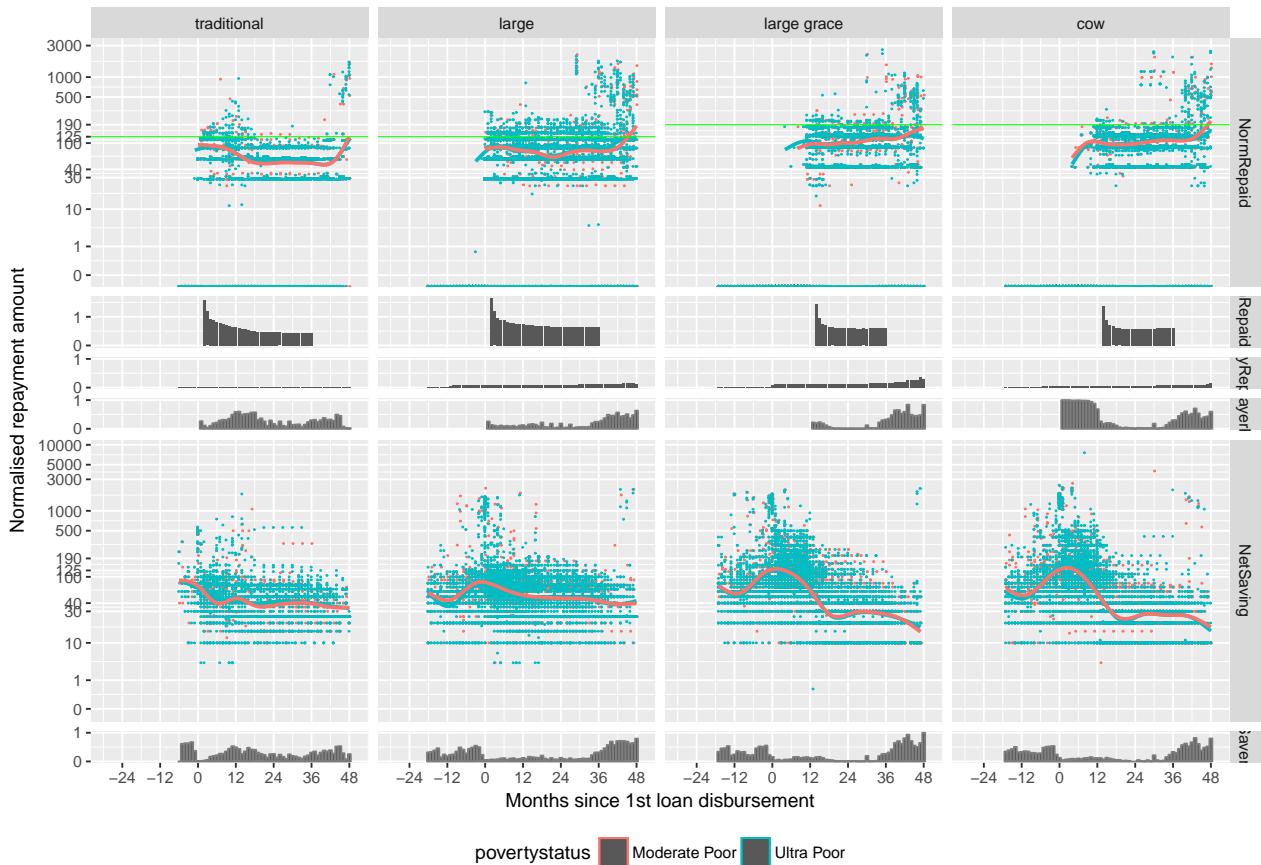


Figure 5: Weekly net saving

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

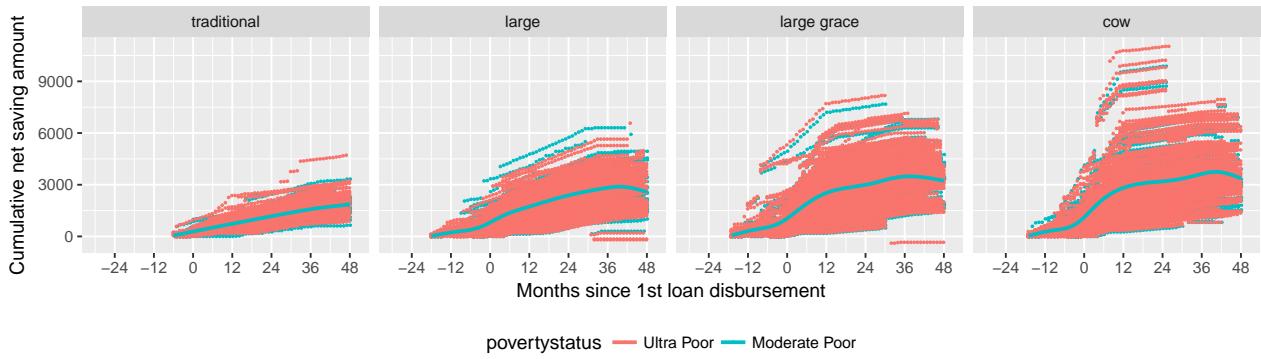


Figure 6: Cumulative net saving

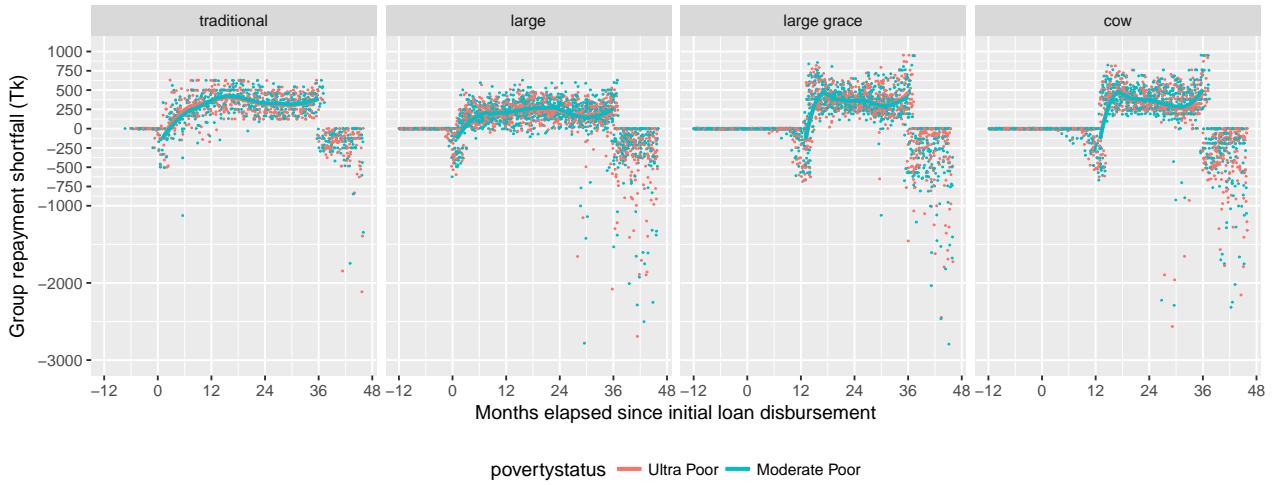


