Permutation tests

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Use the 'trimmed' sample (has all 800 members) rather than the 'initial' sample (has only 776 members after dropping members who received loans only twice). To set to the trimmed sample, set the parameter UseTrimmedSample to T.

```
UseTrimmedSample ← T
TestMedian ← F
```

The majority of descriptive statistics are related to assets. We base our descriptive statistics on the asset data.

```
source(paste0(pathprogram, "ComputeNetAssetsANCOVA.R"))
```

```
Number of obs by Arm and attrition
             AttritIn
Arm             2   3   4   9 Sum
  traditional   6   4  20 144 174
  large         5   2   1 192 200
  large grace  22   3   3 171 199
  cattle        5   5  13 177 200
  Sum          38  14  37 684 773


Number of obs by membership status and attrition
                    AttritIn
BStatus                2   3   4   9 Sum
  borrower             8   6   8 578 600
  pure saver           0   0   0   0   0
  individual rejection 9   4   1  75  89
  group rejection      9   4   0  55  68
  rejection by flood  12   0  28   0  40
  Sum                 38  14  37 708 797
```

```
#  trimmed sample are data before dropping 26 traditional HHs.
ar ← readRDS(paste0(pathsaveHere, DataFileNames[3], "Trimmed.rds"))
arA ← readRDS(paste0(pathsaveHere, DataFileNames[2], "Trimmed.rds"))
ass ← readRDS(paste0(pathsaveHere, DataFileNames[4], "Trimmed.rds"))
lvo ← readRDS(paste0(pathsaveHere, DataFileNames[5], "Trimmed.rds"))
NeA1R ← readRDS(paste0(pathsaveHere, "NetAssetsANCOVATrimmed.rds"))
# NeA1R2 drops (from NeA1R) 24 members in trad who were disbursed loans only twice or once
NeA1R2 ← readRDS(paste0(pathsaveHere, "NetAssetsANCOVA.rds"))
rsk ← readRDS(paste0(pathsaveHere, "RiskPreferences.rds"))
rsk2 ← rsk[, .(hhid, RiskPrefVal, TimePref1Val, TimePref2Val, PresentBias)]
```

```
if (Only800) ar ← ar[o800 == 1L, ]
addmargins(table(ar[tee == 1, .(Arm)]))
```

```
Arm
traditional       large large grace      cattle         Sum
        200         200         200         200         800
```

There are 24 members with TradGroup = twice, double. They were dropped from estimation sample. If UseTrimmedSample==T, attrition is based on all 800 members, if F, attrition is analysed using 776 members. We use the 'initial' sample (has only 776 members after dropping members who received loans only twice), not the 'trimmed' sample (has all 800 members).

```
#To set to the trimmed sample, set the parameter \textsf{UseTrimmedSample} to T. Here, we
#Trimmed sample: Has all 800 HHs. Initial sample: Has 776 HHs.
UseTrimmedSample ← F
TestMedian ← F

cat("UseTrimmedSample is", UseTrimmedSample, "\n")
```

```
UseTrimmedSample is FALSE
```

```
if (!UseTrimmedSample)
  ar ← ar[!grepl("tw|dou", TradGroup), ]
addmargins(table0(ar[o800 == 1L & tee == 1, .(Tee, AttritIn)]))
```

```
     AttritIn
Tee     2   3   4   9 Sum
  1    41   0   0   0  41
  2     0  14   0   0  14
  3     0   0  37   0  37
  4     0   0   0 684 684
  Sum  41  14  37 684 776
```

