

?

## Estimating lending impacts using original 1600 households

March 23, 2019

14:17

Seiro Ito

## Contents

I	Summary	2
I.1	Definitions	2
I.2	Inference	2
I.3	Findings	3
II	Read files	4
II.1	Read from a list	4
II.2	Sample selection and treatment assignment	5
II.2.1	Merge admin and roster files	5
II.2.2	Merge village level info	7
II.3	Merge admin-roster with other files	8
II.3.1	Choosing sample in admin-roster	8
II.3.2	Attach variables from admin-roster to other files	12
III	Descriptive statistics of original 1600 HHs	16
IV	Estimation using original 1600 HHs	18
IV.1	Repayment and net saving	18
IV.2	Schooling	23
IV.3	Assets	27
IV.4	Livestock	32
IV.5	Assets+Livestock	38
IV.6	Incomes	41
IV.7	Consumption	44
IV.8	IGA	47
IV.9	Project cycle	49

# I Summary

## I.1 Definitions

$(125 \times 45 \times 3)$  or, CumRepaid/ $(190 \times 45 \times 2)$

**Traditional** A cash loan of Tk. 5600 with one year maturity. Repay Tk  $125 \times 45$  weeks = 5625 each year for 3 years.

**Large** A cash loan of Tk. 16800 with three year maturity. Repay Tk  $125 \times 45$  weeks  $\times 3$  years = 16875

**Large Grace** A cash loan of Tk. 16800 with a one year grace period and three year maturity. Repay Tk  $190 \times 45$  weeks  $\times 2$  years = 17100.

**Cow** An in-kind loan of a cow worth Tk. 16800 with a one year grace period and three year maturity. Repay Tk  $190 \times 45$  weeks  $\times 2$  years = 17100.

**LargeSize** An indicator variable takes the value of 1 if the arm is Large, Large Grace, or Cow.

**WithGrace** An indicator variable takes the value of 1 if the arm is Large Grace or Cow.

**InKind** Same as Cow.

When one uses covariates Large, Large Grace, Cow in estimation, their estimates represent each arm's characteristics relative to Traditional. When one uses covariates LargeSize, WithGrace, InKind, their estimates represent their labeled names.

## I.2 Inference

- First-difference estimators are used. This can be seen as an extension of DID to multi-periods (although historically the latter precedes the former). FD is used also for a binary indicator such as schooling.
- All the standard errors are clustered at the group (char) level.
- To aid the understanding if the data is more suited to the assumption of first-difference rather than fixed-effects, I used a check suggested by ?, 10.71. It is an AR(1) regression of FD residuals. Most of results show low autocorrelations which is consistent with the assumption of FD estimator. The use of cluster-robust standard errors gives consistent estimates of SEs, so it boils down to efficiency.
- I rely more on the formulation using LargeSize, WithGrace, InKind than Large, LargeGrace, Cow due to an ease in interpretation. Numerically, both are equivalent.
- A caution on reading the estimates: All are estimates on increments. If LargeSize has an estimate of 10, then it is a 10 unit larger change than the baseline (traditional). If the interaction of LargeSize with rd 2-3 is 10, then it is a 10 unit larger change than rd 2-3 change of baseline. If the estimated value of intercept is 10 and rd 2-3 is 10, then rd 2-3 change is 20 for baseline, 30 for LargeSize.

### I.3 Findings

Overall, the intervention reveals that larger sized loans accelerate the timing of becoming an owner of large livestock without adversely affecting the repayments. This applies to both the ultra poor and the moderately poor. A loan amount seems to have convex returns at a low level of assets. Higher growths come at a cost of slower school progression of older girls and smaller increases in consumption for arms with a grace period, so the welfare implication is mixed. In addition, given that the number of cows per owner remains the similar after 2 years, it does not provide evidence for accelerated growth of livestock after becoming an owner in this short window. Another note is that the loan repayment was poor for unknown reasons so, in the hindsight, the risks required a higher margin for this type of lending to the target population, which could have reduced participation.

**Net saving and repayments** Sample uses administrative records of **all borrowers in the original 1600 households**. Smaller net saving for traditional arm. Period of rds 2, 3 saw a positive net saving, then became negative in rd 4 for LargeGrace, Cow. Repayment is greater for Large, LargeGrace, Cow in rds 2, 3. In rd 4, repayment of Large becomes statistically the same with Traditional while LargeGrace, Cow are greater (TABLE 4). TABLE 5 (1) reveals LargeSize have larger net saving while (2) shows WithGrace has a faster decline in rds 2, 3, 4. Repayment is larger with LargeSize but smaller with WithGrace in (3). (4) shows rd 2-3 have larger repayment for WithGrace, which is by design. Repayment is positively autocorrelated and is negatively correlated with previous net saving. The ultra poor repaid just as much as the moderately poor, (TABLE 6). This is evidence against the popular belief that the ultra poor are riskier.

**Schooling** Enrollment changes are larger for primary school girls in Large and Cow arms for primary but smaller for junior in rd 1 vs rd 4 comparisons (TABLE 7). When seen by attributes in TABLE 8, LargeSize shows smaller changes especially for primary school boys. Primary school girls in LargeSize and InKind show larger changes, while junior and high school girls in LargeSize show smaller changes than boys. This indicates that large sized arms have detrimental impacts on older girls' schooling but promotional impacts on primary school aged girls. No decline in enrollment changes when repaying for the arms of WithGrace, despite the larger installments.

**Assets** Household assets increased in all arms. Asset values initially increased then decreased, but do not fully cancel out and remain increased. There might have been liquidation of assets to repay the loans. Productive assets declined consecutively. Flood in rd 1 makes the increase in household assets smaller. Productive assets see a major decline among Large during rd 3-4 period (TABLE 9). Comparison by attributes (TABLE 10) or of rd 2 and rd 4 gives the same picture (TABLE 11). Comparison against the loan non-recipients shows that they also experience a similar, increase-increase-decrease pattern. This indicates that the pattern observed among the loan recipients may be a systemic pattern of the area, not necessarily reflecting the repayment burden (TABLE 12). Comparison of productive asset holding of loan recipients (FIGURE 3) and loan nonrecipients (FIGURE 4) reveals that productive asset holding declined at the top end of loan nonrecipients in all arms (they only save or left the program). This indicates that the decline in productive asset holding among the loan recipients are not due to the repayment burden but a general pattern of the area.

**Livestock** Larger increases in holding values in rd 1-2, smaller increases in rd 2-3, no change in rd 3-4. Previous cow owners show a smaller increase in rd 1-2 while not rd 3-4 or rd 2-3 in the Cow arm (TABLE 13). Figures show that cow ownership increased for all arms but the traditional arm (see FIGURE 8). TABLE 14 shows baseline trend is a large increase in rd 1-2,

a small increase in rd 2-3, a small decline in rd 3-4, while LargeSize sees an even larger increase in rd 1-2 and similar trend as baseline afterwards. This shows that member who received a larger sized disbursement could hold on to its level of livestock accumulation. TABLE 15 shows, albeit at  $p$  values around 10%, the ultra poor has a larger increase relative to the moderately poor, which is another manifestation against the popular notion that the ultra poor are riskier.

**Total asset values** Similar results as assets.

**Labour incomes** Small sample. Increased during rd 2-3 in all arms (TABLE 18).

**Consumption** Increased during rd 2-3 in all arms, a decrease in rd 3-4 (TABLE 20). Another notable result is that InKind reduced the consumption in rd 3-4 even further than the baseline loan (TABLE 21).

**IGAs** Multiple IGAs for Traditional arm. Everyone else chose to invest in cows, suggesting entrepreneurship does not seem to matter in the uptake of loans. It is consistent with the presence of a poverty trap induced by a liquidity constraint and convexity in livestock production technology.

**Project choice** Traditional arm has a smaller rate of second investments, and second investment amounts are generally smaller (FIGURE 15). This confirms that most of Traditional arm members do not use own fund to increase the size of investments even after a few years into the program.

One sees changes in investment choices when one compares traditional and all other arms. However, consumption does not seem to differ. Repayments and asset holding are greater in all other arms. These are consistent with households enforcing the repayment disciplines and reinvesting the proceeds rather than increasing consumption.

## II Read files

### II.1 Read from a list

In reading raw files, I added ID information (`./ID/ID_Updated_received_from_Abu.dta`) to all pages. I further added HH ID information from the admin file.

Description of data:

ad	Administrative data: Up to [-24, 48] months after first loan disbursement. This file has not been used in <code>read_cleaned_data.rnw</code> .
ros	roster to condition the initial status prior to participation.
sch	Schooling panel with attrition. Aged 6-18 in rd1. <code>Enrolled={0,1}</code> is defined for children aged 6-18 in rd1 by referencing to <code>currently_enrolled</code> and age information.
ass	Assets. Household assets (houses, durables) and productive assets (machines, tools).
lvo	Livestock holding.
lab	Labour incomes.
far	Farming revenues (no costs reported).
con	Household consumption. Food expenditure asks both bought and consumed volumes and prices. We impute consumption values by using median prices. All quantity is set to annualised quantity.
shk	Shocks. Merged with all other files.

## II.2 Sample selection and treatment assignment

### II.2.1 Merge admin and roster files

```
Warning: package 'zoo' was built under R version 3.5.2
```

```
Attaching package: 'zoo'
```

```
The following objects are masked from 'package:base':
```

```
as.Date, as.Date.numeric
```

How I combined between pages: First, merge time-invariant portion of admin data with roster data `ros` with `hhid` as a key. Then it is merged with time-variant portion of admin data using `hhid`, `Year`, `Month` as keys. Second, merge the resulting file with other data `sch`, `ass`, ... By merging in this way, I get arm information for each HH in survey 1 with some NAs. I fill in NAs by using village level information.

```
adw3 idfu[adw2]: admin data adw2 + idfu (arm information)
```

```
ad0 Selected columns of adw3.
```

Base: roster.

```
ar.0 adbase[ros]: ros + invariant portion of admin data ad0.
```

```
ar.1 adrest[ar.0]: ar.0 + variable portion of admin data ad0.
```

```
ar vr[ar.1]: ar.1 + vr (RCT_village.dta)
```

Base: admin.

```
ar.00 ros.00W[ad0]: ad0 + ros.00W (survey round info).
```

```
arAll ros.0[ar.00]: ar.00 (admin data with survey round info) + ros.0 (roster only with first observed round).
```

```
arA vr[arAll]: arAll (admin data as base + roster) + vr (village randomisation)
```

Tabulation of arms with `ar.0`. There are 220 NAs which will be filled in with `RCT_village.dta` with `ar`, `arAll` in the next subsection.

traditional	large	large	grace	cow	<NA>
485	464		467	487	220

RArm					
survey	traditional	large	large	grace	cow
1	8	17		20	34
2	167	343		340	346

There are 26 members (`oldMember` in `Mstatus`), 20 members (`newGroup` in `Mstatus`), 162 members (`iRejection` and `iReplacement` in `Mstatus`) who did not borrow but only saved. This is identified by `DisDate1 == NA & creditstatus == No` (not NAs, because they are offered and declined).

survey	DisDate1	creditstatus	Mstatus
Min. :1	Min. :NA	Yes	: 0 gErosion : 80
1st Qu.:1	1st Qu.:NA	No	:208 gRejection :140

Median :1	Median :NA	Replaced Member: 0	iRejection :159
Mean :1	Mean :NA	NA's :220	iReplacement: 3
3rd Qu.:1	3rd Qu.:NA		newGroup : 20
Max. :1	Max. :NA		oldMember : 26
	NA's :428		

220 NAs in creditstatus are gErosion and gRejection. Their arms are not recorded in survey data and they will be supplemented with vr (from RCT\_village.dta) later.

survey	Arm	ObPattern	AttritIn	Mstatus
Min. :1	traditional: 0	0111: 0	2: 46	gErosion : 80
1st Qu.:1	large : 0	1000: 46	3: 6	gRejection :140
Median :1	large grace: 0	1010: 1	4: 54	iRejection : 0
Mean :1	cow : 0	1011: 0	9:114	iReplacement: 0
3rd Qu.:1	NA's :220	1100: 6		newGroup : 0
Max. :1		1110: 53		oldMember : 0
		1111:114		
Mgroup				
continued	: 0			
drop outs	:140			
forced drop outs:	80			
new group	: 0			
replacements	: 0			

Create BorrowerStatus to indicate these guys (DisDate1 == NA & creditstatus == No) as a pure saver.

borrower	pure saver	quit membership
1791	49	159

Set No in creditstatus if NA in DisDate1.

survey	DisDate1	creditstatus	Mstatus
Min. :1	Min. :NA	Yes : 0	gErosion : 80
1st Qu.:1	1st Qu.:NA	No :428	gRejection :140
Median :1	Median :NA	Replaced Member: 0	iRejection :159
Mean :1	Mean :NA		iReplacement: 3
3rd Qu.:1	3rd Qu.:NA		newGroup : 20
Max. :1	Max. :NA		oldMember : 26
	NA's :428		
BorrowerStatus			
borrower	: 0		
pure saver	:208		
quit membership:	220		

Need to merge in 2 steps: Merge admin (time-invariant) with roster with hhid as a key, then merge to admin (time-variant [e.g., OtherRepaid, OtherNetSaving, OtherMisses, CumOtherMisses, CumRepaid, CumEffectiveRepayment, CumNetSaving, CumPlannedInstallment, CumOtherRepaid, CumOtherNetSaving, CumMisses, CumRepaidRate, CumEffectiveRepaidRate, RMOtherNetSaving, RMOtherRepaid]) with hhid, Year, Month as keys. This is because there are 8398 non-matching cases if we merge using Year, Month of IntDate in roster data and Year, Month of Date in admin data. This is inevitable because survey precedes the first meeting of borrowers: The admin data starts from 2013-05-01 while survey data starts from 2011-10-09 and rd 1 ends at 2013-10-12 for oldMembers with the median date 2012-10-20. Below gives Year, Month in roster data in rd 1 with no match in admin data.

2011-October	2011-November	2012-January	2012-October	2012-November
6	1	19	1146	327
2012-December	2013-September	2013-October	2014-January	2014-October
79	6	19	12	83

2014-November	2014-December	2015-November	2015-December	2016-January
43	36	111	40	26
2017-January	2017-February	2017-March	2017-April	NA-NA
44	97	17	17	21

After 2014, it is mostly drop out members who do not match with admin data because they do not attend the meeting.

```
table0(ar00[is.na(MonthsElapsed) & MemNum == 1 & Year ≥ 2014,
Mgroup])
```

continued	drop outs	new group	replacements
78	381	58	9

No additional match if matching only with Year.

	FALSE	TRUE
YearMonthMatch	2055	5958
YearMatch	2055	5958

In roster + admin (base: roster): Tabulate hhid observations by survey round and RArm before supplementing with AssignOriginal and VArm. Note: 220 observations with NA are also pointed in read\_cleaned\_data.rnw and are going to be dealt with in the next subsection.

	RArm					
survey	traditional	large	large	grace	cow	<NA>
1	485	464		467	487	220
2	472	445		447	446	173
3	472	448		452	453	168
4	465	444		447	444	114

## II.2.2 Merge village level info

ar: ar.1 + vr (RCT\_village.dta)

I use arm VArm from village level information. Tabulation of AssignOriginal against VArm shows complementarity so I can use one variable to fill in NAs in another.

	VArm					
AssignOriginal	traditional	large	large	grace	cow	<NA>
traditional		1244	0	0	0	650
large		0	1423	0	0	378
large grace		0	0	1437	0	376
cow		0	0	0	1631	199
<NA>		418	158	40	59	0

Tabulation of RArm after supplementing with AssignOriginal and VArm.

```
ar[is.na(RArm) & !is.na(AssignOriginal), RArm := AssignOriginal]
ar[is.na(RArm) & !is.na(VArm), RArm := VArm]
```

	RArm					
survey	traditional	large	large	grace	cow	
1	605	504		507	507	
2	585	485		447	466	
3	582	487		452	472	
4	540	483		447	444	

Below is what is supplemented from VArm of village level information to the 220 NAs.

		RArm				
BorrowerStatus		traditional	large	large	grace	cow
borrower		0	0		0	0
pure saver		0	0		0	0
quit membership		120	40		40	20

## Contents of pure savers

traditional	large	large	grace	cow
102	12		22	72

arA: arAll (admin data as base + roster) + vr (village randomisation)

		RArm				
survey		traditional	large	large	grace	cow
1		474	397		375	443
2		472	444		447	446
3		468	441		442	435
4		463	444		446	444

		BorrowerStatus				
survey		borrower	pure	saver	quit	membership
1		1496		43		150
2		1636		49		124
3		1621		49		116
4		1622		47		128

		BorrowerStatus				
RArm		borrower	pure	saver	quit	membership
traditional		1501		188		188
large		1686		0		40
large grace		1644		0		66
cow		1544		0		224

		BorrowerStatus				
survey		borrower	pure	saver	quit	membership
1		1400		43		246
2		1636		49		124
3		1621		49		116
4		1622		47		128

## II.3 Merge admin-roster with other files

### II.3.1 Choosing sample in admin-roster

Tabulation of RArm when dropping twice, double in traditional arm.

	traditional	large	large	grace	cow	total
1	441	504		507	507	1959
2	319	485		447	466	1717
3	316	487		452	472	1727
4	278	483		447	444	1652

Tabulation of RArm when dropping twice in traditional arm. This may make most sense but a large attrition between rd 1 and 2.

	traditional	large	large	grace	cow	total
1	505	504		507	507	2023



2	430	485	447	466	1828
3	426	487	452	472	1837
4	388	483	447	444	1762

Tabulation of RArm when dropping dirbursement after 2015-01-01. This has less attrition but includes heterogenous treatment among traditional.

	traditional	large	large	grace	cow	total
1	328	385		359	328	1400
2	323	371		350	316	1360
3	323	372		349	318	1362
4	321	370		345	312	1348

In roster + admin 1: Tabulate observations after keeping only observations used in estimation: Keep if Mstatus includes strings old, iRej, gEro, gRej, & DisDate1 is before 2015-01-01, & TradGroup does not include strings tw.

	traditional	large	large	grace	cow	total
1	170	296		278	248	992
2	137	285		270	240	932
3	137	286		270	239	932
4	136	284		266	235	921

In roster + admin 2: Keep if Mstatus includes strings old, iRej, gEro, gRej, & TradGroup does not include strings tw (relaxing DisDate1 is before 2015-01-01). [This the data used in this note](#). This also shows a lower attrition rate for large arm.

	traditional	large	large	grace	cow	total
1	400	400		400	400	1600
2	327	384		342	366	1419
3	324	386		348	366	1424
4	287	382		343	342	1354

Create o1600 to indicate the original 1600 HHs. Tabulation of total observations in roster by o1600 and survey.

	survey			
o1600	1	2	3	4
0	2101	2510	2543	2457
1	6532	5817	5843	5420

Tabulation of total observations in roster by o1600 and survey after restricting to 1 obs per HH.

	survey			
o1600	1	2	3	4
0	523	611	616	607
1	1600	1372	1377	1307

Tabulation for arA. This has fewer observations per meeting than ar when only using 1 obs per rd,

	RArm				
survey	traditional	large	large	grace	cow
1		138	285	253	311
2		167	343	342	346
3		165	341	338	335
4		165	343	342	342

but more observations per round because there are multiple meetings per round.