Figure 7: Repayment shortfall by group

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

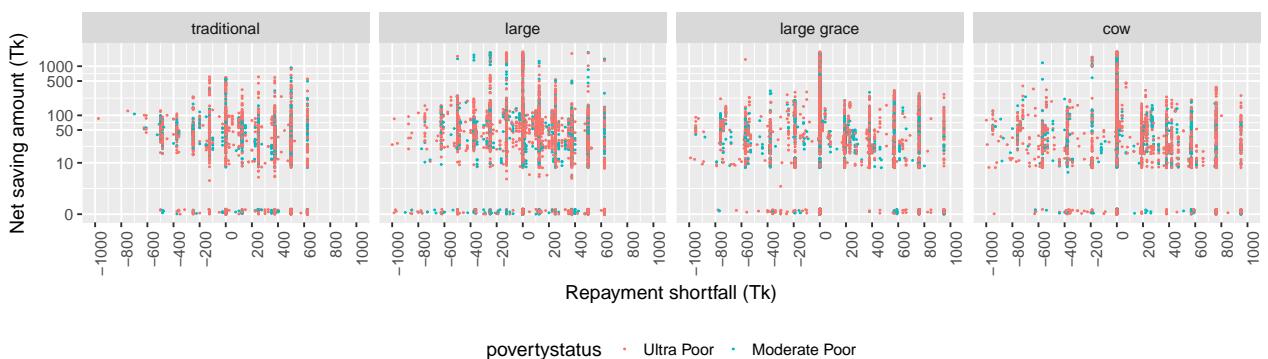


Figure 8: Repayment shortfall and net saving

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.