Out of 776 members, there are 92 members who attrited.

```
addmargins(table0(ar[tee==1 & o800==1 & AttritIn<9, .(BStatus,AttritIn)]))
```

```
                      AttritIn
BStatus                 2  3  4 Sum
  borrower              8  6  8  22
  pure saver            0  0  0   0
  individual rejection 10  4  1  15
  group rejection      11  4  0  15
  rejection by flood   12  0 28  40
  Sum                  41 14 37  92
```

```
#addmargins(table(ar[mid == 1 & Time == 1, .(BStatus, Arm)]), 1:2, sum, T)
#addmargins(table(ar[mid == 1 & Time == 4, .(BStatus, Arm)]), 1:2, sum, T)
# "ar" is roster
# AttritIn is created as below in read_cleaned_data.rnw
# (465): xid[, AttritIn := 9L]
# (466): xid[grepl("^En|^2nd and 4", missing_followup), AttritIn := 4L]
# (467): xid[grepl("^3rd and 4", missing_followup), AttritIn := 3L]
# (468): xid[grepl("^2.*3.*4", missing_followup), AttritIn := 2L]

ar[, Tee := max(survey), by = hhid]
arA[, Tee := max(survey), by = hhid]
ass[, Tee := max(survey), by = hhid]
lvo[, Tee := max(survey), by = hhid]
```

```
#addmargins(table(ar[tee == 1 & grepl("tw|dou", TradGroup), AttritIn]))
#ar[Tee == 1 & AttritIn == 9 & grepl("tw|dou", TradGroup), AttritIn := 2L]

psas ← ass[o800 == 1 & tee == 1,
  .(hhid, tee, NLHAssetAmount, PAssetAmount)]
pslv ← lvo[o800 == 1 & tee == 1,
  .(hhid, tee, TotalImputedValue, NumCows)]
nne ← NeA1R[o800 == 1 & tee == 1,
  # NetBroadValue is similar to NetValue, so drop it.
  .(hhid, tee, NetValue , #NarrowNetValue,
  NetBroadValue
  #, RNetValue, RNarrowNetValue, RNetBroadValue
  )]

source(paste0(pathprogram, "AttritionPermutationTableHeaders5.R"))
armerge ← ar[, c("groupid", "hhid", "mid", "o800", "TradGroup",
  "BStatus", "AttritIn", "survey", "tee", "Time", vartobetested[1:5]), with = F]
armerge[, En := 1:.N, by = .(hhid, Time)]
armerge[, Tee := .N, by = .(hhid, mid, Time)]
armerge ← armerge[En == 1 & Time == 1 & o800 == 1, ]
as ← merge(armerge, psas, by = c("hhid", "tee"), all.x = T)
asl ← merge(as, pslv, by = c("hhid", "tee"), all.x = T)
asln ← merge(asl, nne, by = c("hhid", "tee"), all.x = T)
asv ← merge(asln, rsk2, by = "hhid", all.x = T)
addmargins(table0(asv[!grepl("tw|dou", TradGroup), .(Arm, AttritIn)]))
```

	AttritIn				
Arm	2	3	4	9	Sum
traditional	8	4	20	144	176
large	5	2	1	192	200
large grace	23	3	3	171	200
cattle	5	5	13	177	200
Sum	41	14	37	684	776

```
# keep only rational respondents of risk preferences

# use tee==4 to define attrition, where tee is survey round in asset and livestock
# while tee in roster is meeting number (must rename survey to tee)
asv[, Attrited := 0L]
asv[hhid %in% hhid[AttritIn < 9], Attrited := 1L]
addmargins(table0(asv[!grepl("tw|dou", TradGroup), .(Arm, Attrited)]))
```

	Attrited		
Arm	0	1	Sum
traditional	144	32	176
large	192	8	200
large grace	171	29	200
cattle	177	23	200
Sum	684	92	776

```
asv[, c("Rejected", "GRejected", "IRejected") := 0L]
asv[grepl("^i.*rej", BStatus), IRejected := 1L]
asv[grepl("^g.*rej", BStatus), GRejected := 1L]
asv[IRejected == 1L | GRejected == 1L, Rejected := 1L]
asv[, Active := 1L]
asv[Attrited == 1 | Rejected == 1, Active := 0L]
asv[, CompletePanel := F]
```

```
asv[hhid %in% intersect(hhid[tee == 1 & !is.na(NetValue)], hhid[tee == 4 & !is.na(NetValue
  CompletePanel := T]
saveRDS(asv, paste0(pathsaveHere, "DestatData.rds"))
```