	RArm				
survey	traditional	large	large	grace	cow
1		747	1359	1379	2393
2		3054	6197	6221	6156

3	2220	4650	4607	4596
4	2379	5074	5073	5095

arA is used in saving and repayment regressions. Summary by conditioning on o1600 == 1 & MemNum == 1 & DisDate1 == NA.

There are errors in repayment. hhid 8169303, 8169305, 8169306, 8169316 recorded as repaid 16300, 16800, 16300, 16424, respectively, but with no record of disbursement and repayment before the final meeting. Change repayment to 0.

hhid	survey	DisDate1	ObPattern	creditstatus
8169303:48	Min. :2.0	Min. :NA	0111: 0	Yes : 0
8169305:48	1st Qu.:2.0	1st Qu.:NA	1000: 0	No :192
8169306:48	Median :3.0	Median :NA	1010: 0	Replaced Member: 0
8169316:48	Mean :2.9	Mean :NA	1011: 0	
	3rd Qu.:4.0	3rd Qu.:NA	1100: 0	
	Max. :4.0	Max. :NA	1110: 0	
		NA 's :192	1111:192	
RArm	Mgroup	Mstatus	GroupStatus	
traditional:192	continued :192	gErosion : 0	accepted:192	
large : 0	drop outs : 0	gRejection : 0		
large grace: 0	forced drop outs: 0	iRejection : 0		
cow : 0	new group : 0	iReplacement: 0		
	replacements : 0	newGroup : 0		
		oldMember :192		
value.repay	value.NetSaving	BorrowerStatus		
0 :188	0 :93	borrower : 0		
16300: 2	40 :29	pure saver :192		
16424: 1	60 : 9	quit membership: 0		
16800: 1	20 : 8			
	30 : 8			
	50 : 8			
	(Other):37			

After correcting the error, below gives the summary.

hhid	survey	DisDate1	ObPattern	creditstatus
7020405: 1	Min. :1.00	Min. :NA	0111: 13	Yes : 0
7020412: 1	1st Qu.:2.00	1st Qu.:NA	1000: 22	No :185
7020417: 1	Median :2.00	Median :NA	1010: 0	Replaced Member: 0
7020905: 1	Mean :1.81	Mean :NA	1011: 0	
7031502: 1	3rd Qu.:2.00	3rd Qu.:NA	1100: 8	
7031505: 1	Max. :2.00	Max. :NA	1110: 1	
(Other):179		NA 's :185	1111:141	
RArm	Mgroup	Mstatus	GroupStatus	
traditional:79	continued : 26	gErosion : 0	accepted:185	
large :12	drop outs :159	gRejection : 0		
large grace:22	forced drop outs: 0	iRejection :159		
cow :72	new group : 0	iReplacement: 0		
	replacements : 0	newGroup : 0		
		oldMember : 26		
value.repay	value.NetSaving	BorrowerStatus		
0:185	0 :159	borrower : 0		
	80 : 9	pure saver : 26		
	60 : 5	quit membership:159		
	40 : 2			
	50 : 2			
	70 : 2			
	(Other): 6			

Tabulate observations without disbursement date info.

survey	DisDate1	creditstatus	Mstatus
Min. :1	Min. :NA	Yes : 0	gErosion : 80
1st Qu.:1	1st Qu.:NA	No :428	gRejection :140
Median :1	Median :NA	Replaced Member: 0	iRejection :159
Mean :1	Mean :NA		iReplacement: 3
3rd Qu.:1	3rd Qu.:NA		newGroup : 20
Max. :1	Max. :NA		oldMember : 26
	NA's :428		
BorrowerStatus			
borrower	: 0		
pure saver	:208		
quit membership	:220		

These are people who rejected loans. Add RejectedLoans to FirstDisPeriod.

survey	DisDate1	FirstDisPeriod
Min. :1	Min. :2013-05-01 00:00:00	BeforeJan2015:1400
1st Qu.:1	1st Qu.:2013-07-01 00:00:00	Year2015 : 295
Median :1	Median :2013-11-01 00:00:00	Year2016 : 0
Mean :1	Mean :2014-03-23 17:07:57	AfterJan2017 : 0
3rd Qu.:1	3rd Qu.:2014-12-01 00:00:00	RejectedLoans: 428
Max. :1	Max. :2015-12-01 00:00:00	
	NA's :428	
creditstatus	Mstatus	BorrowerStatus
Yes :1695	gErosion : 80	borrower :1695
No : 428	gRejection : 140	pure saver : 208
Replaced Member: 0	iRejection : 160	quit membership: 220
	iReplacement: 115	
	newGroup : 408	
	oldMember :1220	

There are 114 cases of group rejections in GroupStatus classified as individual rejections in Mstatus. Overwrite Mstatus with GroupStatus in these cases.

Mstatus	GroupStatus		
	accepted	erosion	group rejection
gErosion	0	189	0
gRejection	0	0	486
iRejection	543	0	0
iReplacement	445	0	0
newGroup	1603	0	0
oldMember	4747	0	0

	traditional	large	large	grace	cow	total
accepted	1894	1801		1813	1830	7338
erosion	110	0		20	59	189
group rejection	308	158		20	0	486

As one can see below, gRejection is more frequent in traditional and large, while there is none in cow. traditional, cow have more frequent iRejection. So traditional was disliked both at group and individual levels, large was disliked as a group, cow was disliked at an individual level, and large grace were well received at both group and individual levels. This indicates attractiveness of a grace period at least at the group level, and a large cash form (over small cash or in-kind) at the individual level.

Mstatus	RArm				
	traditional	large	large	grace	cow
gErosion	40	0		20	20
gRejection	80	40		20	0
iRejection	54	12		22	72

iReplacement	39	8	11	57
newGroup	166	96	96	50
oldMember	226	348	338	308

	traditional	large	large	grace	cow
gErosion	0.07	0.00		0.03	0.04
gRejection	0.16	0.08		0.04	0.00
iRejection	0.11	0.02		0.04	0.12
iReplacement	0.08	0.02		0.02	0.11
newGroup	0.27	0.19		0.16	0.10
oldMember	0.45	0.69		0.67	0.61
total	1.14	1.00		0.96	0.98

Save roster-admin data.

```
saveRDS(ar, paste0(pathsaveHere, "RosterAdminData.rds"))
saveRDS(arA, paste0(pathsaveHere, "AllMeetingsRosterAdminData.rds"))
fwrite(ar, paste0(pathsaveHere, "RosterAdminData.prn"), sep = "\t", quote = F)
fwrite(arA, paste0(pathsaveHere, "AllMeetingsRosterAdminData.prn"), sep = "\t", quote = F)
```

### II.3.2 Attach variables from admin-roster to other files

Attach RArm, Arm, TradGroup, Mem, ObPattern, AttritIn, o1600, Mstatus, BorrowerStatus, creditstatus, povertystatus, RMvalue.repay, RMvalue.NetSaving, RMOtherNetSaving, RMOtherRepaid, HHsize, HeadLiteracy, IntDate, DisDate1 from ar.

```
varstoattach <- c("RArm", "Arm", "TradGroup", "Mem",
  "ObPattern", "AttritIn", "o1600", "Mstatus", "BorrowerStatus",
  "creditstatus", "povertystatus", "RMvalue.repay",
  "RMvalue.NetSaving", "RMOtherNetSaving", "RMOtherRepaid",
  "HHsize", "HeadLiteracy", "IntDate", "DisDate1")
dfiles <- c("ass", "s1", "lvo", "lvp", "lab", "far", "con", "shk")
for (j in 1:length(dfiles)) {
  dd <- get(dfiles[j])
  dd[, groupid := as.integer(as.numeric(as.character(gid)))]
  dd[, gid := NULL]
  dd[, Year := as.numeric(format(as.Date(IntDate), "%Y"))]
  dd[, Month := as.character(format(as.Date(IntDate), "%B"))]
  dd[Year <= 2010, Year := Year + 10]
  # drop all variables in each page before copying from ar0
  dd[, (varstoattach) := NULL]
  setorder(dd, groupid, hhid, survey, Year, Month)
  setkey(dd, groupid, hhid, survey)
  if (j < length(dfiles)) dd <- ar0[dd]
  assign(dfiles[j], dd)
}
```

Check number of HHs in assets by o1600:

```
table(ass[, .(creditstatus, survey, o1600)])
```

, , o1600 = 0					
	survey				
creditstatus	1	2	3	4	
Yes	478	588	593	586	
No	23	23	23	21	
Replaced Member	0	0	0	0	

, , o1600 = 1				
	survey			
creditstatus	1	2	3	4
Yes	1192	1047	1054	1039
No	403	323	323	268
Replaced Member	0	0	0	0

```
#table0(ass[o1600 == 0L, .(creditstatus, survey)])
```

Save all data.

```
fwrite(s1, paste0(pathsaveHere, "RosterAdminSchoolingData.prn"), sep = "\t", quote = F)
fwrite(ass, paste0(pathsaveHere, "AssetAdminData.prn"), sep = "\t", quote = F)
fwrite(lvo, paste0(pathsaveHere, "LivestockAdminData.prn"), sep = "\t", quote = F)
fwrite(lvp, paste0(pathsaveHere, "LivestockProductsAdminData.prn"), sep = "\t", quote = F)
fwrite(lab, paste0(pathsaveHere, "LabourIncomeAdminData.prn"), sep = "\t", quote = F)
fwrite(far, paste0(pathsaveHere, "FarmRevenueAdminData.prn"), sep = "\t", quote = F)
fwrite(con, paste0(pathsaveHere, "ConsumptionAdminData.prn"), sep = "\t", quote = F)
fwrite(shk, paste0(pathsaveHere, "Shocks.prn"), sep = "\t", quote = F)
```

Further data preparations (trimming, adding shocks, round numbering, creating dummy vectors, interaction terms) for estimation. Produces files: RosterAdminDataUsedForEstimation.prn, AllMeetingsRosterAdminDataUsedForEstimation.prn, AssetAdminDataUsedForEstimation.prn, LivestockAdminDataUsedForEstimation.prn, LabourIncomeAdminDataUsedForEstimation.prn, FarmRevenueAdminDataUsedForEstimation.prn, ConsumptionAdminDataUsedForEstimation.prn, ShocksAdminDataUsedForEstimation.prn.

TABLE 1: DATA TRIMMING RESULTS

file	old Rej ^g in		No tw dou in		
	Mstatus		TradGroup		
all rounds					
sch1	9007	⇒	6013	⇒	5781
ar	33223	⇒	24806	⇒	23612
arA	95952	⇒	66240	⇒	61200
ass	7989	⇒	5958	⇒	5649
lvo	7989	⇒	5953	⇒	5645
lvp	15964	⇒	11914	⇒	11296
lab	16004	⇒	12102	⇒	11723
far	589	⇒	411	⇒	393
con	5888	⇒	4360	⇒	4051
round 1 only					
sch1	2904	⇒	1931	⇒	1931
ar	2123	⇒	1600	⇒	1600
arA	1999	⇒	1380	⇒	1275
ass	2121	⇒	1596	⇒	1596
lvo	2121	⇒	1574	⇒	1574
lvp	2119	⇒	1598	⇒	1598
lab	2121	⇒	1596	⇒	1596
far	336	⇒	236	⇒	226
con	2022	⇒	1505	⇒	1401

Source: GUK survey data.

Notes: 1. Top panel is observations for all rounds. Bottom panel is observations for round 1 only. We aim for ITT estimates and need to retain original sampled individuals. old|Rej|^g in Mstatus are strings for old members, individual rejecters, group rejecters, group erosion. con|^dro|^rep in Mgroup indicates continuing, dropouts, replacing members. tw|dou in TradGroup are members who received loans twice and double amount in the 2nd loans. They are omitted from analysis because they are under a different treatment arm.

2.

TABLE 2: NUMBER OF OBSERVATIONS IN EACH FILE AT ROUND 1 FROM HHs WITH SINGLE TREATMENT

files	rounds	traditional	large	large grace	cow	total
sch	1	728	622	618	614	2582
	2	630	523	471	522	2146
	3	560	473	438	453	1924
	4	463	406	369	358	1596
arA	1	485	464	467	487	1903
	2	476	451	457	465	1849
	3	473	448	453	454	1828
	4	465	444	447	444	1800
ass	1	603	504	507	507	2121
	2	590	491	457	484	2022
	3	581	485	453	467	1986
	4	528	478	431	418	1855
lvo	1	603	504	507	507	2121
	2	590	491	457	484	2022
	3	581	485	452	466	1984
	4	528	477	412	416	1833
lvp	1	601	504	507	507	2119
	2	588	491	457	485	2021
	3	581	487	453	472	1993
	4	538	483	447	444	1912
lab	1	601	504	507	507	2119
	2	588	491	457	485	2021
	3	581	487	453	472	1993
	4	534	481	443	433	1891
far	1	78	123	70	64	335
	2	35	68	39	30	172
	3	13	27	25	12	77
	4	2	1	2	1	6
con	2	590	490	457	484	2021
	3	581	484	453	470	1988
	4	536	477	435	428	1876

Source: Estimated with GUK administrative and survey data.

Notes: 1. Sample is all households: Original 1600 and added households through new groups and individuals replacing opt-out members. All households in traditional arm who received more than one loan are excluded.

2.

TABLE 3: NUMBER OF OBSERVATIONS IN EACH FILE AT ROUND 1 FROM ORIGINAL 1600 HHs

files	rounds	traditional	large	large grace	cow	total
sch	1	460	479	505	487	1931
	2	300	396	369	403	1468
	3	266	356	340	351	1313
	4	204	306	282	277	1069
arA	1	175	360	360	380	1275
	2	169	349	352	359	1229
	3	167	347	349	348	1211
	4	165	343	343	342	1193
ass	1	398	400	400	400	1598
	2	283	389	352	378	1402
	3	276	384	349	365	1374
	4	238	378	330	329	1275
lvo	1	398	400	400	400	1598
	2	283	389	352	378	1402
	3	276	384	348	365	1373
	4	238	377	330	327	1272
lvp	1	398	400	400	400	1598
	2	387	389	352	379	1507
	3	277	386	349	366	1378
	4	240	382	343	342	1307
lab	1	398	400	400	400	1598
	2	385	389	352	379	1505
	3	364	386	349	367	1466
	4	303	381	342	340	1366
far	1	21	96	52	57	226
	2	5	51	28	27	111
	3	2	22	17	12	53
	4	2	1	2	1	6
con	2	283	388	352	378	1401
	3	276	383	349	365	1373
	4	238	377	331	331	1277

Source: Estimated with GUK administrative and survey data.

Notes: 1. Sample is original 1600 households who agree to join the group. This includes households who later dropped out due to flood, group rejections, and individual rejections. All original 1600 households are tracked but some attrit from the sample.

2.

### III Descriptive statistics of original 1600 HHs

- c continuing members.
- d drop out members.
- a absence.
- n members of a new group.
- r replacing members.

Mpattern															
ObPattern	caaa	caca	cacc	ccaa	ccac	ccca	cccc	daaa	dada	dadd	ddaa	ddda	dddd	naaa	
0111	0	0	14	0	0	0	0	0	0	13	0	0	0	0	
1000	25	0	0	0	0	0	0	68	0	0	0	0	0	5	
1010	0	4	0	0	0	0	0	0	1	0	0	0	0	0	
1011	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
1100	0	0	0	11	0	0	0	0	0	0	14	0	0	0	
1110	0	0	0	0	0	13	0	0	0	0	0	54	0	0	
1111	0	0	0	0	0	0	1153	0	0	0	0	0	229	0	

Mpattern											
ObPattern	nann	nnaa	nnna	nnnn	raaa	rara	rarr	rraa	rrra	rrrr	
0111	4	0	0	0	0	0	5	0	0	0	
1000	0	0	0	0	2	0	0	0	0	0	
1010	0	0	0	0	0	1	0	0	0	0	
1011	0	0	0	0	0	0	0	0	0	0	
1100	0	2	0	0	0	0	0	1	0	0	
1110	0	0	9	0	0	0	0	0	6	0	
1111	0	0	0	440	0	0	0	0	0	144	

AttritIn: Attrition round. 9 is nonattriting members.

2	3	4	9
100	56	258	7975

ObPattern							
AttritIn	0111	1000	1010	1011	1100	1110	1111
2	0	100	0	0	0	0	0
3	0	0	0	0	28	0	0
4	0	0	6	0	0	82	0
9	36	0	0	1	0	0	1966

survey				
AttritIn	1	2	3	4
2	100	0	0	0
3	28	28	0	0
4	88	82	88	0
9	2003	1967	2002	2003

Mstatus changes for some groupids. Correct Mstatus by checking comment for dropping out (taken from CharRandomization2012.prn).

survey				
Mstatus	1	2	3	4
gErosion	0	0	0	0
gRejection	114	114	114	0
iRejection	1	1	1	114



iReplacement	0	0	0	0
newGroup	0	0	0	0
oldMember	0	0	0	1

See how Mstatus changes at rd 4: This suggests iRejection needs to change to gRejection, and iRejection to oldMember.

	survey			
Mstatus	1	2	3	4
gErosion	80	55	54	0
gRejection	140	118	114	0
iRejection	7	7	5	118
iReplacement	6	6	6	6
newGroup	0	0	0	0
oldMember	13	13	13	14

group.id (created from first characters of hhid) and their reasons for dropping out.

	comment	
group.id	denial	<NA>
70317	19	0
70319	20	0
70539	16	0
70858	20	0
71372	0	1
81483	20	0
81697	19	0

Correct Mstatus in rd 4 from iRejection to gRejection if denial is the comment.

	survey			
Mstatus	1	2	3	4
gErosion	0	0	0	0
gRejection	114	114	114	114
iRejection	1	1	1	0
iReplacement	0	0	0	0
newGroup	0	0	0	0
oldMember	0	0	0	1

Correct Mstatus in rd 1-3 from iRejection to oldMember if NA is the comment.

	hhid	Mstatus	survey	creditstatus
1:	7137220	iRejection	1	Yes
2:	7137220	iRejection	2	Yes
3:	7137220	iRejection	3	Yes
4:	7137220	oldMember	4	Yes

	survey			
Mstatus	1	2	3	4
gErosion	0	0	0	0
gRejection	0	0	0	0
iRejection	1	1	1	0
iReplacement	0	0	0	0
newGroup	0	0	0	0
oldMember	0	0	0	1

	survey			
Mstatus	1	2	3	4
gErosion	0	0	0	0
gRejection	0	0	0	0
iRejection	0	0	0	0
iReplacement	0	0	0	0

newGroup	0	0	0	0
oldMember	1	1	1	1

Original 1600 HHs (original sample) by arm and membership status.