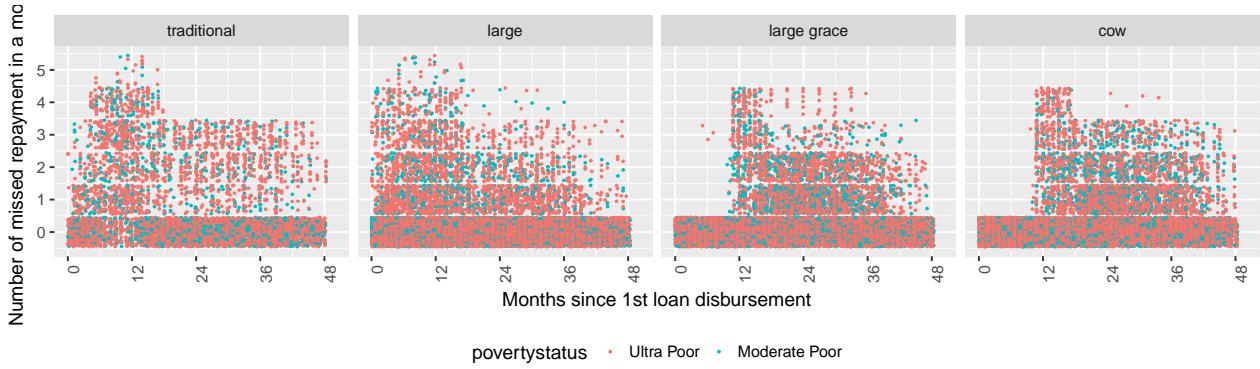


Figure 9: Number of missed repayment in a month
Dots indicate individuals. Dots are jittered to avoid plot overlap.

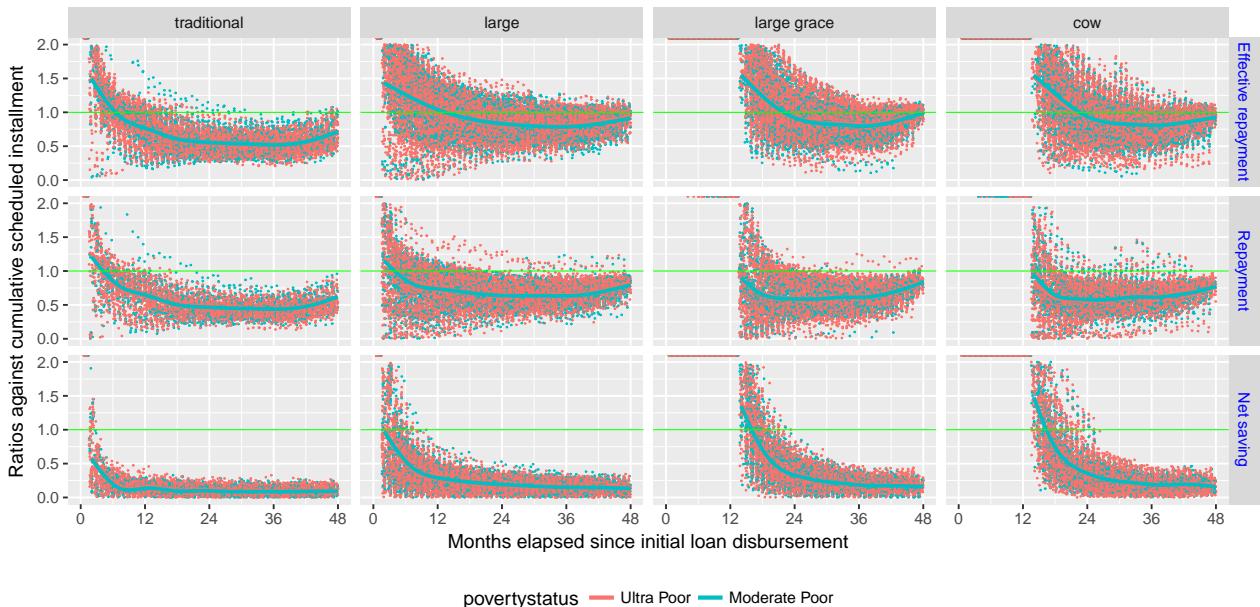


Figure 10: Reported repayment plus net saving as effective repayment

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.