Mstatus	AssignOriginal				
	traditional	large	large	grace	cow
gErosion	40	0		20	20
gRejection	80	40		20	0
iRejection	53	12		22	72
iReplacement	0	0		0	0
newGroup	0	0		0	0
oldMember	227	348		338	308

Including r or individually replacing HHs (replacing sample): 1759

Mstatus	AssignOriginal				
	traditional	large	large	grace	cow
gErosion	40	0		20	20
gRejection	80	40		20	0
iRejection	53	12		22	72
iReplacement	53	12		22	72
newGroup	0	0		0	0
oldMember	227	348		338	308

Use original sample. Attrition.

Number of obs per survey round in the schooling file:

tee				
teenum	1	2	3	4
1	1600	1600	1600	1600
2	682	511	446	322
3	248	150	120	83
4	50	26	17	11
5	13	3	2	2
6	2	0	0	0

Assets: Original arm assignment by membership status in rd 1: 1820 households.

Mstatus	AssignOriginal					<NA>
	traditional	large	large	grace	cow	
gErosion	40	0		20	20	0
gRejection	80	40		20	0	0
iRejection	53	12		22	72	0
iReplacement	0	0		0	0	0
newGroup	0	0		0	0	0
oldMember	227	348		338	308	0
<NA>	0	0		0	0	220

## IV Estimation using original 1600 HHs

### IV.1 Repayment and net saving

Dropped 1090 obs due to NA.

Dropped 6540 obs due to NA.

Repayment formally started in round 2. So taking a first-difference leaves us with period 2-3 and period 3-4. After first-differencing, arA has 51230 rows with 1090 individuals with repeatedly observed

for 48 times, respectively. By survey rounds, there are 2, 18, 13, 15 observations per household in rounds 1, 2, 3, 4, respectively. Saving started in rd 1. Repayment and saving are more frequent than survey rounds. In regressions, we opted to use survey rounds as period indicators rather than meeting serial numbers to increase the precision of estimates.

Note all binary interaction terms are demeaned and then interacted.

Tabulation at rd 1:

Mstatus	RArm			
	traditional	large	large grace	cow
gErosion	0	0	0	0
gRejection	0	0	0	0
iRejection	54	9	18	70
iReplacement	0	0	0	0
newGroup	0	0	0	0
oldMember	84	276	235	241

Warning: package 'ggplot2' was built under R version 3.5.2

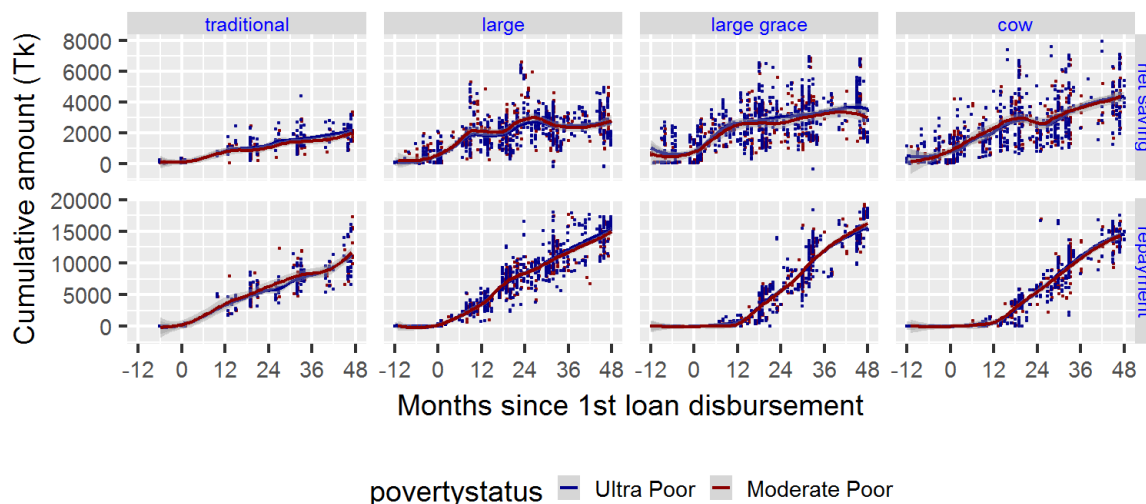
Warning: Removed 714 rows containing non-finite values (stat\_smooth).

Warning: Removed 742 rows containing missing values (geom\_point).

Warning: Removed 1610 rows containing non-finite values (stat\_smooth).

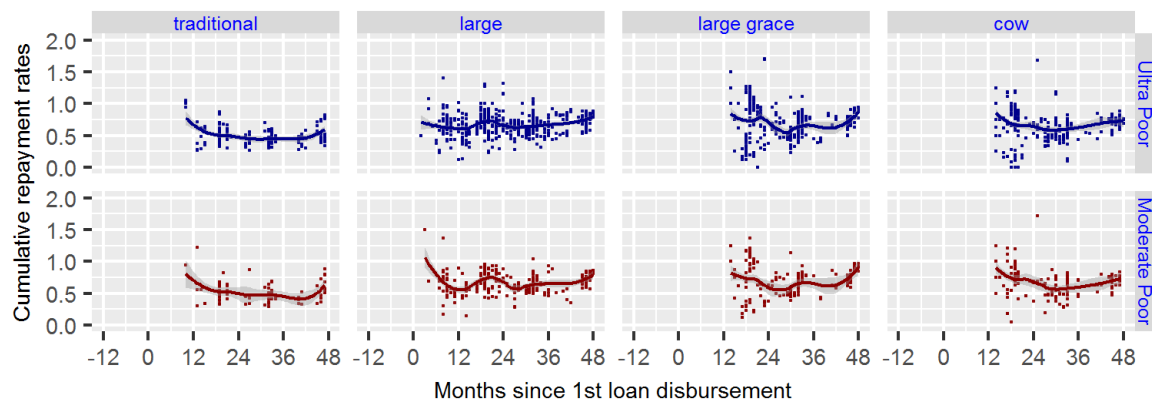
Warning: Removed 1610 rows containing missing values (geom\_point).

FIGURE 1: CUMULATIVE WEEKLY NET SAVING AND REPAYMENT



Note: Each dot represents weekly observations. Only members who received loans are shown. Each panel shows cumulative net saving (saving - withdrawal) or cumulative repayment against weeks after first disbursement. Lines are smoothed lines with a penalized cubic regression spline in `ggplot2::geom_smooth` function, originally from `mgcv::gam` with `bs='cs'`.

FIGURE 2: CUMULATIVE WEEKLY NET REPAYMENT RATES



povertystatus    Ultra Poor    Moderate Poor

Note: Each dot represents weekly observations. Only members who received loans are shown. Each panel shows cumulative net saving (saving - withdrawal) or cumulative repayment against weeks after first disbursement. Lines are smoothed lines with a penalized cubic regression spline in `ggplot2::geom_smooth` function originally from `mgcv::gam` with `bs='cs'`

Loading required package: sandwich

Warning: package 'sandwich' was built under R version 3.5.2

Loading required package: lmtest

TABLE 4: FD ESTIMATION OF CUMULATIVE NET SAVING AND REPAYMENT

	Cumulative net saving		Cumulative repayment			Cumulative net saving +cumulative repayment			Cumulative excess repayment		
covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(Intercept)	39.8*** (2.3)	55.3*** (12.5)	243.0*** (15.1)	120.9*** (27.2)	120.2*** (23.6)	265.4*** (13.0)	176.7*** (27.1)	175.6*** (24.7)	-161.3*** (15.1)	-108.4*** (22.0)	-125.0*** (20.8)
Large	19.8*** (3.4)	21.4*** (3.8)	49.2*** (16.3)	42.7** (17.7)	18.1 (14.4)	68.9*** (14.5)	66.1*** (16.3)	50.0*** (14.4)	79.5*** (16.2)	90.8*** (17.2)	68.9*** (13.9)
LargeGrace	22.7*** (4.2)	25.7*** (4.9)	7.6 (18.1)	-7.2 (19.0)	-36.3** (14.4)	41.8*** (15.9)	28.6 (17.7)	6.6 (15.3)	71.4*** (16.4)	86.5*** (17.2)	64.0*** (13.6)
Cow	20.4*** (3.8)	19.6*** (4.2)	2.5 (17.5)	-11.3 (18.5)	-45.4*** (13.4)	27.2* (14.4)	12.8 (16.4)	-9.4 (13.9)	68.3*** (16.8)	82.0*** (17.8)	54.5*** (13.8)
rd 2		-2.1 (12.3)		36.5* (22.2)	43.2*** (16.3)		28.2 (23.9)	41.0** (18.3)		-76.0*** (15.9)	-66.0*** (13.2)
Large × rd 2		-31.3 (19.0)		185.8*** (56.9)	148.8** (73.3)		127.6*** (48.2)	103.0** (52.5)		43.9 (52.1)	9.6 (68.8)
LargeGrace × rd 2		-64.3*** (23.0)		350.7*** (58.3)	121.6* (70.8)		247.1*** (49.0)	92.5* (52.5)		94.9* (53.5)	-115.7* (65.9)
Cow × rd 2		-35.8 (22.0)		315.9*** (57.2)	99.0 (71.8)		230.9*** (47.0)	86.6* (51.6)		96.1* (53.2)	-106.5 (69.2)
rd 3		-34.1*** (12.2)		168.7*** (21.6)	201.3*** (17.3)		130.4*** (24.3)	156.2*** (20.2)		-144.4*** (16.2)	-110.5*** (13.6)
Large × rd 3		-21.5 (18.1)		260.0*** (36.3)	307.6*** (69.2)		220.2*** (22.8)	250.4*** (42.4)		-95.9* (49.0)	-51.1 (58.0)
LargeGrace × rd 3		-100.8*** (22.5)		536.3*** (35.1)	492.1*** (66.1)		424.3*** (23.5)	383.5*** (42.5)		-147.6*** (47.0)	-190.2*** (55.9)
Cow × rd 3		-81.1*** (21.2)		517.2*** (36.1)	463.6*** (67.6)		412.0*** (24.9)	367.7*** (42.5)		-145.2*** (48.8)	-199.3*** (58.8)
rd 4		-46.7*** (12.5)		447.7*** (48.9)	211.8*** (21.8)		227.7*** (26.6)	151.1*** (23.1)		344.0*** (49.2)	133.3*** (20.8)
Large × rd 4		-30.8 (19.5)		193.4 (123.0)	286.8*** (71.5)		168.3*** (46.2)	217.2*** (50.1)		-322.2*** (135.0)	-234.6*** (68.4)
LargeGrace × rd 4		-104.6*** (24.3)		297.0** (119.8)	418.8*** (61.5)		339.0*** (46.4)	329.4*** (43.9)		-616.7*** (138.4)	-511.7*** (69.6)
Cow × rd 4		-77.6*** (22.8)		382.6** (151.2)	454.1*** (64.7)		363.5*** (48.1)	362.1*** (43.5)		-543.4*** (167.3)	-486.8*** (73.1)
FloodInRd1					-19.0*** (6.9)			-12.7* (7.2)			-3.6 (5.6)
Head literate					0.1 (9.0)			0.9 (9.1)			0.6 (6.5)
Head age					-0.2 (0.3)			-0.2 (0.3)			-0.1 (0.2)
6M repavment					4.9*** (0.1)			3.4*** (0.1)			4.4*** (0.2)
6M net saving					-0.3*** (0.1)			0.9*** (0.1)			0.4*** (0.1)
6M other member net saving					-0.4** (0.2)			-0.6*** (0.2)			-0.9*** (0.3)
6M other member Repaid					0.0 (0.2)			0.2 (0.1)			0.1 (0.3)
Effectiverepaymentment						0.7*** (0.0)	0.8*** (0.0)	0.3*** (0.0)			
$\bar{R}^2$	0.003	0.052	0.002	0.082	0.753	0.585	0.639	0.795	0.002	0.096	0.55
$\hat{\rho}$	0.500	0.409	0.729	0.619	0.653	0.774	0.711	0.722	0.576	0.498	0.634
Pr( $\hat{\rho} = 0$ )	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	51230	45780	51230	45780	45486	51230	45780	45486	51230	45780	45486

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. Saving and repayment information is taken from administrative data. Time invariant household characteristics are taken from household survey data. Administrative data are merged with survey data by the dating the survey rounds in administrative data. Net saving is saving - withdrawal. Excess repayment is repayment - due amount.

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

TABLE 5: FD ESTIMATION OF CUMULATIVE NET SAVING AND REPAYMENT BY ATTRIBUTES

	Cumulative net saving		Cumulative repayment			Cumulative net saving +cumulative repayment			Cumulative excess repayment		
covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(Intercept)	39.8*** (2.3)	55.3*** (12.5)	243.0*** (15.1)	120.9*** (27.2)	120.2*** (23.6)	265.4*** (13.0)	176.7*** (27.1)	175.6*** (24.7)	-161.3*** (15.1)	-108.4*** (22.0)	-125.0*** (20.8)
LargeSize	19.8*** (3.4)	21.4*** (3.8)	49.2*** (16.3)	42.7** (17.7)	18.1 (14.4)	68.9*** (14.5)	66.1*** (16.3)	50.0*** (14.4)	79.5*** (16.2)	90.8*** (17.2)	68.9*** (13.9)
WithGrace	2.9 (4.4)	4.4 (4.9)	-41.6*** (11.7)	-49.9*** (11.9)	-54.3*** (11.6)	-27.0** (11.0)	-37.5*** (11.8)	-43.4*** (12.1)	-8.2 (8.6)	-4.2 (9.2)	-4.9 (9.0)
InKind	-2.3 (4.7)	-6.2 (5.2)	-5.1 (13.3)	-4.1 (13.0)	-9.1 (10.4)	-14.6 (10.9)	-15.8 (11.8)	-16.0 (11.7)	-3.0 (9.7)	-4.5 (10.2)	-9.5 (8.4)
rd 2		-2.1 (12.3)		36.5* (22.2)	43.2*** (16.3)		28.2 (23.9)	41.0** (18.3)		-76.0*** (15.9)	-66.0*** (13.2)
LargeSize × rd 2		-31.3 (19.0)		185.8*** (56.9)	148.8** (73.3)		127.6*** (48.2)	103.0** (52.5)		43.9 (52.1)	9.6 (68.8)
WithGrace × rd 2		-33.0* (18.0)		164.9*** (32.8)	-27.2 (30.4)		119.5*** (28.7)	-10.5 (23.3)		51.0 (35.2)	-125.4*** (35.1)
InKind × rd 2		28.5 (20.6)		-34.7 (32.7)	-22.6 (26.1)		-16.2 (26.9)	-5.9 (21.7)		1.2 (36.4)	9.2 (29.9)
rd 3		-34.1*** (12.2)		168.7*** (21.6)	201.3*** (17.3)		130.4*** (24.3)	156.2*** (20.2)		-144.4*** (16.2)	-110.5*** (13.6)
LargeSize × rd 3		-21.5 (18.1)		260.0*** (36.3)	307.6*** (69.2)		220.2*** (22.8)	250.4*** (42.4)		-95.9* (49.0)	-51.1 (58.0)
WithGrace × rd 3		-79.3*** (20.1)		276.2*** (21.8)	184.4*** (29.0)		204.1*** (21.1)	133.0*** (24.9)		-51.6* (29.9)	-139.2*** (29.6)
InKind × rd 3		19.8 (22.5)		-19.1 (20.4)	-28.5 (26.0)		-12.3 (22.3)	-15.8 (25.5)		2.3 (29.9)	-9.1 (29.4)
rd 4		-46.7*** (12.5)		447.7*** (48.9)	211.8*** (21.8)		227.7*** (26.6)	151.1*** (23.1)		344.0*** (49.2)	133.3*** (20.8)
LargeSize × rd 4		-30.8 (19.5)		193.4 (123.0)	286.8*** (71.5)		168.3*** (46.2)	217.2*** (50.1)		-322.2** (135.0)	-234.6*** (68.4)
WithGrace × rd 4		-73.8*** (23.1)		103.6 (85.4)	132.0*** (41.8)		170.7*** (47.6)	112.2*** (42.6)		-294.5*** (91.9)	-277.2*** (46.7)
InKind × rd 4		27.0 (25.5)		85.6 (122.5)	35.4 (27.7)		24.5 (46.0)	32.8 (35.3)		73.3 (135.3)	25.0 (49.7)
FloodInRd1					-19.0*** (6.9)			-12.7* (7.2)			-3.6 (5.6)
Head literate					0.1 (9.0)			0.9 (9.1)			0.6 (6.5)
Head age					-0.2 (0.3)			-0.2 (0.3)			-0.1 (0.2)
6M repavment					4.9*** (0.1)			3.4*** (0.1)			4.4*** (0.2)
6M net saving					-0.3*** (0.1)			0.9*** (0.1)			0.4*** (0.1)
6M other member net saving					-0.4** (0.2)			-0.6*** (0.2)			-0.9*** (0.3)
6M other member Repaid					0.0 (0.2)			0.2 (0.1)			0.1 (0.3)
Effectiverepayment						0.7*** (0.0)	0.8*** (0.0)	0.3*** (0.0)			
$\bar{R}^2$	0.003	0.052	0.002	0.082	0.753	0.585	0.639	0.795	0.002	0.096	0.55
$\hat{\rho}$	0.500	0.409	0.729	0.619	0.653	0.774	0.711	0.722	0.576	0.498	0.634
Pr[ $\hat{\rho} = 0$ ]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	51230	45780	51230	45780	45486	51230	45780	45486	51230	45780	45486

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. LargeSize is an indicator function if the arm is of large size, WithGrace is an indicator function if the arm is with a grace period, InKind is an indicator function if the arm provides a cow. Saving and repayment information is taken from administrative data. Time invariant household characteristics are taken from household survey data. Administrative data are merged with survey data by the dating the survey rounds in administrative data. Net saving is saving - withdrawal. Excess repayment is repayment - due amount.

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

TABLE 6: FD ESTIMATION OF NET CUMULATIVE SAVING AND REPAYMENT, ULTRA POOR VS. MODERATELY POOR

	Cumulative net saving		Cumulative repayment			Cumulative net saving +cumulative repayment			Cumulative excess repayment		
covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(Intercept)	59.0*** (2.1)	80.7*** (13.8)	263.7*** (5.5)	103.3*** (37.9)	76.8*** (26.5)	307.0*** (5.3)	188.7*** (34.4)	173.1*** (28.9)	-94.0*** (4.6)	-14.4 (14.9)	-56.9** (22.4)
UltraPoor	-0.0 (1.2)	0.5 (1.4)	-2.8 (3.7)	-3.4 (3.9)	-0.1 (3.5)	1.5 (3.8)	1.3 (3.8)	1.7 (3.9)	-0.7 (3.3)	-0.2 (3.4)	2.9 (3.2)
rd 2		-7.6 (13.8)		62.9* (34.8)	65.0*** (23.0)		46.2 (32.1)	55.2** (24.1)		-84.7*** (17.2)	-77.4*** (18.2)
UltraPoor × rd 2		-5.8 (4.7)		10.0* (5.5)	7.5* (3.9)		4.1 (7.6)	2.2 (5.8)		-14.5** (7.3)	-18.4** (7.4)
rd 3		-39.7*** (14.2)		201.3*** (39.1)	231.6*** (27.0)		155.1*** (36.3)	178.2*** (28.8)		-161.0*** (16.0)	-124.1*** (20.7)
UltraPoor × rd 3		-8.3 (5.1)		7.2 (6.9)	9.6 (6.7)		-0.9 (7.8)	-0.6 (6.9)		0.2 (8.3)	-0.3 (7.6)
rd 4		-52.9*** (14.4)		473.9*** (56.6)	244.6*** (30.2)		248.9*** (37.0)	174.1*** (31.8)		312.8*** (51.1)	106.6*** (31.2)
UltraPoor × rd 4		-3.6 (5.7)		-48.9* (26.1)	-3.1 (3.8)		0.5 (17.3)	1.9 (12.5)		-56.3* (29.5)	-17.1 (15.1)
FloodInRd1					-14.4* (8.1)			-10.2 (8.5)			-2.5 (6.5)
Head literate					1.1 (9.4)			1.7 (9.8)			1.7 (7.1)
Head age					-0.2 (0.3)			-0.2 (0.3)			-0.1 (0.2)
6M renavment					4.9*** (0.1)			3.4*** (0.1)			4.4*** (0.2)
6M net saving					-0.2*** (0.1)			0.9*** (0.1)			0.4*** (0.1)
6M other member net saving					-0.0 (0.2)			-0.3 (0.2)			-1.0*** (0.3)
6M other member Repaid					-0.0 (0.2)			0.1 (0.1)			0.1 (0.3)
Effectiverenavmentment						0.7*** (0.0)	0.8*** (0.0)	0.4*** (0.0)			
$\bar{R}^2$	0	0.031	0	0.068	0.731	0.582	0.63	0.782	0	0.08	0.543
$\hat{\rho}$	0.516	0.414	0.699	0.642	0.700	0.768	0.736	0.752	0.574	0.507	0.639
Pr[ $\hat{\rho} = 0$ ]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	51230	45780	51230	45780	45486	51230	45780	45486	51230	45780	45486

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\text{Pr}[\rho = 0]$  is its  $p$  value. UltraPoor is an indicator function if the household is classified as the ultra poor. Saving and repayment information is taken from administrative data. Time invariant household characteristics are taken from household survey data. Administrative data are merged with survey data by the dating the survey rounds in administrative data. Net saving is saving - withdrawal. Excess repayment is repayment - due amount.

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

**Finding IV.1** FIGURE 1 visually presents that repayment is no different between the ultra poor and the moderately poor. The subsequent regression table econometrically confirms this (TABLE 6).

## IV.2 Schooling

Dropped 1721 obs due to NA.  
Dropped 1721 obs due to NA.  
Dropped 399 obs due to T<2.  
Dropped 1136 obs due to NA.

Enrollment pattern in original schooling panel. 'n' indicates NA (either attrition or not reported).

SchPattern															
ObPattern	0000	0001	000n	0011	001n	00nn	0100	010n	0111	011n	01nn	0nnn	1000	1001	
	0111	0	0	0	0	0	0	0	0	2	2	6	0	0	

1000	0	0	0	0	0	0	0	0	0	0	0	63	0	0
1010	0	0	0	0	0	1	0	0	0	0	0	4	0	0
1011	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100	0	0	0	0	0	2	0	0	0	0	5	2	0	0
1110	0	0	7	0	2	2	0	0	0	8	0	3	0	0
1111	40	7	41	25	4	50	2	2	173	15	11	182	13	2
SchPattern														
ObPattern	100n	1011	101n	10nn	1100	1101	110n	1110	1111	111n	11n1	11nn	1nnn	
0111	0	0	0	1	0	0	0	0	0	12	0	0	5	
1000	0	0	0	0	0	0	0	0	0	0	0	0	56	
1010	0	0	0	0	0	0	0	0	0	0	0	1	4	
1011	0	0	0	0	0	0	0	0	0	0	0	1	0	
1100	0	0	0	0	0	0	0	0	0	0	0	12	3	
1110	2	0	1	0	0	0	1	0	0	42	0	5	0	
1111	9	9	4	17	11	1	16	4	781	77	1	44	135	

Left panel is before dropping nnn, right panel is after: Original panel.

	traditional	large	large	grace	cow	traditional	large	large	grace	cow
1	460	479		505	487	300	396		369	403
2	300	396		369	403	300	396		369	403
3	266	356		340	351	266	356		340	351
4	204	306		282	277	204	306		282	277

sch has 5781 rows. Drop 463 observations in sch with nnn in SchPattern.

With OLS, 154, 246, 1068 individuals are repeatedly observed for 2, 3, 4 times, respectively. With FD, sch is reduced to 3597 rows after first-differencing with 140, 231, 993 individuals with repeatedly observed for 1, 2, 3 times, respectively. Individuals with NAs in Enrolled: 0 obs for sch. Check missingness in schooling level information.

0	1
3065	2253

Drop 3065 obs without school level information.

Dropped 1721 obs due to NA.  
Dropped 1721 obs due to NA.  
Dropped 399 obs due to T<2.  
Dropped 1136 obs due to NA.



TABLE 7: FD ESTIMATION OF SCHOOL ENROLLMENT, ROUND 1 VS. ROUND 4 DIFFERENCES

covariates	(1)	(2)	(3)	(4)
(Intercept)	0.58*** (0.10)	0.74*** (0.09)	0.75*** (0.08)	0.75*** (0.08)
Junior	-0.42*** (0.10)	-0.47*** (0.09)	-0.47*** (0.09)	-0.47*** (0.09)
High	-0.49*** (0.10)	-0.54*** (0.10)	-0.53*** (0.10)	-0.53*** (0.10)
Large	-0.15* (0.08)	-0.18*** (0.07)	-0.18** (0.07)	-0.18** (0.07)
LargeGrace	-0.14* (0.08)	-0.16** (0.07)	-0.16** (0.07)	-0.16** (0.07)
Cow	-0.11 (0.08)	-0.14* (0.08)	-0.14* (0.08)	-0.14* (0.08)
Large × Junior	0.09 (0.13)	0.15 (0.13)	0.15 (0.13)	0.15 (0.13)
LargeGrace × Junior	0.06 (0.12)	0.10 (0.12)	0.10 (0.12)	0.10 (0.12)
Cow × Junior	0.01 (0.12)	0.06 (0.11)	0.06 (0.11)	0.06 (0.11)
Large × High	0.09 (0.13)	0.14 (0.13)	0.14 (0.13)	0.14 (0.13)
LargeGrace × High	0.06 (0.13)	0.09 (0.14)	0.09 (0.14)	0.09 (0.14)
Cow × High	0.05 (0.13)	0.11 (0.12)	0.11 (0.12)	0.11 (0.12)
Female		-0.25*** (0.07)	-0.24*** (0.07)	-0.24*** (0.07)
Junior × Female		0.48*** (0.13)	0.49*** (0.13)	0.49*** (0.13)
High × Female		0.35*** (0.13)	0.34*** (0.13)	0.34*** (0.13)
Large × Female		0.23** (0.10)	0.23** (0.10)	0.23** (0.10)
LargeGrace × Female		0.12 (0.08)	0.12 (0.08)	0.12 (0.08)
Cow × Female		0.28*** (0.09)	0.28*** (0.09)	0.28*** (0.09)
Large × Junior × Female		-0.42** (0.18)	-0.43** (0.17)	-0.43** (0.17)
LargeGrace × Junior × Female		-0.21 (0.18)	-0.22 (0.18)	-0.22 (0.18)
Cow × Junior × Female		-0.41** (0.18)	-0.42** (0.18)	-0.42** (0.18)
Large × High × Female		-0.28* (0.17)	-0.28* (0.17)	-0.28* (0.17)
LargeGrace × High × Female		0.00 (0.20)	0.01 (0.20)	0.01 (0.20)
Cow × High × Female		-0.20 (0.24)	-0.19 (0.23)	-0.19 (0.23)
FloodInRd1			-0.01 (0.03)	-0.01 (0.03)
EldestSon			-0.02 (0.04)	-0.02 (0.04)
EldestDaughter			-0.03 (0.03)	-0.03 (0.03)
ChildAgeOrderAtRd1		-0.01 (0.03)	-0.01 (0.03)	-0.01 (0.03)
$\bar{R}^2$	0.158	0.166	0.165	0.165
N	1002	1002	1002	1002

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value.

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

TABLE 8: FD ESTIMATION OF SCHOOL ENROLLMENT, ROUND 1 VS. ROUND 4 DIFFERENCES BY ATTRIBUTES

covariates	(1)	(2)	(3)	(4)
(Intercept)	0.23*** (0.04)	0.74*** (0.09)	0.74*** (0.12)	0.74*** (0.12)
Junior		-0.47*** (0.09)	-0.48*** (0.09)	-0.48*** (0.09)
High		-0.54*** (0.10)	-0.54*** (0.10)	-0.54*** (0.10)
LargeSize	-0.08* (0.05)	-0.18*** (0.07)	-0.18** (0.07)	-0.18** (0.07)
WithGrace	0.00 (0.04)	0.02 (0.06)	0.02 (0.06)	0.02 (0.06)
InKind	0.03 (0.05)	0.02 (0.07)	0.02 (0.07)	0.02 (0.07)
WithGrace × Junior		-0.05 (0.12)	-0.05 (0.12)	-0.05 (0.12)
WithGrace × High		-0.05 (0.13)	-0.05 (0.13)	-0.05 (0.13)
LargeSize × Junior		0.15 (0.13)	0.15 (0.12)	0.15 (0.12)
LargeSize × High		0.14 (0.13)	0.14 (0.13)	0.14 (0.13)
Female		-0.25*** (0.07)	-0.24*** (0.07)	-0.24*** (0.07)
Junior × Female		0.48*** (0.13)	0.49*** (0.13)	0.49*** (0.13)
High × Female		0.35*** (0.13)	0.34** (0.13)	0.34** (0.13)
WithGrace × Female		-0.11 (0.09)	-0.10 (0.09)	-0.10 (0.09)
LargeSize × Female		0.23** (0.10)	0.23** (0.10)	0.23** (0.10)
WithGrace × Junior × Female		0.21 (0.16)	0.21 (0.16)	0.21 (0.16)
WithGrace × High × Female		0.28 (0.19)	0.28 (0.19)	0.28 (0.19)
LargeSize × Junior × Female		-0.42** (0.18)	-0.43** (0.17)	-0.43** (0.17)
LargeSize × High × Female		-0.28* (0.17)	-0.27 (0.17)	-0.27 (0.17)
FloodInRd1			-0.01 (0.03)	-0.01 (0.03)
Head literate			-0.04 (0.07)	-0.04 (0.07)
Head age			0.00 (0.00)	0.00 (0.00)
EldestSon			-0.01 (0.04)	-0.01 (0.04)
EldestDaughter			-0.03 (0.03)	-0.03 (0.03)
InKind × Junior		-0.05 (0.10)	-0.05 (0.10)	-0.05 (0.10)
InKind × High		0.02 (0.12)	0.02 (0.12)	0.02 (0.12)
InKind × Female		0.16** (0.08)	0.15* (0.08)	0.15* (0.08)
InKind × Junior × Female		-0.20 (0.17)	-0.19 (0.17)	-0.19 (0.17)
InKind × High × Female		-0.20 (0.25)	-0.19 (0.25)	-0.19 (0.25)
ChildAgeOrderAtRd1		-0.01 (0.03)	-0.01 (0.03)	-0.01 (0.03)
$\bar{R}^2$	0.002	0.166	0.164	0.164
N	1002	1002	1001	1001

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. LargeSize is an indicator function if the arm is of large size, WithGrace is an indicator function if the arm is with a grace period, InKind is an indicator function if the arm provides a cow. Saving and repayment information is taken from administrative data. Time invariant household characteristics are taken from household survey data. Administrative data are merged with survey data by the dating the survey rounds in administrative data. Net saving is saving - withdrawal. Excess repayment is repayment - due amount.

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

### IV.3 Assets

Assets reported in rd 1 is too small, indicating possible errors or different way of reporting only in rd 1. So we also examine rd 2 vs. rd 4 differences (as3, as4).

Dropped	2804	obs	due	to	NA.
Dropped	4027	obs	due	to	NA.
Dropped	2804	obs	due	to	NA.
Dropped	4027	obs	due	to	NA.
Dropped	2039	obs	due	to	NA.
Dropped	2040	obs	due	to	NA.
Dropped	2039	obs	due	to	NA.
Dropped	2040	obs	due	to	NA.

Main assets are household assets (HAssetAmount) and production assets (PAssetAmount) both with 4973 observations. After first-differencing, they become 3595 observations, with 21, 94, 3480 households observed for 2, 3, 4 times. We also examine rd 2 vs. rd 4 differences, which has 2389 observations. After first-differencing, they become 1161 observations.

TABLE 9: FD ESTIMATION OF ASSETS

covariates	Household asset amount (Tk)				Productive asset amount (Tk)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(Intercept)	6633.5*** (940.5)	8132.6*** (1333.8)	9544.7*** (1616.5)	10414.0*** (2469.8)	-216.2*** (58.7)	-59.4 (160.4)	18.7 (165.0)	-350.7* (212.0)
Large	1022.0 (1538.5)	386.6 (1454.4)	317.4 (1366.9)	2911.6 (3111.6)	129.0 (100.1)	354.2* (193.5)	355.4* (185.7)	20.9 (353.4)
LargeGrace	1835.7 (1544.1)	1437.4 (1647.4)	987.4 (1629.1)	3150.3 (3063.7)	-62.7 (96.1)	54.9 (159.0)	32.9 (156.1)	-134.4 (265.0)
Cow	1508.8 (1585.9)	1861.9 (1943.0)	1574.1 (1811.9)	3233.1 (3599.7)	135.1 (91.2)	148.4 (137.9)	144.6 (134.2)	145.1 (196.7)
rd 2 - 3		2530.7 (1940.5)	2533.2 (1950.4)			-265.4 (295.6)	-265.7 (296.0)	
Large × rd 2 - 3		4774.1 (4892.3)	4820.3 (4899.8)			-823.6 (928.4)	-823.5 (929.6)	
LargeGrace × rd 2 - 3		4650.6 (5183.8)	4689.1 (5183.9)			-276.5 (653.7)	-276.2 (654.6)	
Cow × rd 2 - 3		3499.1 (6180.8)	3422.5 (6229.7)			152.6 (507.3)	151.2 (507.5)	
rd 3 - 4		-6539.4*** (1680.9)	-6510.9*** (1676.2)	-9357.6*** (2159.8)		-488.7** (227.2)	-489.9** (227.7)	-298.3 (202.2)
Large × rd 3 - 4		2022.6 (2561.2)	2037.1 (2562.8)	-3813.6 (5799.2)		-1479.2** (628.5)	-1481.5** (628.7)	-998.5 (675.7)
LargeGrace × rd 3 - 4		-242.7 (3642.9)	-269.3 (3645.0)	-5618.1 (4931.6)		-909.3 (608.7)	-912.6 (611.6)	-742.5* (398.0)
Cow × rd 3 - 4		-6742.5 (5364.1)	-6688.8 (5343.6)	-10379.9 (7374.1)		-275.1 (286.9)	-277.7 (287.0)	-352.7 (316.1)
FloodInRd1			-3003.2*** (1069.5)	-2897.1** (1463.2)			-113.8 (70.4)	197.4 (161.3)
Head literate			2259.9 (1974.6)	1338.2 (3276.6)			-124.1** (58.8)	-39.4 (254.2)
6M repayment				1914.3 (1812.4)				-25.3 (407.3)
6M net saving				-8134.5 (9978.7)				-740.1 (911.0)
6M other member net saving				-9892.3 (40250.7)				-5633.7 (3695.1)
6M other member Repaid				-3184.9 (4587.9)				287.0 (537.8)
$T = 2$	21	21	21	44	21	21	21	44
$T = 3$	47	47	44	1160	47	47	44	1160
$T = 4$	1160	1160	1160	0	1160	1160	1160	0
$\bar{R}^2$	-0.001	0.013	0.014	0.014	-0.001	0.001	0	0
$\hat{\rho}$	0.062	0.104	0.091	-0.017	-0.091	-0.077	-0.065	0.413
$\Pr[\hat{\rho} = 0]$	0.006	0.000	0.000	0.334	0.000	0.000	0.000	0.000
$N$	3595	3595	3589	2364	3595	3595	3589	2364

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value.

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

TABLE 10: FD ESTIMATION OF ASSETS BY ATTRIBUTES

covariates	Household asset amount (Tk)				Productive asset amount (Tk)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(Intercept)	6633.5*** (940.5)	8132.6*** (1333.8)	9544.7*** (1616.5)	10414.0*** (2469.8)	-216.2*** (58.7)	-59.4 (160.4)	18.7 (165.0)	-350.7* (212.0)
LargeSize	1022.0 (1538.5)	386.6 (1454.4)	317.4 (1366.9)	2911.6 (3111.6)	129.0 (100.1)	354.2* (193.5)	355.4* (185.7)	20.9 (353.4)
WithGrace	813.8 (1726.8)	1050.8 (1625.7)	670.0 (1589.6)	238.7 (3532.1)	-191.7* (111.2)	-299.3 (216.9)	-322.6 (213.6)	-155.3 (405.9)
InKind	-326.9 (1769.2)	424.5 (2074.3)	586.7 (1988.0)	82.9 (3590.3)	197.8* (103.3)	93.5 (169.2)	111.7 (165.7)	279.4 (238.7)
rd 2 - 3		2530.7 (1940.5)	2533.2 (1950.4)			-265.4 (295.6)	-265.7 (296.0)	
LargeSize × rd 2 - 3		4774.1 (4892.3)	4820.3 (4899.8)			-823.6 (928.4)	-823.5 (929.6)	
WithGrace × rd 2 - 3		-123.5 (4672.4)	-131.1 (4665.6)			547.1 (1006.2)	547.3 (1008.0)	
InKind × rd 2 - 3		-1151.5 (6008.3)	-1266.7 (6047.7)			429.1 (638.8)	427.4 (639.7)	
rd 3 - 4		-6539.4*** (1680.9)	-6510.9*** (1676.2)	-9357.6*** (2159.8)		-488.7** (227.2)	-489.9** (227.7)	-298.3 (202.2)
LargeSize × rd 3 - 4		2022.6 (2561.2)	2037.1 (2562.8)	-3813.6 (5799.2)		-1479.2** (628.5)	-1481.5** (628.7)	-998.5 (675.7)
WithGrace × rd 3 - 4		-2265.3 (3741.4)	-2306.4 (3737.3)	-1804.5 (5104.5)		569.9 (820.3)	568.9 (822.6)	256.0 (676.4)
InKind × rd 3 - 4		-6499.8 (6017.6)	-6419.5 (5989.5)	-4761.8 (7760.0)		634.2 (600.2)	634.9 (603.1)	389.8 (393.2)
FloodInRd1			-3003.2*** (1069.5)	-2897.1** (1463.2)			-113.8 (70.4)	197.4 (161.3)
Head literate			2259.9 (1974.6)	1338.2 (3276.6)			-124.1** (58.8)	-39.4 (254.2)
6M repayment				1914.3 (1812.4)				-25.3 (407.3)
6M net saving				-8134.5 (9978.7)				-740.1 (911.0)
6M other member net saving				-9892.3 (40250.7)				-5633.7 (3695.1)
6M other member Renaid				-3184.9 (4587.9)				287.0 (537.8)
$T = 2$	21	21	21	44	21	21	21	44
$T = 3$	47	47	44	1160	47	47	44	1160
$T = 4$	1160	1160	1160	0	1160	1160	1160	0
$\bar{R}^2$	-0.001	0.013	0.014	0.014	-0.001	0.001	0	0
$\hat{\rho}$	0.062	0.104	0.091	-0.017	-0.091	-0.077	-0.065	0.413
$\Pr[\hat{\rho} = 0]$	0.006	0.000	0.000	0.334	0.000	0.000	0.000	0.000
$N$	3595	3595	3589	2364	3595	3595	3589	2364

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. LargeSize is an indicator function if the arm is of large size, WithGrace is an indicator function if the arm is with a grace period, InKind is an indicator function if the arm provides a cow.