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

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 repercussions 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 understandable 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 FIXED EFFECTS ESTIMATION OF REPAYMENT SHORTFALL

covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Per member group shortfall (Tk)				Shortfall (Tk)				
OtherShortfall							1.15*** (0.13)		1.14*** (0.12)
OtherShortfall _{t-1}		0.01 (0.03)	0.04 (0.03)	0.04 (0.03)	-0.35*** (0.08)				
GRSRlow × OtherShortfall - LagShortfall _{t-1}							-0.28*** (0.02)	-0.30*** (0.03)	
GRSRhigh × OtherShortfall - LagShortfall _{t-1}							-0.40*** (0.12)	-0.44*** (0.12)	
GRSRlow × per member group shortfall _{t-1}	0.75*** (0.05)								
GRSRhigh × per member group shortfall _{t-1}	0.91*** (0.01)								
per member group shortfall _{t-1}		0.64*** (0.07)							
GRSRlow × Shortfall _{t-1}			0.35*** (0.02)	0.27*** (0.02)	0.30*** (0.02)	0.30*** (0.03)			
GRSRhigh × Shortfall _{t-1}			0.32*** (0.07)	0.28*** (0.07)	0.30*** (0.06)	0.35*** (0.07)			
Per member group net saving _{t-1}		-0.03*** (0.01)							
Per member cumulative group net saving (1000Tk) _{t-1}		-0.02 (0.02)							
Net saving _{t-1}				-0.12*** (0.02)	-0.11*** (0.02)	-0.12*** (0.03)	-0.11*** (0.02)		
OtherNetSaving _{t-1}				-0.11** (0.05)	0.05 (0.03)	-0.08 (0.09)	0.05 (0.03)		
Cumulative net saving _{t-1}				0.01** (0.00)	0.01*** (0.00)	0.01 (0.00)	0.01*** (0.00)		
CumOtherNetSaving _{t-1}				-0.03** (0.01)	-0.02* (0.01)	-0.03* (0.02)	-0.02* (0.01)		
traditional × FirstYear	126.04*** (15.50)			8.30 (8.93)					
large × FirstYear	85.10*** (11.82)			50.08*** (5.16)					
large grace × FirstYear	19.87** (9.35)			-112.24*** (8.40)					
cow × FirstYear	30.30*** (9.83)			-116.84*** (10.40)					
traditional × SecondYear	237.97*** (13.83)	52.18*** (12.66)		7.33 (5.68)	43.36*** (9.84)	48.80*** (7.41)	44.07*** (11.75)	48.13*** (7.47)	
large × SecondYear	192.23*** (10.06)	43.98*** (10.29)		15.81** (6.97)	51.06*** (10.38)	29.71*** (7.50)	57.88*** (12.02)	29.09*** (7.82)	
large grace × SecondYear	165.21*** (12.44)	40.51*** (8.93)		66.63*** (8.23)	98.47*** (10.60)	93.19*** (7.62)	99.26*** (12.59)	93.29*** (7.51)	
cow × SecondYear	153.94*** (11.82)	38.38*** (8.09)		77.35*** (6.56)	108.29*** (10.09)	110.35*** (7.51)	106.80*** (11.86)	110.70*** (7.32)	
traditional × ThirdYear	145.56*** (16.20)	-0.21 (11.95)		-28.01*** (6.03)	6.85 (11.42)	-10.01 (10.06)	14.19 (13.63)	-9.98 (10.29)	
large × ThirdYear	-10.43 (26.73)	-86.24*** (23.79)		-64.12*** (10.28)	-21.78 (13.30)	19.99** (9.72)	-33.97** (13.84)	21.30** (10.20)	
large grace × ThirdYear	119.76*** (19.67)	-6.41 (15.36)		49.46*** (12.07)	80.36*** (14.79)	43.28*** (12.43)	92.05*** (17.00)	42.15*** (13.42)	
cow × ThirdYear	74.61*** (18.40)	-32.87 (20.69)		48.30*** (9.00)	73.91*** (13.95)	42.09*** (12.42)	83.35*** (15.83)	41.25*** (12.93)	
Ultra Poor		27.74*** (4.92)			-35.11*** (7.70)	-30.75*** (5.49)	-36.85*** (8.83)	-30.66*** (5.53)	
Moderate Poor		37.04*** (9.13)			-37.19*** (8.51)	-32.10*** (6.22)	-38.96*** (9.64)	-31.99*** (6.27)	
number of clusters	92	92	92	92	92	92	92	92	92
R ²	0.329	0.218	0.353	0.072	0.113	0.098	0.381	0.082	0.38
N	4147	4173	4147	47213	47213	47213	47213	47213	47213