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

TABLE 11: FD ESTIMATION OF ASSETS, ROUND 2 AND 4 COMPARISON

covariates	Household asset amount (Tk)				Productive asset amount (Tk)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(Intercept)	11278.8*** (2441.3)	14311.5*** (3199.6)	14311.5*** (3199.6)	15968.4*** (3455.0)	-366.5* (203.8)	-637.4** (301.9)	-637.4** (301.9)	-716.9** (301.3)
Large	4182.6 (4208.9)	4020.4 (3959.7)	4020.4 (3959.7)	2964.2 (3990.0)	-509.9 (486.9)	-499.0 (470.5)	-499.0 (470.5)	-443.0 (465.4)
LargeGrace	5448.6 (4212.5)	4472.7 (4482.6)	4472.7 (4482.6)	4738.8 (4819.6)	-532.9 (447.8)	-448.3 (436.1)	-448.3 (436.1)	-632.4 (443.2)
Cow	1777.3 (4181.1)	1225.8 (3931.4)	1225.8 (3931.4)	1692.4 (4146.1)	241.4 (254.4)	284.0 (264.8)	284.0 (264.8)	121.8 (320.9)
FloodInRd1		-5927.5** (2960.2)	-5927.5** (2960.2)	-5095.4* (2870.0)		497.1 (327.1)	497.1 (327.1)	312.4 (335.9)
Head literate		2684.2 (6714.2)	2684.2 (6714.2)	2425.4 (6702.1)		-83.3 (526.8)	-83.3 (526.8)	-90.2 (519.2)
6M repayment				9310.3*** (2922.7)				847.1* (476.2)
6M net saving				2548.1 (26233.0)				1822.8 (1897.9)
6M other member net saving				25421.9 (47296.6)				-6666.5 (6219.5)
6M other member Renaid				-16346.6** (7304.6)				11.5 (552.4)
$\bar{R}^2$	-0.001	0.003	0.003	0.008	0	0	0	0
N	1161	1161	1161	1160	1161	1161	1161	1160

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates between round 2 and 4. A first-difference is defined as  $\Delta x_{t+k} \equiv x_{t+k} - x_t$  for  $k = 1, 2, \dots$ . Saving and repayment misses are taken from administrative data and merged with survey data at Year-Month of survey interviews. Intercept terms are omitted in estimating equations. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Household assets do not include livestock. Regressions (1)-(3), (5)-(6) use only arm and calendar information. (4) and (7) use previous six month repayment and saving information which is lacking in rd 1, hence starts from rd 2.

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

**Robustness:** To understand underlying pattern of asset accumulation, we compare the loan recipients and loan rejecters. This distinction is made by households by choice, so the indicator variable is considered to be endogenous to asset level. This is a limitation, however, it has its own merit in giving an idea how loan recipients fared during the study period relative to loan nonrecipients. TABLE 12 shows that the pure controls also experience similar increase-increase-decrease pattern for household assets. This suggests the pattern observed among the loan recipients may be a systemic pattern of the area, not necessarily reflecting the repayment burden. This partially relieves a concern that repayment burden was excessive for loan recipients.

TABLE 12: FD ESTIMATION OF ASSETS, LOAN RECIPIENTS VS. PURE CONTROL

	Household asset amount (Tk)			Productive asset amount (Tk)		
covariates	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	7415.9*** (1580.2)	2901.6 (2000.5)	3826.6* (2030.5)	-213.7*** (69.0)	-279.9** (124.6)	-224.0* (121.3)
Large	1113.3 (2363.7)	322.4 (2563.6)	787.7 (2581.9)	123.7 (90.3)	-168.0 (120.2)	-144.7 (120.0)
LargeGrace	1129.1 (1922.3)	468.4 (1909.5)	481.7 (1940.7)	-64.3 (98.0)	-254.4** (122.0)	-256.9** (121.6)
Cow	843.4 (1699.6)	-874.4 (1556.0)	-720.1 (1567.5)	130.7 (86.7)	21.8 (98.2)	36.5 (92.8)
PureControl	-1532.2 (2058.6)	-1633.0 (2576.7)	-1337.5 (2623.1)	-19.8 (59.5)	67.6 (329.6)	75.7 (331.6)
PureControl × rd 2 - 3		2236.4 (2946.4)	2223.0 (2961.4)		110.7 (454.6)	108.9 (455.0)
PureControl × rd 3 - 4		-3224.3 (5625.1)	-3161.3 (5632.3)		-393.1 (557.9)	-391.9 (558.3)
rd 1 - 2		6521.5*** (2060.3)	6490.2*** (2051.4)		482.6* (264.0)	483.5* (264.5)
Large × rd 1 - 2		2885.2 (5451.8)	2890.2 (5460.8)		2211.3*** (701.2)	2216.1*** (701.8)
LargeGrace × rd 1 - 2		2299.4 (4601.0)	2328.9 (4609.7)		1260.6* (665.6)	1266.1* (668.1)
Cow × rd 1 - 2		8098.1 (5138.9)	8007.1 (5132.2)		564.3 (369.8)	568.8 (370.3)
rd 2 - 3		9456.2*** (2638.4)	9426.1*** (2657.6)		188.9 (201.3)	189.8 (201.9)
Large × rd 2 - 3		6005.2 (6933.3)	6049.6 (6938.9)		951.1* (501.4)	955.0* (502.6)
LargeGrace × rd 2 - 3		4747.6 (5842.7)	4811.4 (5845.6)		781.8** (367.7)	786.6** (368.5)
Cow × rd 2 - 3		8975.9 (6898.3)	8807.8 (6940.2)		512.5* (288.3)	514.8* (288.2)
FloodInRd1			-2769.9*** (982.4)			-113.3* (66.8)
Head literate			1584.7 (1864.4)			-117.8** (56.1)
$T = 2$	28	28	28	28	28	28
$T = 3$	100	100	97	100	100	97
$T = 4$	1274	1274	1274	1274	1274	1274
$R^2$	0	0.015	0.016	-0.001	0.003	0.002
$\hat{\rho}$	0.041	0.089	0.075	-0.091	-0.068	-0.057
Pr[ $\hat{\rho} = 0$ ]	0.062	0.000	0.000	0.000	0.000	0.000
$N$	4050	4050	4044	4050	4050	4044

Source: Estimated with GUK administrative and survey data.

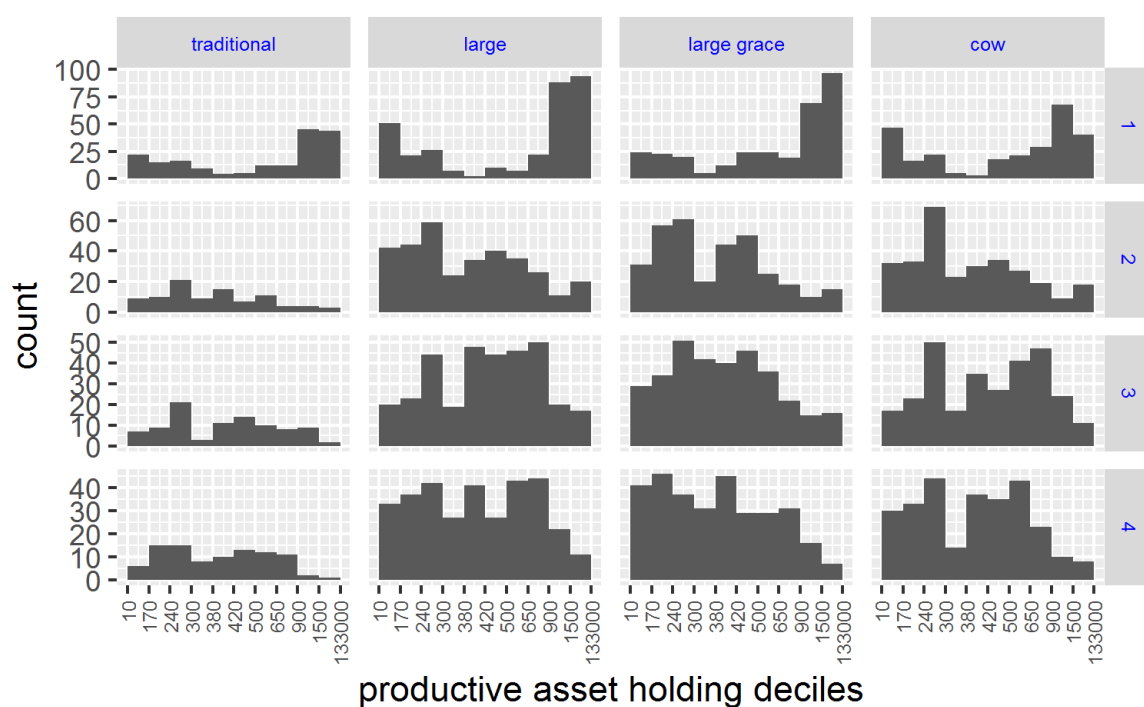
Notes: 1. First-difference estimates between round 2 and 4. A first-difference is defined as  $\Delta x_{t+k} \equiv x_{t+k} - x_t$  for  $k = 1, 2, \dots$ . Saving and repayment misses are taken from administrative data and merged with survey data at Year-Month of survey interviews. Pure control is members not receiving loans while they were put on a wait list. Sample is continuing members and replacing members of early rejecters. Household assets do not include livestock. Regressions (1)-(2), (4)-(5) use only arm and calendar information. (3) and (6) information if the household was exposed to the flood in round 1. Pure controls are households who rejected to receive a loan.

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

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10	170	240	300	380	420	500	650	900	1500	133000

Check what is happening with productive assets.

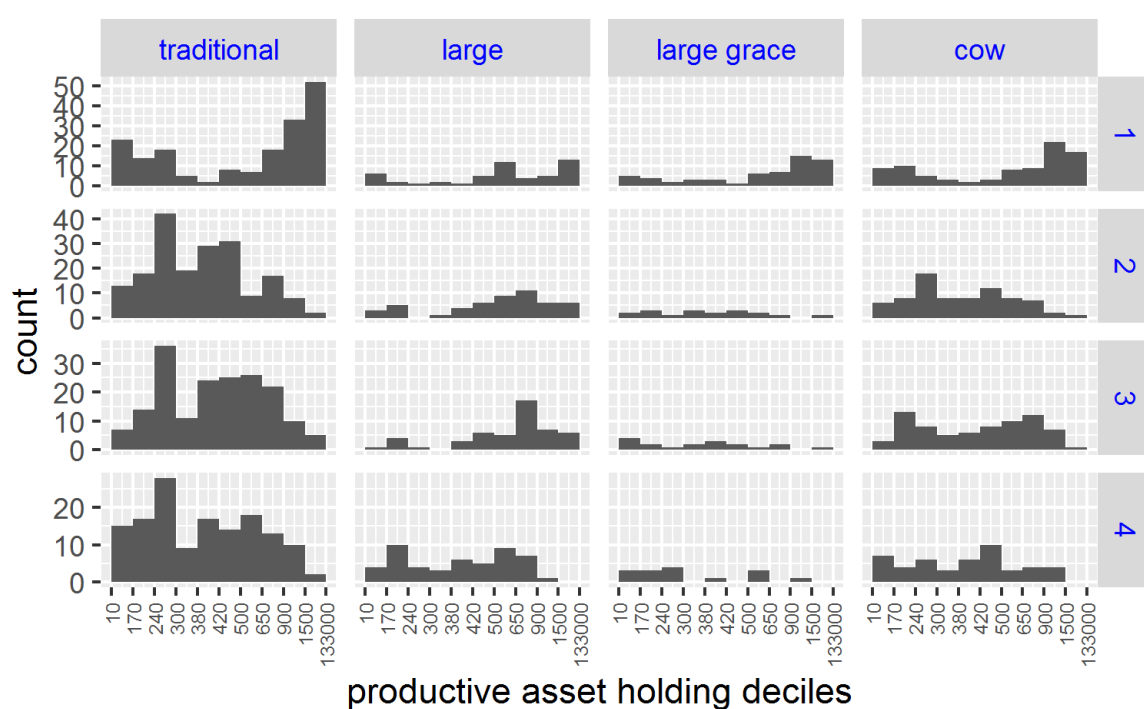
FIGURE 3: PRODUCTIVE ASSET HOLDING



Source: Survey data.

Note: Deciles of asset holding are displayed on horizontal axes. Deciles are defined for the productive asset values pooled over all survey rounds. Loan recipients only.

FIGURE 4: PRODUCTIVE ASSET HOLDING OF LOAN NONRECIPIENTS



Source: Survey data.

Note: Deciles of asset holding are displayed on horizontal axes. Deciles are defined for the productive asset values pooled over all survey rounds. Loan nonrecipients only.

## IV.4 Livestock

Dropped 2807 obs due to NA.



```
Dropped 4031 obs due to NA.  
Dropped 2041 obs due to NA.  
Dropped 2042 obs due to NA.
```

```
Dropped 196 obs due to T<2.  
Dropped 1402 obs due to NA.  
Dropped 196 obs due to T<2.  
Dropped 3080 obs due to NA.  
Dropped 154 obs due to T<2.  
Dropped 1272 obs due to NA.  
Dropped 154 obs due to T<2.  
Dropped 1386 obs due to NA.
```

TABLE 13: FD ESTIMATION OF LIVESTOCK HOLDING VALUES

covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	5396.9*** (532.8)	11936.0*** (1007.8)	11945.2*** (1026.3)	12836.2*** (1031.5)	13169.8*** (961.7)	13082.9*** (943.5)	12693.7*** (1016.9)
Large	3468.5*** (866.3)	4794.9*** (1250.5)	4834.5*** (1265.6)	4984.4*** (1327.6)	5006.7*** (1325.9)	4202.5*** (1043.3)	5005.4*** (1326.1)
LargeGrace	2292.9** (892.2)	2723.4** (1248.4)	2750.6** (1256.7)	3007.2** (1215.0)	3030.0** (1209.4)	3834.6*** (1085.3)	3185.8*** (1215.6)
Cow	2882.8*** (680.9)	3410.3*** (973.0)	3501.7*** (970.6)	3473.1*** (924.3)	3502.4*** (921.2)	3727.0*** (1001.3)	3460.5*** (928.2)
rd 2 - 3		-9110.0*** (1523.4)	-9045.3*** (1528.0)	-9047.8*** (1530.2)	-9056.8*** (1208.3)	-9034.6*** (1192.8)	-9043.9*** (1529.9)
Large × rd 2 - 3		-5014.4 (4506.8)	-4796.4 (4525.8)	-4849.2 (4536.9)	-4868.1 (4487.2)	-4328.5 (3457.2)	-4851.7 (4533.5)
LargeGrace × rd 2 - 3		-1075.8 (3753.8)	-1077.6 (3756.3)	-1116.4 (3757.6)	-1130.8 (3727.2)	-2120.9 (3058.1)	-1121.2 (3758.9)
Cow × rd 2 - 3		-3186.3 (3386.1)	-3172.2 (3387.5)	-3204.5 (3389.7)	-3215.5 (3390.1)	-6356.4** (3138.1)	-3210.3 (3390.3)
rd 3 - 4		-12529.8*** (1251.9)	-12584.6*** (1252.3)	-12608.7*** (1248.6)	-13679.8*** (948.6)	-13692.8*** (937.9)	-12619.9*** (1245.5)
Large × rd 3 - 4		-6142.0* (3728.9)	-6358.3* (3729.7)	-6403.0* (3742.4)	-6570.3* (3736.5)	-4376.6* (2547.1)	-6389.6* (3738.1)
LargeGrace × rd 3 - 4		-655.4 (2565.2)	-652.2 (2565.1)	-660.1 (2570.6)	-928.1 (2513.3)	-1101.4 (2129.6)	-651.2 (2568.7)
Cow × rd 3 - 4		-742.8 (2315.7)	-759.3 (2313.2)	-924.5 (2278.2)	-841.7 (2209.4)	-1618.7 (2181.6)	-956.1 (2267.8)
HadCows				-5608.3*** (781.7)	-7474.1** (2939.4)	-6244.3* (3553.0)	
Large × HadCows						6725.0 (7971.0)	
LargeGrace × HadCows						-12123.8 (8379.8)	
Cow × HadCows						-6986.1 (5122.8)	
HadCows × rd 2 - 3					43.6 (4355.2)	-5552.0 (5513.5)	
Large × HadCows × rd 2 - 3						-1841.7 (11622.5)	
LargeGrace × HadCows × rd 2 - 3						7632.1 (12565.0)	
Cow × HadCows × rd 2 - 3						18487.8** (8184.9)	
HadCows × rd 3 - 4					5802.1 (4025.2)	7578.0** (3304.1)	
Large × HadCows × rd 3 - 4						-10221.2 (11226.1)	
LargeGrace × HadCows × rd 3 - 4						10785.2 (12060.0)	
Cow × HadCows × rd 3 - 4						4737.1 (5655.0)	
NumCowsOwnedAtRd1							-3843.6*** (607.0)
FloodInRd1			218.6 (545.9)	297.7 (528.3)	291.9 (528.8)	349.4 (527.6)	481.9 (550.1)
Head literate			-1300.3** (659.6)	-1098.6* (659.3)	-1102.7* (658.4)	-933.3 (629.2)	-1028.5 (639.2)
$T = 2$	29	29	28	28	28	28	28
$T = 3$	101	101	99	99	99	99	99
$T = 4$	1272	1272	1272	1272	1272	1272	1272
$\bar{R}^2$	0.003	0.072	0.073	0.084	0.086	0.091	0.088
$\hat{\rho}$	-0.237	-0.247	-0.255	-0.260	-0.263	-0.268	-0.267
$\Pr[\hat{\rho} = 0]$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$N$	4047	4047	4042	4042	4042	4042	4042

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. Saving and repayment information is taken from administrative data. Time invariant household characteristics are taken from household survey data. Administrative data are merged with survey data by the dating the survey rounds in administrative data. Net saving is saving - withdrawal. Excess repayment is repayment - due amount. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Regressand is TotalImputedValue, a sum of all livestock holding values evaluated at respective median market prices in the same year.

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

TABLE 14: FD ESTIMATION OF LIVESTOCK HOLDING VALUES BY ATTRIBUTES

covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	5396.9*** (532.7)	11940.5*** (1006.7)	11934.1*** (1026.3)	12835.0*** (1031.2)	13170.0*** (956.1)	13134.2*** (957.9)	12695.7*** (1016.8)
LargeSize	3468.5*** (866.2)	4794.9*** (1250.0)	4828.9*** (1264.5)	4982.2*** (1326.8)	4984.6*** (1311.3)	4922.2*** (1260.4)	5004.9*** (1325.2)
WithGrace	-875.0 (799.0)	-1720.5 (1223.2)	-1695.6 (1242.7)	-1736.5 (1287.7)	-1736.3 (1287.1)	-1622.9 (1198.0)	-1677.9 (1296.0)
rd 2 - 3		-9118.6*** (1522.7)	-9053.6*** (1527.3)	-9055.5*** (1529.3)	-9044.7*** (1192.6)	-9053.4*** (1193.3)	-9051.3*** (1529.0)
LargeSize × rd 2 - 3		-5014.4 (4505.1)	-4796.3 (4524.1)	-4849.4 (4535.2)	-4745.4 (4420.8)	-4668.5 (4394.8)	-4851.8 (4531.8)
WithGrace × rd 2 - 3		2852.1 (4293.5)	2640.7 (4313.4)	2659.3 (4323.0)	2762.8 (4256.1)	2643.3 (4104.6)	2657.2 (4320.1)
rd 3 - 4		-12540.2*** (1248.0)	-12595.5*** (1248.3)	-12616.8*** (1245.2)	-13665.7*** (940.1)	-13694.4*** (937.0)	-12626.3*** (1242.5)
LargeSize × rd 3 - 4		-6142.0* (3727.5)	-6357.4* (3728.2)	-6402.7* (3741.0)	-6498.4* (3683.7)	-6463.0* (3600.3)	-6389.5* (3736.7)
WithGrace × rd 3 - 4		5422.0 (3791.6)	5631.0 (3790.1)	5593.3 (3792.3)	5720.4 (3824.0)	5577.7 (3621.7)	5571.5 (3787.4)
HadCows				-5623.9*** (786.6)	-7603.9*** (2845.0)	-7610.2*** (2583.4)	
HadCows × rd 2 - 3					339.5 (4080.8)	286.0 (3903.4)	
HadCows × rd 3 - 4					5901.4 (3869.8)	6110.0* (3547.4)	
NumCowsOwnedAtRd1							-3848.1*** (609.3)
FloodInRd1			246.7 (528.7)	311.9 (511.6)	311.6 (513.9)	361.0 (512.2)	487.0 (532.8)
Head literate			-1264.1* (665.5)	-1083.3 (663.4)	-1079.1 (664.0)	-923.3 (633.5)	-1027.7 (640.4)
HadCows × InKind					-1512.6 (2087.6)	2466.4 (2237.2)	
HadCows × InKind × rd 2 - 3					17163.2** (7799.1)	12635.5 (9473.2)	
HadCows × InKind × rd 3 - 4					8514.0 (6722.5)	4087.5 (7187.1)	
HadCows × LargeSize						3912.2 (3114.2)	
HadCows × LargeSize × rd 2 - 3						-1841.9 (11618.1)	
HadCows × LargeSize × rd 3 - 4						-10220.8 (11221.8)	
HadCows × WithGrace						-7802.7** (3140.3)	
HadCows × WithGrace × rd 2 - 3						7785.2 (12646.5)	
HadCows × WithGrace × rd 3 - 4						10754.8 (12102.7)	
$T = 2$	29	29	28	28	28	28	28
$T = 3$	101	101	99	99	99	99	99
$T = 4$	1272	1272	1272	1272	1272	1272	1272
$R^2$	0.003	0.072	0.073	0.085	0.09	0.092	0.089
$\hat{\rho}$	-0.237	-0.247	-0.251	-0.259	-0.268	-0.270	-0.266
$\Pr[\hat{\rho} = 0]$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$N$	4047	4047	4042	4042	4042	4042	4042

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. LargeSize is an indicator function if the arm is of large size, WithGrace is an indicator function if the arm is with a grace period, InKind is an indicator function if the arm provides a cow. Saving and repayment information is taken from administrative data. Time invariant household characteristics are taken from household survey data. Administrative data are merged with survey data by the dating the survey rounds in administrative data. Net saving is saving - withdrawal. Excess repayment is repayment - due amount. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Regressand is TotalImputedValue, a sum of all livestock holding values evaluated at respective median market prices in the same year.

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

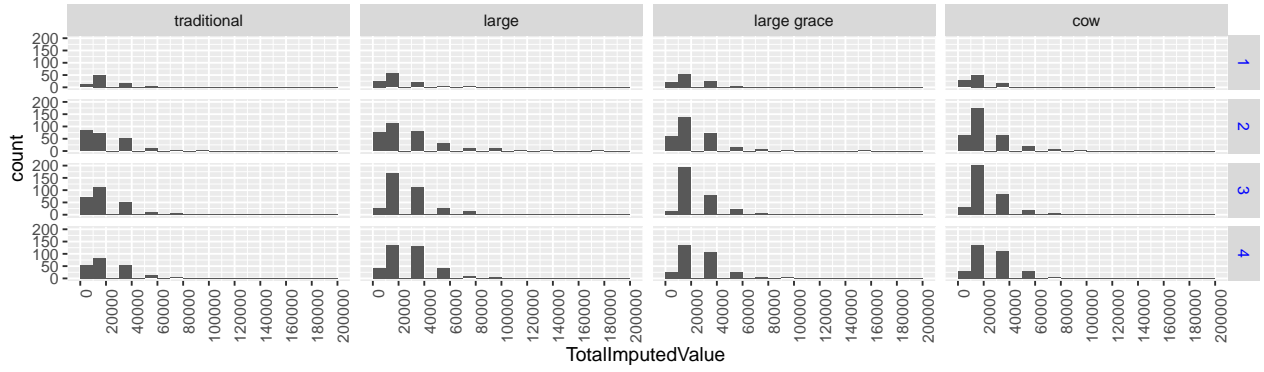


Figure 5: Total imputed value of livestock holding  
Livestock holding values are computed by using respective median prices of each year.

TABLE 15: FD ESTIMATION OF LIVESTOCK HOLDING VALUES, ULTRA VS. MODERATELY POOR

covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	7254.6*** (393.7)	14715.9*** (1320.3)	14646.4*** (1277.8)	15763.5*** (1287.1)	16145.6*** (1066.0)	16145.6*** (1066.0)	15713.2*** (1265.7)
UltraPoor	759.1* (416.5)	263.9 (789.8)	249.2 (781.0)	19.6 (814.7)	-12.3 (804.3)	-12.3 (804.3)	-38.4 (807.3)
rd 2 - 3		-9135.4*** (1540.4)	-9069.4*** (1543.6)	-9071.6*** (1546.1)	-9107.2*** (1234.8)	-9107.2*** (1234.8)	-9067.3*** (1545.9)
UltraPoor × rd 2 - 3		3099.8 (3350.9)	3193.0 (3350.7)	3191.3 (3358.6)	3198.6 (3271.7)	3198.6 (3271.7)	3193.5 (3356.7)
rd 3 - 4		-12580.1*** (1294.5)	-12637.5*** (1297.6)	-12652.6*** (1293.6)	-13731.9*** (985.4)	-13731.9*** (985.4)	-12660.2*** (1291.1)
UltraPoor × rd 3 - 4		3963.2 (2725.2)	3881.4 (2732.5)	3935.2 (2721.2)	4152.6 (2670.0)	4152.6 (2670.0)	3973.6 (2713.7)
HadCows				-5509.4*** (842.2)	-7432.0** (3039.4)	-7432.0** (3039.4)	
HadCows × rd 2 - 3					185.7 (4338.7)	185.7 (4338.7)	
HadCows × rd 3 - 4					5813.2 (4076.3)	5813.2 (4076.3)	
NumCowsOwnedAtRd1							-3777.6*** (635.5)
FloodInRd1			421.8 (524.9)	497.2 (502.9)	493.9 (503.5)	493.9 (503.5)	666.0 (515.7)
Head literate			-1030.8 (677.8)	-849.3 (679.3)	-851.4 (678.3)	-851.4 (678.3)	-792.2 (660.0)
$T = 2$	29	29	28	28	28	28	28
$T = 3$	101	101	99	99	99	99	99
$T = 4$	1272	1272	1272	1272	1272	1272	1272
$R^2$	0	0.068	0.069	0.08	0.082	0.082	0.083
$\Pr[\hat{\rho} = 0]$	-0.232 0.000	-0.239 0.000	-0.240 0.000	-0.252 0.000	-0.257 0.000	-0.257 0.000	-0.252 0.000
$N$	4047	4047	4042	4042	4042	4042	4042

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. UltraPoor is an indicator function if the household is classified as the ultra poor. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Regressand is TotalImputedValue, a sum of all livestock holding values evaluated at respective median market prices in the same year.

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

- cow reports above 20000 holding in rds 2-4 while traditional does not.

	Arm	survey	MeanImputedVal	MeanNumCows	N
1:	traditional	1	5065.33	0.233668	398
2:	traditional	2	15854.00	0.817844	280
3:	traditional	3	20179.62	1.022059	277
4:	traditional	4	21233.75	1.050000	240
5:	large	1	6092.42	0.275689	399
6:	large	3	31056.41	1.625000	386

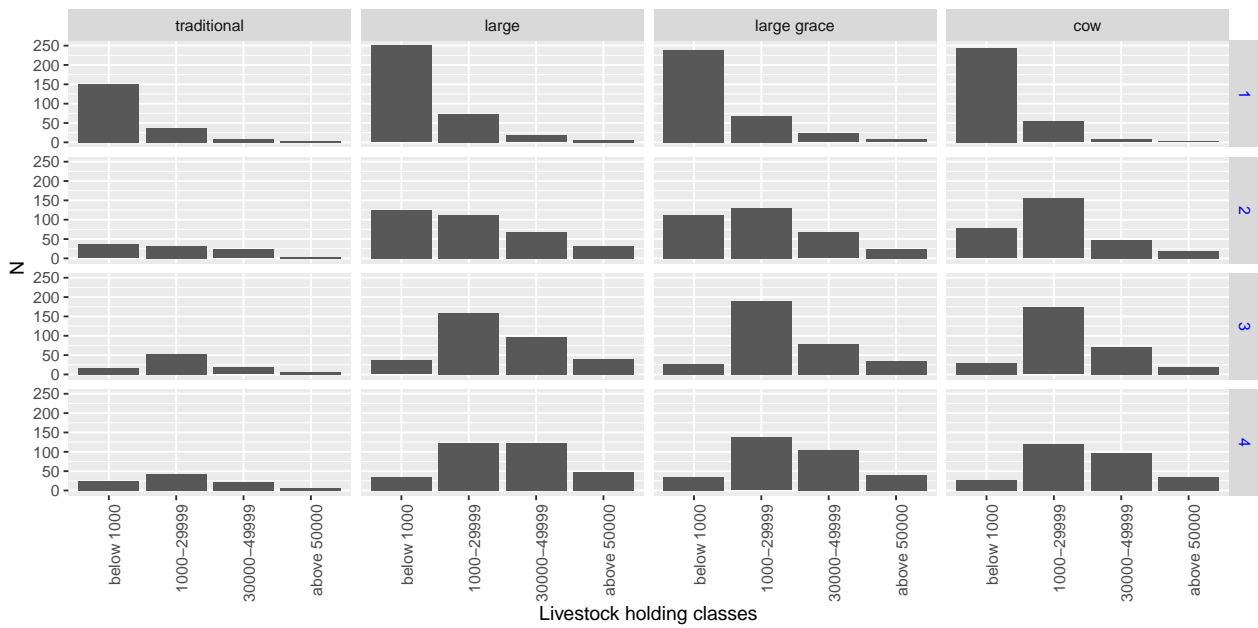


Figure 6: Histogram of livestock holding classes  
Livestock holding values are computed by using respective median prices of each year.

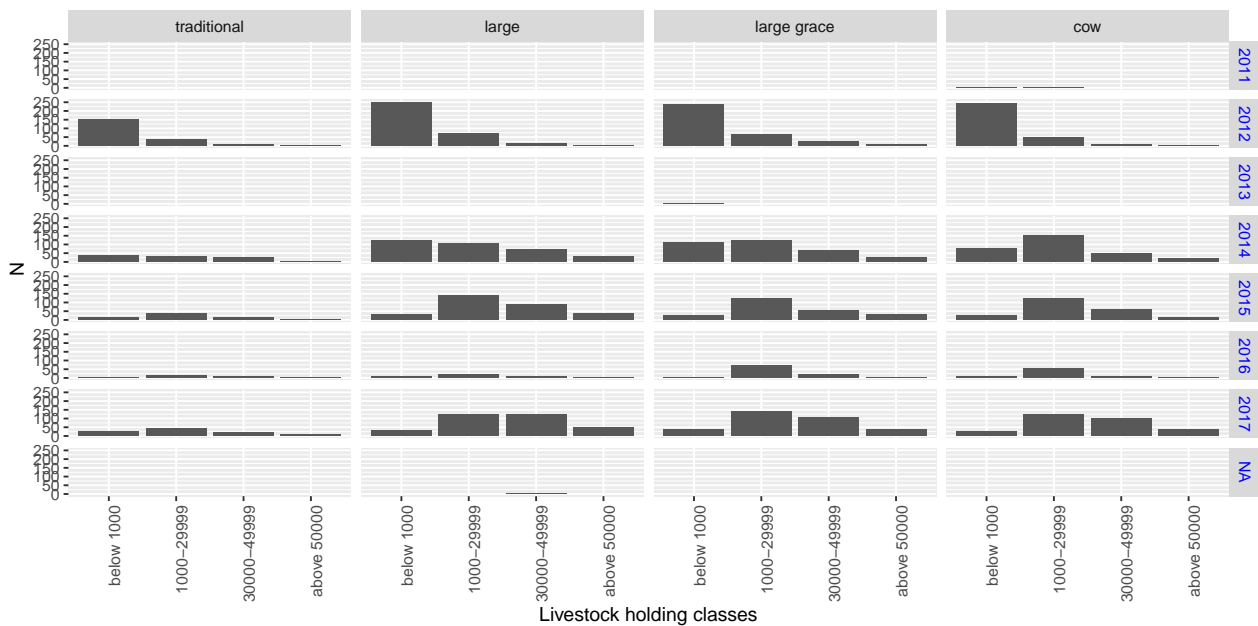


Figure 7: Histogram of livestock holding classes by year  
Livestock holding values are computed by using respective median prices of each year.

7:	large	2	24992.86	1.278820	383
8:	large	4	32686.07	1.630890	382
9:	large grace	1	7392.54	0.333333	399
10:	large grace	2	21510.32	1.150943	341
11:	large grace	3	27565.65	1.422619	347
12:	large grace	4	30276.97	1.528024	343
13:	cow	1	4997.68	0.218045	399
14:	cow	2	20550.29	1.078035	364
15:	cow	3	25399.62	1.300562	365
16:	cow	4	28700.23	1.436950	342

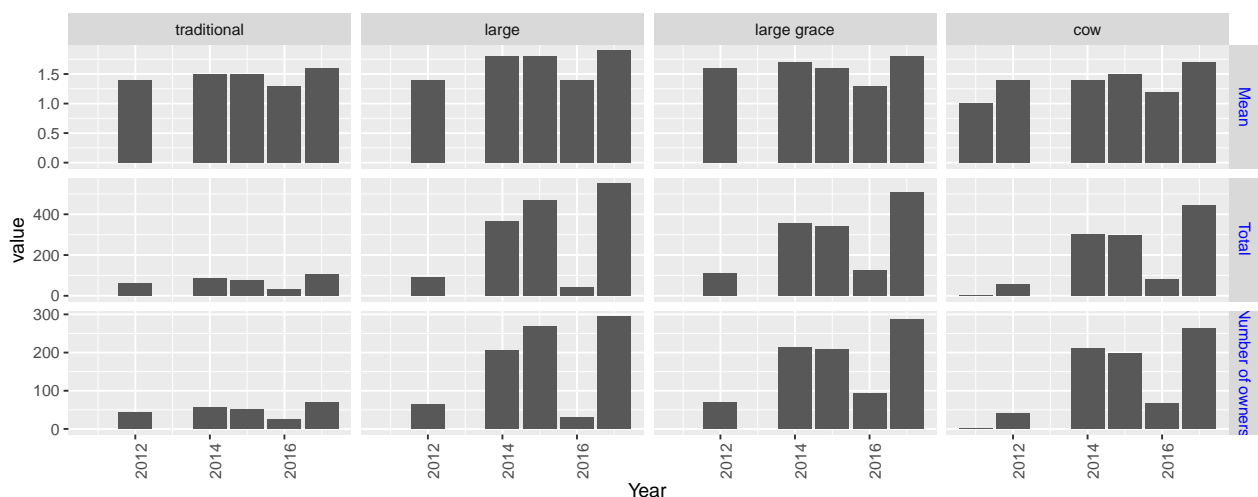


Figure 8: Number of cows/oxen by year

Means are mean holding among the owners. Totals are total number of cows/oxen owned. Mean and total number of cows/oxen may diverge because the number of owners differ across round.

**Finding IV.2** FIGURE 7 shows increasing livestock accumulation in all arms but traditional. FIGURE 8 shows increasing cow ownership relative to traditional in the bottom panel while the holding per owner is similar across all arms. This is evidence of an acceleration of becoming a large livestock owner for the large sized arms relative to the small size arm. Given that the number of cows per owner remains the similar, it does not provide evidence for accelerated growth of livestock after becoming an owner.