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. Shortfall is (planned installment) - (actual repayment). OtherShortfall indicates mean shortfall of other members in a group. Group repayment shortfall rates (GRSR) are defined as high if the first six months' repayment shortfall rate is above median, low if otherwise. Median GRSR is $-\infty$.

2. ***, **, * indicate statistical significance at 1%, 5%, 10%, respectively. 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, so is individual level shortfall. The coefficient is larger in groups with high shortfall rates, hinting lower loan repayment discipline or repayment struggles as a group. In (7), Lagged shortfall of others conditional concurrent other shortfall tends to reduce own shortfall, and this relationship stays qualitatively same when we take a lagged intragroup shortfall difference in (8), (9), indicating some loan discipline as a group member. Concurrent shortfall by others has a point estimate close to one, implying that intragroup shortfall is almost perfectly positively correlated. Group level shortfall gets smaller in the third year in all arms, indicating stronger efforts in repayment in the final loan year. Both group and individual shortfall are smaller when net saving are larger. Cumulative net saving by others is negatively correlated with individual shortfall, again, suggesting loan repayment discipline.

Check correlations between repayment, saving, revenues, costs.

TABLE 2: GROUP FIXED EFFECTS AND IV ESTIMATION OF REPAYMENT

covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Group fixed effects				GFE instrumental variables		
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)		
cow × 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)	
cow × 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)	
cow × 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	92 646.23	92 482.73	92 264.86
Weak IV: Net saving _t							
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
\bar{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.

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

Finding III.2 TABLE 2 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 3: 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)			
cow × 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)			
cow × 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)		
cow × 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)
cow × 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)
cow × 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 3 shows costs are positively autocorrelated (persistent) and strongly, positively correlated with other members' concurrent costs.

Cumulative profits.

TABLE 4: GROUP FIXED EFFECTS ESTIMATION OF CUMULATIVE PROFIT

covariates	(1)	(2)	(3)	(4)	(5)	(6)
	12 months		24 months		36 months	
traditional × Ultra Poor	232.9*** (82.4)	231.3*** (36.1)	-122.2** (57.1)	-137.4*** (42.8)	-685.5*** (101.7)	-782.7*** (86.3)
large × Ultra Poor	205.0*** (62.9)	163.0*** (33.7)	-236.3*** (48.2)	-121.6*** (40.8)	-700.0*** (79.7)	-456.6*** (60.0)
large grace × Ultra Poor	284.2*** (82.6)	308.7*** (41.2)	-128.0* (76.1)	-127.4*** (48.1)	-733.2*** (132.0)	-752.8*** (106.2)
cow × Ultra Poor	217.1*** (69.1)	292.3*** (39.7)	-84.0 (55.1)	-126.9*** (31.6)	-594.6*** (104.1)	-662.7*** (81.8)
traditional × Moderate Poor	351.5*** (88.7)	336.2*** (47.2)	35.2 (82.3)	-7.4 (65.7)	-614.5*** (106.5)	-703.6*** (97.0)
large × Moderate Poor	195.6** (81.7)	148.6** (60.2)	-337.4*** (69.5)	-232.9*** (62.6)	-810.8*** (107.5)	-562.6*** (113.4)
large grace × Moderate Poor	299.9*** (84.3)	312.5*** (47.4)	-99.9 (93.8)	-103.1 (67.3)	-720.8*** (162.8)	-745.8*** (129.6)
cow × Moderate Poor	282.9*** (80.1)	334.2*** (41.2)	-58.7 (70.5)	-114.1** (56.8)	-661.3*** (114.8)	-726.8*** (81.7)
CumOtherProfit		0.8*** (0.1)		0.7*** (0.1)		0.7*** (0.1)
number of clusters	92	92	92	92	92	92
\bar{R}^2	0.13	0.345	0.053	0.177	0.541	0.651
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 4 shows cumulative profits are positively only in the first year.

TABLE 5: 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)
cow × 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)
cow × 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 5 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.