## IV.5 Assets+Livestock

BorrowerStatus	creditstatus	
	Yes	No
borrower	1192	0
pure saver	0	183
quit membership	0	220

Mstatus	creditstatus	
	Yes	No
gErosion	0	80
gRejection	0	140
iRejection	1	157
iReplacement	0	0
newGroup	0	0
oldMember	1191	26

Dropped 196 obs due to T<2.  
Dropped 1402 obs due to NA.  
Dropped 196 obs due to T<2.  
Dropped 3080 obs due to NA.  
Dropped 196 obs due to T<2.  
Dropped 1402 obs due to NA.  
Dropped 196 obs due to T<2.  
Dropped 3080 obs due to NA.  
Dropped 130 obs due to T<2.

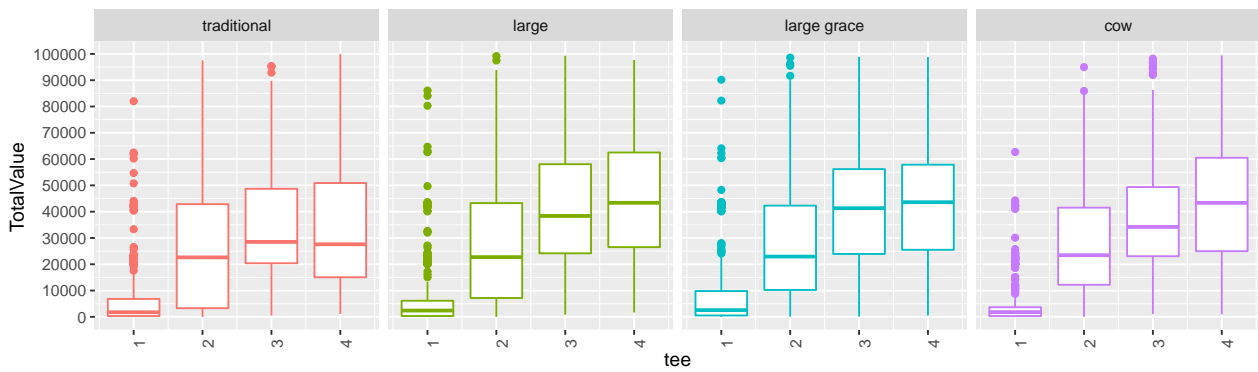


Figure 9: Total asset values  
Sum of assets and livestock holding values. Original 1600 HHs.

Dropped 1274 obs due to NA.  
Dropped 130 obs due to T<2.  
Dropped 1388 obs due to NA.  
Dropped 130 obs due to T<2.  
Dropped 1274 obs due to NA.  
Dropped 130 obs due to T<2.  
Dropped 1388 obs due to NA.

Arm					
tee	traditional	large	large	grace	cow
1	398	399		379	398
2	283	390		373	379
3	276	384		348	365
4	238	377		330	328

Arm					
tee	traditional	large	large	grace	cow
1	66	78		81	63
2	151	254		258	283
3	189	348		323	324
4	156	328		291	287

Dropped 196 obs due to T<2.  
Dropped 1402 obs due to NA.  
Dropped 196 obs due to T<2.  
Dropped 3080 obs due to NA.  
Dropped 154 obs due to T<2.  
Dropped 1272 obs due to NA.  
Dropped 154 obs due to T<2.  
Dropped 1386 obs due to NA.

Warning in `[.data.table`(AL2R, , `:=`(grepout("Time", colnames(AL2)), NULL)): length(LHS)

TABLE 16: FD ESTIMATION OF TOTAL ASSETS, ORIGINAL HHs

covariates	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	11404.6*** (1118.0)	19753.6*** (1690.1)	21220.8*** (1869.8)	21734.1*** (1970.4)	23377.7*** (1896.0)	21081.9*** (2138.4)
Large	5104.6*** (1607.4)	4735.4*** (1742.9)	4703.6*** (1586.1)	4589.2*** (1608.6)	4474.7*** (1624.3)	4732.4*** (1595.8)
LargeGrace	4487.9** (1882.2)	4162.1** (2096.7)	3707.6* (2115.7)	3665.0* (2117.6)	3610.8* (2109.3)	3694.6* (2092.1)
Cow	4867.7*** (1712.9)	5528.9** (2194.3)	5300.5*** (2042.2)	5100.3** (2045.4)	4896.3** (2026.9)	5364.9*** (2070.9)
rd 2 - 3		-6257.7*** (2257.5)	-6188.8*** (2255.6)	-6190.8*** (2255.8)	-8759.7*** (2385.2)	-6188.3*** (2256.1)
Large × rd 2 - 3		5066.2 (5917.0)	5357.9 (5877.8)	5354.6 (5878.7)	6033.4 (5624.2)	5358.9 (5879.1)
LargeGrace × rd 2 - 3		5009.0 (5663.8)	5026.6 (5664.7)	5023.3 (5667.3)	5323.5 (5443.0)	5027.4 (5665.6)
Cow × rd 2 - 3		1083.7 (6448.4)	1023.6 (6484.5)	1022.7 (6485.0)	2204.7 (6218.8)	1023.8 (6485.6)
rd 3 - 4		-18818.5*** (1810.6)	-18849.6*** (1812.3)	-18847.0*** (1811.4)	-20890.1*** (1844.3)	-18850.7*** (1812.4)
Large × rd 3 - 4		-630.0 (4012.9)	-850.0 (4048.5)	-841.0 (4045.1)	-319.6 (3970.2)	-851.7 (4050.0)
LargeGrace × rd 3 - 4		-900.0 (4236.3)	-918.7 (4241.7)	-900.9 (4234.5)	-689.4 (4120.7)	-923.2 (4240.2)
Cow × rd 3 - 4		-7556.5 (5850.3)	-7494.5 (5824.0)	-7482.3 (5822.3)	-6560.3 (5616.4)	-7497.4 (5825.0)
HadCows				-2278.7 (1515.2)	-10323.3*** (2703.7)	
HadCows × rd 2 - 3					13442.7*** (4486.2)	
HadCows × rd 3 - 4					10656.4** (4511.6)	
NumCowsOwnedAtRd1						487.1 (2133.7)
FloodInRd1			-2878.7** (1237.8)	-2867.4** (1240.5)	-2871.8** (1241.0)	-2903.5** (1175.5)
Head literate			1146.7 (1926.6)	1240.8 (1912.6)	1217.6 (1909.8)	1108.1 (1810.0)
$T = 2$	22	22	22	22	22	22
$T = 3$	45	45	43	43	43	43
$T = 4$	1159	1159	1159	1159	1159	1159
$\bar{R}^2$	0.001	0.038	0.039	0.039	0.042	0.039
$\Pr[\hat{\rho} = 0]$	-0.162 0.000	-0.137 0.000	-0.141 0.000	-0.140 0.000	-0.144 0.000	-0.140 0.000
$N$	3589	3589	3585	3585	3585	3585

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Household assets do not include livestock. Regressions (1)-(3), (5)-(6) use only arm and calendar information. (4) and (7) use previous six month repayment and saving information which is lacking in rd 1, hence starts from rd 2.

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



TABLE 17: FD ESTIMATION OF TOTAL ASSETS BY ATTRIBUTES

covariates	(1)	(2)	(3)	(4)	(5)	(6)
(Intercept)	11404.6*** (1118.0)	19753.6*** (1690.1)	21220.8*** (1869.8)	21734.1*** (1970.4)	23111.4*** (1852.2)	21081.9*** (2138.4)
LargeSize	5104.6*** (1607.4)	4735.4*** (1742.9)	4703.6*** (1586.1)	4589.2*** (1608.6)	4577.5*** (1611.9)	4732.4*** (1595.8)
WithGrace	-616.7 (1904.4)	-573.2 (1986.4)	-996.0 (2056.0)	-924.2 (2043.3)	-734.3 (2005.2)	-1037.8 (1964.3)
InKind	379.7 (1994.2)	1366.8 (2392.3)	1592.9 (2412.9)	1435.3 (2372.8)	1208.0 (2346.0)	1670.3 (2282.7)
rd 2 - 3		-6257.7*** (2257.5)	-6188.8*** (2255.6)	-6190.8*** (2255.8)	-8692.1*** (2350.1)	-6188.3*** (2256.1)
LargeSize × rd 2 - 3		5066.2 (5917.0)	5357.9 (5877.8)	5354.6 (5878.7)	5939.3 (5662.8)	5358.9 (5879.1)
WithGrace × rd 2 - 3		-57.2 (6105.9)	-331.2 (6060.7)	-331.3 (6061.2)	-531.2 (5878.7)	-331.5 (6061.9)
InKind × rd 2 - 3		-3925.3 (6622.1)	-4003.0 (6651.3)	-4000.6 (6651.3)	-2776.3 (6299.9)	-4003.6 (6652.6)
rd 3 - 4		-18818.5*** (1810.6)	-18849.6*** (1812.3)	-18847.0*** (1811.4)	-20869.2*** (1806.1)	-18850.7*** (1812.4)
LargeSize × rd 3 - 4		-630.0 (4012.9)	-850.0 (4048.5)	-841.0 (4045.1)	-363.2 (3963.2)	-851.7 (4050.0)
WithGrace × rd 3 - 4		-269.9 (4086.8)	-68.7 (4126.2)	-59.9 (4121.1)	-365.8 (4001.3)	-71.5 (4126.2)
InKind × rd 3 - 4		-6656.5 (5901.2)	-6575.8 (5875.0)	-6581.4 (5872.5)	-5823.8 (5617.5)	-6574.2 (5876.0)
HadCows				-2278.7 (1515.2)	-10135.6*** (2578.2)	
HadCows × rd 2 - 3					14167.8*** (4413.9)	
HadCows × rd 3 - 4					10662.8** (4283.7)	
NumCowsOwnedAtRd1						487.1 (2133.7)
FloodInRd1			-2878.7** (1237.8)	-2867.4** (1240.5)	-2786.4** (1235.9)	-2903.5** (1175.5)
Head literate			1146.7 (1926.6)	1240.8 (1912.6)	1437.3 (1870.1)	1108.1 (1810.0)
HadCows × WithGrace					-6228.6 (3928.9)	
HadCows × WithGrace × rd 2 - 3					-5175.0 (8635.2)	
HadCows × WithGrace × rd 3 - 4					990.6 (11741.3)	
HadCows × InKind					5362.8 (4289.3)	
HadCows × InKind × rd 2 - 3					20413.4 (15054.0)	
HadCows × InKind × rd 3 - 4					928.5 (12745.9)	
$T = 2$	22	22	22	22	22	22
$T = 3$	45	45	43	43	43	43
$T = 4$	1159	1159	1159	1159	1159	1159
$\bar{R}^2$	0.001	0.038	0.039	0.039	0.042	0.039
$\hat{\rho}$	-0.162	-0.137	-0.141	-0.140	-0.141	-0.140
$\Pr[\hat{\rho} = 0]$	0.000	0.000	0.000	0.000	0.000	0.000
$N$	3589	3589	3585	3585	3585	3585

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. LargeSize is an indicator function if the arm is of large size, WithGrace is an indicator function if the arm is with a grace period, InKind is an indicator function if the arm provides a cow. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Household assets do not include livestock. Regressions (1)-(3), (5)-(6) use only arm and calendar information. (4) and (7) use previous six month repayment and saving information which is lacking in rd 1, hence starts from rd 2.

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

## IV.6 Incomes

Dropped 4546 obs due to T<2.  
Dropped 1133 obs due to NA.  
Dropped 4546 obs due to T<2.  
Dropped 1469 obs due to NA.

```
Dropped 6242 obs due to NA.  
Dropped 6250 obs due to NA.
```

```
Dropped 4546 obs due to T<2.  
Dropped 1133 obs due to NA.  
Dropped 4546 obs due to T<2.  
Dropped 1469 obs due to NA.  
Dropped 6242 obs due to NA.  
Dropped 6250 obs due to NA.
```

Income sources are mainly labour incomes (lab) and farm revenues (far) with 6165 and 6400 observations, respectively. After first-differencing, they become 486 and 150 observations, with 486 households observed for 487 times.

Obs for survey labour income.

```
1 2 3 4  
1 311 128 46
```

Obs for survey labour income and admin repayment data.

```
3 4  
106 43
```

```
3 4  
79 71
```

Obs for survey farm revenue.

```
3 4  
79 71
```

Obs for survey farm revenue and admin repayment data.

```
3 4  
79 71
```

TABLE 18: FD ESTIMATION OF INCOMES

covariates	Labour income (Tk)				Farm income (Tk)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	5.77** (2.93)	1.79 (3.70)	-1.98 (4.12)	3.71 (5.50)	-8.30 (6.88)	-12.09 (7.91)	-13.90 (8.47)
Large	-1.46 (4.10)	0.07 (4.54)	0.72 (4.18)	-7.41 (5.45)	9.95 (7.00)	11.72 (7.51)	10.60 (8.05)
LargeGrace	-5.55 (4.49)	-3.18 (5.13)	-2.26 (4.55)	-11.58** (5.20)	9.82 (7.04)	4.92 (8.92)	-8.15 (17.68)
Cow	-7.57 (4.98)	-6.37 (5.42)	-5.56 (4.89)	2.73 (10.02)	6.90 (7.13)	7.52 (7.77)	-0.40 (10.54)
rd 2 - 3		10.53*** (3.62)	10.43*** (3.68)	15.42*** (5.46)		7.12 (8.70)	15.49 (14.99)
Large × rd 2 - 3		-2.05 (10.60)	-4.24 (10.87)	6.99 (10.78)		10.01 (11.79)	1.45 (24.63)
LargeGrace × rd 2 - 3		-9.10 (11.77)	-8.73 (12.04)	0.75 (11.55)		57.96 (35.81)	37.68 (30.26)
Cow × rd 2 - 3		1.74 (12.13)	1.45 (12.53)	-9.88 (16.26)		18.42 (12.21)	-14.08 (36.04)
rd 3 - 4		-2.45 (6.20)	-2.02 (6.87)				
Large × rd 3 - 4		4.19 (20.89)	1.75 (22.21)				
LargeGrace × rd 3 - 4		10.92 (20.98)	10.33 (22.02)				
Cow × rd 3 - 4		22.38 (25.28)	22.81 (26.87)				
FloodInRd1			8.45*** (3.19)	1.57 (2.85)			-3.39 (3.17)
Head literate			-10.73 (7.42)	-11.10** (5.61)			1.89 (2.56)
6M repayment				-4.16 (8.53)			17.33 (15.06)
6M net saving				53.01** (22.38)			61.67 (61.19)
6M other member net saving				-68.04 (90.53)			-409.32 (355.57)
6M other member Renaid				-56.00*** (14.01)			-22.53 (28.02)
$T = 2$	240	240	239	82	56	56	56
$T = 3$	78	78	76	31	47	47	47
$T = 4$	30	30	30	0	0	0	0
$\bar{R}^2$	0	0.008	0.026	0.202	-0.018	0.027	0.031
$\hat{\rho}$	-0.142	-0.190	-0.184	-0.350	-0.575	-0.675	-0.612
$\Pr[\hat{\rho} = 0]$	0.056	0.006	0.011	0.067	0.000	0.000	0.000
$N$	486	486	481	144	150	150	150

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Labour income is in 1000 Tk unit and is sum of all earned labour incomes. Farm revenue is total of agricultural produce sales.

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

TABLE 19: FD ESTIMATION OF INCOMES BY ATTRIBUTES

	Labour income (Tk)				Farm income (Tk)		
covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	5.77** (2.93)	1.79 (3.70)	-1.98 (4.12)	3.71 (5.50)	-8.30 (6.88)	-12.09 (7.91)	-13.90 (8.47)
LargeSize	-1.46 (4.10)	0.07 (4.54)	0.72 (4.18)	-7.41 (5.45)	9.95 (7.00)	11.72 (7.51)	10.60 (8.05)
WithGrace	-4.09 (4.45)	-3.25 (4.74)	-2.99 (4.24)	-4.18 (4.77)	-0.13 (1.98)	-6.80 (5.01)	-18.75 (14.89)
InKind	-2.02 (5.27)	-3.19 (5.59)	-3.29 (5.01)	14.31 (9.95)	-2.92 (2.39)	2.60 (5.41)	7.75 (10.04)
rd 2 - 3		10.53*** (3.62)	10.43*** (3.68)	15.42*** (5.46)		7.12 (8.70)	15.49 (14.99)
LargeSize × rd 2 - 3		-2.05 (10.60)	-4.24 (10.87)	6.99 (10.78)		10.01 (11.79)	1.45 (24.63)
WithGrace × rd 2 - 3		-7.04 (8.55)	-4.49 (8.61)	-6.23 (8.12)		47.95 (34.26)	36.23 (24.81)
InKind × rd 2 - 3		10.84 (10.39)	10.18 (10.64)	-10.63 (13.07)		-39.54 (34.41)	-51.77 (41.55)
rd 3 - 4		-2.45 (6.20)	-2.02 (6.87)				
LargeSize × rd 3 - 4		4.19 (20.89)	1.75 (22.21)				
WithGrace × rd 3 - 4		6.73 (7.16)	8.58 (7.70)				
InKind × rd 3 - 4		11.46 (15.94)	12.49 (16.99)				
FloodInRd1			8.45*** (3.19)	1.57 (2.85)			-3.39 (3.17)
Head literate			-10.73 (7.42)	-11.10** (5.61)			1.89 (2.56)
6M repayment				-4.16 (8.53)			17.33 (15.06)
6M net saving				53.01** (22.38)			61.67 (61.19)
6M other member net saving				-68.04 (90.53)			-409.32 (355.57)
6M other member Repaid				-56.00*** (14.01)			-22.53 (28.02)
T = 2	240	240	239	82	56	56	56
T = 3	78	78	76	31	47	47	47
T = 4	30	30	30	0	0	0	0
R <sup>2</sup>	0	0.008	0.026	0.202	-0.018	0.027	0.031
$\hat{\rho}$	-0.142	-0.190	-0.184	-0.350	-0.575	-0.675	-0.612
Pr[ $\rho = 0$ ]	0.056	0.006	0.011	0.067	0.000	0.000	0.000
N	486	486	481	144	150	150	150

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\text{Pr}[\rho = 0]$  is its  $p$  value. LargeSize is an indicator function if the arm is of large size, WithGrace is an indicator function if the arm is with a grace period, InKind is an indicator function if the arm provides a cow. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Labour income is in 1000 Tk unit and is sum of all earned labour incomes. Farm revenue is total of agricultural produce sales.

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

## IV.7 Consumption

Arm	ConsumptionBaseline	
	0	1
traditional	513	284
large	146	1002
large grace	51	981
cow	200	874

Dropped 4028 obs due to NA.

Dropped 4029 obs due to NA.

Warning in `[.data.table`(dat, , `:=`(grepout("Time.?2", colnames(dat)), : length(LHS)==0;

Consumption is observed in rd 2-4. There are 6400 observations, with first-differencing, it becomes 2372 observations with 42, 2330 households observed for 2, 3 times.

Dropped 4028 obs due to NA.  
Dropped 4029 obs due to NA.

Warning in `[.data.table`(dat, , `:=`(grepout("Time.?2|Arm", colnames(dat)), : length(LHS)

TABLE 20: FD ESTIMATION OF CONSUMPTION

	Per capita consumption (Tk)				Per capita hygiene consumption (Tk)		
covariates	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	336.8*** (37.7)	571.9*** (60.1)	569.1*** (61.6)	562.8*** (64.5)	171.7*** (21.3)	214.9*** (32.2)	207.3*** (33.9)
Large	8.9 (50.7)	8.6 (68.8)	7.5 (68.6)	16.2 (70.3)	28.4 (26.7)	46.9 (36.6)	43.4 (37.8)
LargeGrace	-36.8 (50.1)	-82.0 (60.3)	-82.5 (60.5)	-88.5 (63.2)	13.6 (27.6)	4.1 (32.0)	13.8 (30.8)
Cow	-40.6 (46.4)	-9.1 (58.8)	-20.5 (57.9)	-27.2 (64.8)	1.2 (28.0)	35.5 (35.0)	37.4 (34.9)
rd 3 - 4		-461.2*** (70.8)	-448.9*** (70.7)	-449.1*** (73.1)		-109.5*** (35.1)	-91.4*** (34.0)
Large × rd 3 - 4		3.5 (222.4)	8.2 (222.9)	-8.6 (236.1)		-103.3 (103.7)	-61.2 (108.3)
LargeGrace × rd 3 - 4		260.1 (220.6)	261.7 (220.7)	270.4 (220.4)		53.1 (110.9)	81.9 (110.5)
Cow × rd 3 - 4		-158.3 (209.6)	-118.6 (208.6)	-105.5 (210.1)		-186.2* (100.7)	-163.1* (98.5)
FloodInRd1			-9.3 (27.6)	-14.0 (31.8)			-1.0 (17.3)
Head literate			35.8 (37.5)	35.2 (37.9)			28.7 (24.5)
6M repayment				22.2 (84.4)			37.1 (49.2)
6M net saving				-118.1 (219.2)			69.2 (130.8)
6M other member net saving				-222.7 (1063.8)			578.1 (427.9)
6M other member Renaid				58.4 (161.7)			15.5 (80.7)
$T = 2$	42	42	42	43	42	42	43
$T = 3$	1165	1165	1162	1161	1165	1165	1161
$\bar{R}^2$	-0.001	0.072	0.07	0.07	-0.001	0.019	0.018
$\hat{\rho}$	-0.456	-0.374	-0.370	-0.360	-0.319	-0.266	-0.253
$\Pr[\hat{\rho} = 0]$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$N$	2372	2372	2366	2365	2372	2372	2365

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Consumption is annualised values.

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

TABLE 21: FD ESTIMATION OF CONSUMPTION BY ATTRIBUTES

covariates	Per capita consumption (Tk)				Per capita hygiene consumption (Tk)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	336.8*** (37.7)	571.9*** (60.1)	569.1*** (61.6)	562.8*** (64.5)	171.7*** (21.3)	214.9*** (32.2)	207.3*** (33.9)
LargeSize	8.9 (50.7)	8.6 (68.8)	7.5 (68.6)	16.2 (70.3)	28.4 (26.7)	46.9 (36.6)	43.4 (37.8)
WithGrace	-45.7 (47.3)	-90.6 (59.6)	-90.0 (59.8)	-104.7* (62.3)	-14.9 (23.8)	-42.8 (29.9)	-29.6 (31.6)
InKind	-3.8 (42.7)	72.9 (47.7)	62.0 (47.4)	61.3 (49.1)	-12.3 (25.2)	31.4 (27.8)	23.5 (25.3)
rd 3 - 4		-461.2*** (70.8)	-448.9*** (70.7)	-449.1*** (73.1)		-109.5*** (35.1)	-91.4*** (34.0)
LargeSize × rd 3 - 4		3.5 (222.4)	8.2 (222.9)	-8.6 (236.1)		-103.3 (103.7)	-61.2 (108.3)
WithGrace × rd 3 - 4		256.5 (198.0)	253.4 (198.4)	279.0 (196.7)		156.3 (100.5)	143.1 (96.7)
InKind × rd 3 - 4		-418.4** (183.6)	-380.3** (182.3)	-375.9** (182.6)		-239.2** (97.4)	-245.0*** (93.6)
FloodInRd1			-9.3 (27.6)	-14.0 (31.8)			-1.0 (17.3)
Head literate			35.8 (37.5)	35.2 (37.9)			28.7 (24.5)
6M repayment				22.2 (84.4)			37.1 (49.2)
6M net saving				-118.1 (219.2)			69.2 (130.8)
6M other member net saving				-222.7 (1063.8)			578.1 (427.9)
6M other member Renaid				58.4 (161.7)			15.5 (80.7)
$T = 2$	42	42	42	43	42	42	43
$T = 3$	1165	1165	1162	1161	1165	1165	1161
$\bar{R}^2$	-0.001	0.072	0.07	0.07	-0.001	0.019	0.018
$\hat{\rho}$	-0.456	-0.374	-0.370	-0.360	-0.319	-0.266	-0.253
$\Pr[\hat{\rho} = 0]$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$N$	2372	2372	2366	2365	2372	2372	2365

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. LargeSize is an indicator function if the arm is of large size, WithGrace is an indicator function if the arm is with a grace period, InKind is an indicator function if the arm provides a cow. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Consumption is annualised values.

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

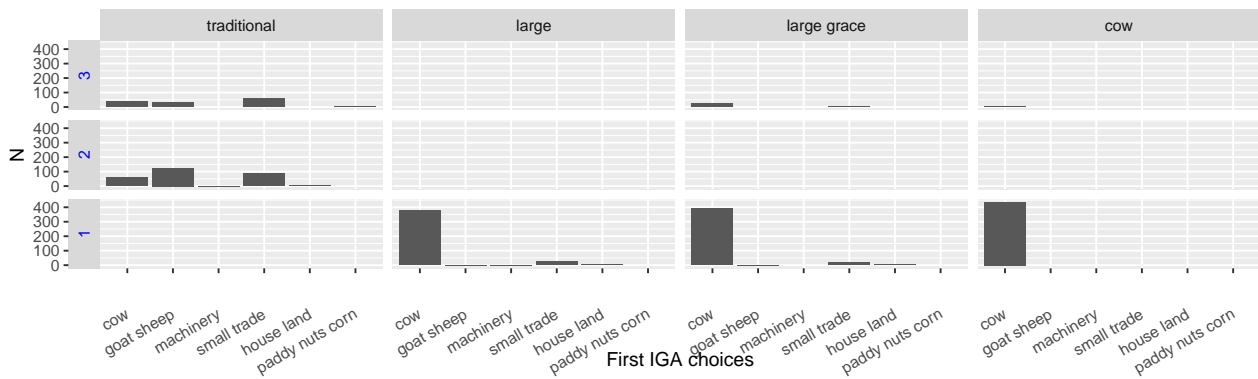


Figure 10: Income generating activity choices  
The first income generating activity choices are plotted.

TABLE 22: FD ESTIMATION OF CONSUMPTION, MODERATELY POOR VS. ULTRA POOR

covariates	Per capita consumption (Tk)				Per capita hygiene consumption (Tk)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Intercept)	335.3*** (25.4)	565.2*** (47.1)	547.9*** (45.4)	547.3*** (46.7)	195.7*** (14.4)	255.0*** (24.5)	246.6*** (25.3)
UltraPoor	-25.5 (24.2)	-26.8 (29.2)	-16.3 (28.0)	-18.9 (27.8)	-16.3 (16.3)	-19.9 (17.2)	-15.5 (17.4)
rd 3 - 4		-454.9*** (75.1)	-438.8*** (74.2)	-443.4*** (77.2)		-113.3*** (38.2)	-95.7*** (36.1)
UltraPoor × rd 3 - 4		-20.0 (89.1)	-56.7 (82.5)	-53.6 (83.6)		12.7 (54.9)	-3.6 (55.1)
FloodInRd1			-4.9 (28.0)	-5.7 (31.4)			-1.7 (17.2)
Head literate			35.5 (35.9)	34.8 (36.4)			27.5 (23.6)
6M repayment				17.6 (86.5)			37.5 (49.9)
6M net saving				-112.3 (227.7)			82.0 (131.5)
6M other member net saving				-182.6 (971.7)			428.8 (430.7)
6M other member Renaid				0.9 (163.2)			-0.3 (78.1)
T = 2	42	42	42	43	42	42	43
T = 3	1165	1165	1162	1161	1165	1165	1161
$\bar{R}^2$	0	0.065	0.064	0.063	0	0.011	0.01
$\hat{\rho}$	-0.458	-0.375	-0.369	-0.363	-0.322	-0.298	-0.282
Pr[ $\hat{\rho} = 0$ ]	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	2372	2372	2366	2365	2372	2372	2365

Source: Estimated with GUK administrative and survey data.

Notes: 1. First-difference estimates using administrative and survey data. First-differenced ( $\Delta x_{t+1} \equiv x_{t+1} - x_t$ ) regressands are regressed on categorical and time-variant covariates. Head age and literacy are from baseline survey data.  $\rho$  indicates the AR(1) coefficient of first-difference residuals as suggested by ?, 10.71 and  $\Pr[\rho = 0]$  is its  $p$  value. UltraPoor is an indicator function if the household is classified as the ultra poor. Sample is continuing members and replacing members of early rejecters and received loans prior to 2015 January. Consumption is annualised values.

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

## IV.8 IGA

Finding IV.3 FIGURE 10, 11 show that there are very few members who chose to invest in more than one project for the “large” arms, while in the traditional arm, almost no one invested only in one project. Goat/sheep and small trades are the top choices for the first IGA in traditional. This indicates the existence of both a liquidity constraint and convexity in the production technology of large domestic animals. This also validates our supposition that dairy livestock production is the most preferred and probably the only economically viable investment choice. It reduces a concern that the cow arm may have imposed an unnecessary restriction in an in-

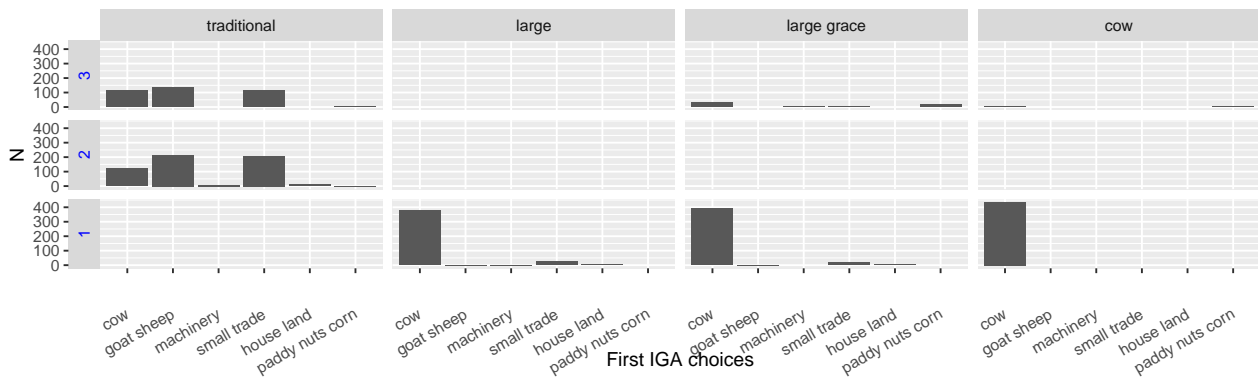


Figure 11: All income generating activity choices  
All of multiple investment choices are summed by arms and the number of IGAs and plotted as bars.

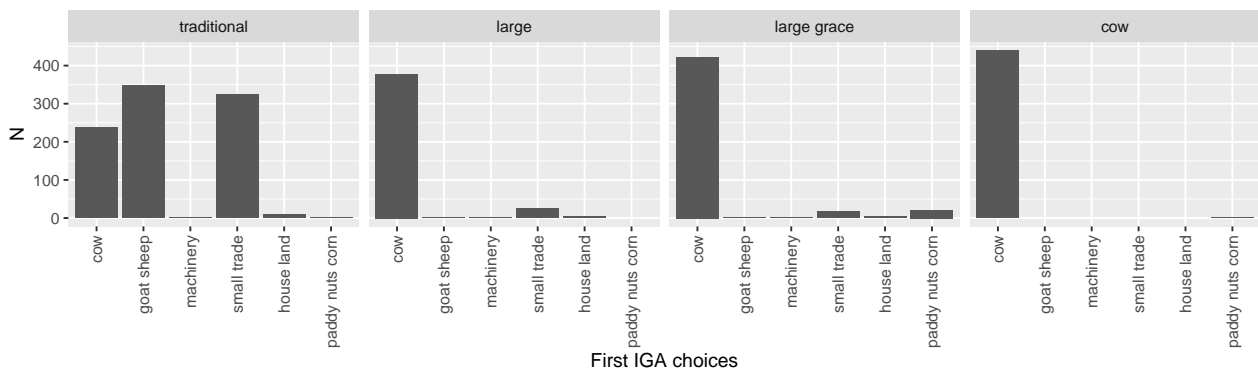


Figure 12: All income generating activity choices collapsed over different number of IGAs  
All of multiple investment choices are summed by arms and plotted as bars.

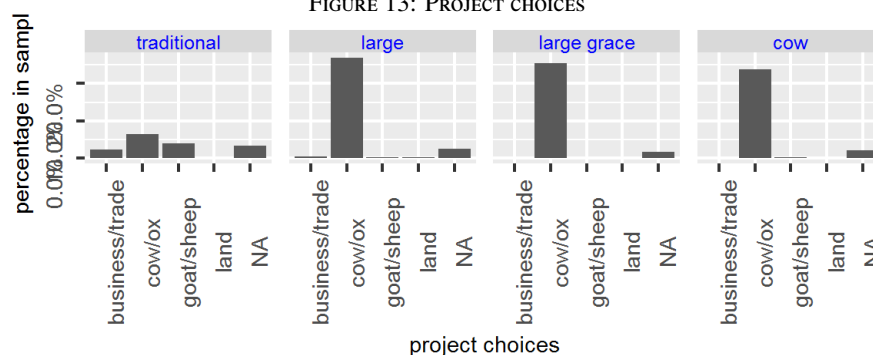
vestment choice by forcing to receive a cow. FIGURE 12 shows there are a significant number of cases in the traditional arm that members reportedly raise cows, yet they are also accompanied by parallel projects in smaller livestock production and small trades. Contrasting large, large grace with cow arms, it suggests that entrepreneurship (to the extent that is necessary for dairy livestock production) may not be an impediment for a microfinance loan uptake among members.

Together with TABLE ?? showing smaller net saving and repayment among traditional, the restriction on a project choice induced by a smaller loaned sum resulted in smaller returns.



## IV.9 Project cycle

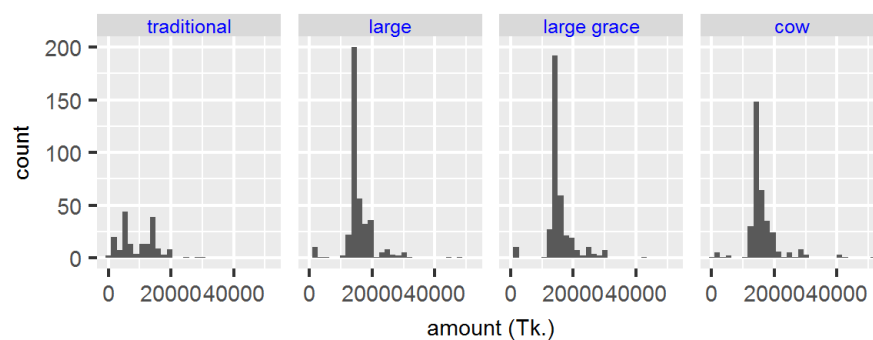
FIGURE 13: PROJECT CHOICES



Source: Survey data.

Note: Reported project choices using the lending. NAs include nonresponse to the question and dropped out individuals.

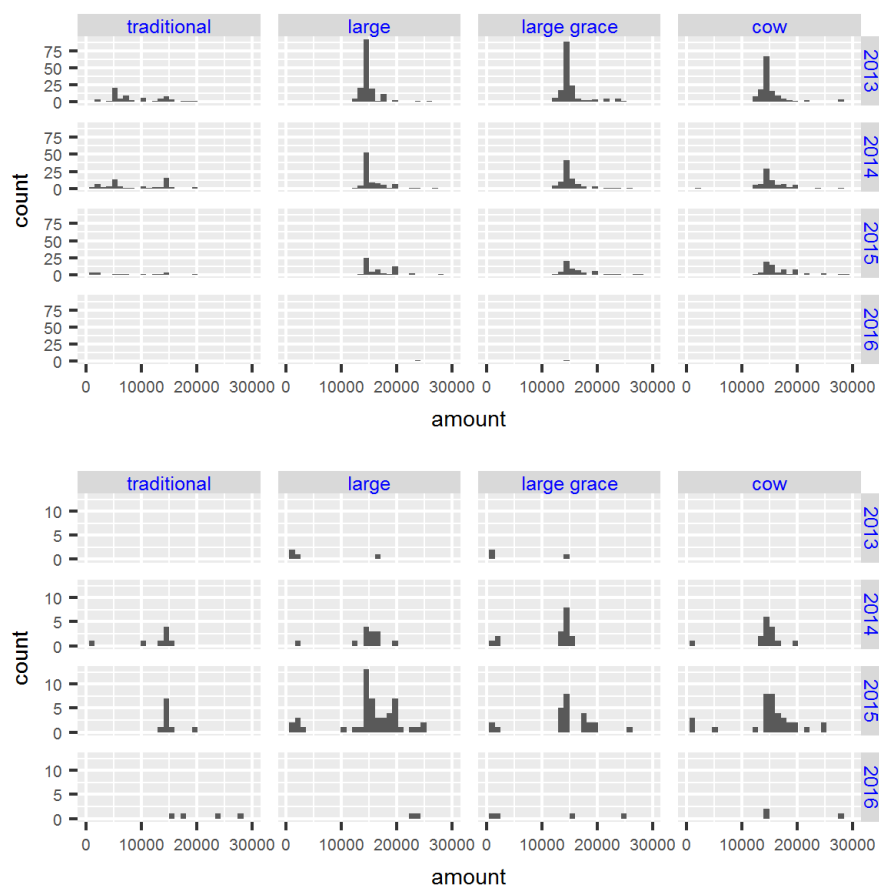
FIGURE 14: LARGEST FIXED INVESTMENT AMOUNT



Source: Survey data.

Note: Reported largest one-off investment amounts of the lending.

FIGURE 15: FIRST AND 2ND OR LATER FIXED INVESTMENT AMOUNT



Source: Survey data.

Note: Reported largest one-off investment amounts of the lending. Top panel is the first investments reported, bottom panel is 2nd or later investments reported.