Attrition of members who were not affected by floods.

```
asv ← readRDS(paste0(pathsaveHere, "DestatData.rds"))
addmargins(table0(asv[!grepl("flo", BStatus) & Rejected == 0, .(Attrited, Arm)]))
```

```
         Arm
Attrited traditional large large grace cattle Sum
     0            83   164         160    147 554
     1             2     7           7      6  22
     Sum          85   171         167    153 576
```

```
# these are HHs with two disbursements under traditional; read_admin_data.rnw(472)
# adw[(loanamount1st == 5600 & loanamount2nd == 5600 & loanamount3rd == 5600) |
#   (!is.na(DisDate1) & !is.na(DisDate2) & !is.na(DisDate3)),
#   TradGroup := "planned"]
# adw[loanamount1st == 5600 & loanamount2nd == 11200,
#   TradGroup := "double"]
# adw[(loanamount1st == 7840 & loanamount2nd == 8960) |
#   (!is.na(DisDate1) & !is.na(DisDate2) & is.na(DisDate3)),
#   TradGroup := "twice"]
# adw[, TradGroup := factor(TradGroup, levels = c("planned", "twice", "double"))]
```

```
# data to use in each tests: TradNonTradAttrited, AttritedInTrad, TradNonTradRejected, IRe
# drop 2 loan receivers
asv1 ← asv[!grepl("tw|dou", TradGroup), ]
# drop group rejecters
asv2 ← asv[!grepl("gr", BStatus), ]
# drop 2 loan receivers and group rejecters
asv3 ← asv[!grepl("gr", BStatus) & !grepl("tw|dou", TradGroup), ]
asvT ← asv[grepl("tra", Arm), ]
asvNT ← asv[!grepl("tra", Arm), ]
# data to be used for each tested variable
# vartobetested is defined in AttritionPermutationTableHeaders5.R in FormSample.rnw
datalist ← rep("asv", length(vartobetested))
datalist1 ← paste0(datalist, 1) # drop 2 loan receivers
datalist2 ← paste0(datalist, 2) # drop group rejecters
datalist3 ← paste0(datalist, 3) # drop 2 loan receivers and group rejecters
datasets ← "asv"
datasets1 ← paste0(datasets, 1)
datasets2 ← paste0(datasets, 2)
datasets3 ← paste0(datasets, 3)
for (k in 1:3) {
  addchar ← c("f", "t", "j")[k]
  Datasets ← get(paste0("datasets", c("", 1, 2)[k]))
  for (dd in Datasets) {
    xdd ← get(dd)
    # all members all arms: attrited vs. nonattrited
    xa ← xdd
    assign(paste0(dd, "a", addchar), xa)
    # all in trad: attrition vs. nonattrition
    xTa ← xdd[grepl("trad", Arm), ]
    assign(paste0(dd, "Ta", addchar), xTa)
    # all in nontrad: attrition vs. nonattrition
```

```
    xNTa ← xdd[!grepl("trad", Arm), ]
    assign(paste0(dd, "NTa", addchar), xNTa)
    # attrited members in all arms: trad vs. nontrad
    xTNTa ← xdd[Attrited == 1L, ]
    xTNTa[, TradArm := 1L]; xTNTa[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "TNTa", addchar), xTNTa)
    # all members except flood victims: attrited vs. nonattrited
    xNFa ← xdd[!grepl("floo", BStatus), ]
    assign(paste0(dd, "NFa", addchar), xNFa)
    # all except flood victims in trad: attrition vs. nonattrition
    xNFTa ← xdd[!grepl("floo", BStatus) & grepl("trad", Arm), ]
    assign(paste0(dd, "NFTa", addchar), xNFTa)
    # all except flood victims in nontrad: attrition vs. nonattrition
    xNFNTa ← xdd[!grepl("floo", BStatus) & !grepl("trad", Arm), ]
    assign(paste0(dd, "NFNTa", addchar), xNFNTa)
    # attrited members except flood victims in all arms: trad vs. nontrad
    xNFTNTa ← xdd[!grepl("floo", BStatus) & Attrited == 1L, ]
    xNFTNTa[, TradArm := 1L]; xNFTNTa[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "NFTNTa", addchar), xNFTNTa)
    # attrited members except flood victims in all arms: cow vs. noncow
    xNFCNCa ← xdd[!grepl("floo", BStatus) & Attrited == 1L, ]
    xNFCNCa[, CowArm := 1L]; xNFCNCa[!grepl("cow", Arm), CowArm := 0L]
    assign(paste0(dd, "NFCNCa", addchar), xNFCNCa)
    # attrited members except flood victims: cow vs. large grace
    xNFCGa ← xdd[!grepl("floo", BStatus) & grepl("cow|gr", Arm) & Attrited == 1L, ]
    xNFCGa[, CowArm := 1L]; xNFCGa[!grepl("cow", Arm), CowArm := 0L]
    assign(paste0(dd, "NFCGa", addchar), xNFCGa)
    # active/surviving (neither attrited nor rejected) members except flood victims
    # (these people are considered not fit for the offered program)
    # active/survival in all arms
    xs ← xdd
    assign(paste0(dd, "s", addchar), xs)
    # active in trad: attrition vs. nonattrition
    xTs ← xdd[grepl("trad", Arm), ]
    assign(paste0(dd, "Ts", addchar), xTs)
    # active in nontrad: attrition vs. nonattrition
    xNTs ← xdd[!grepl("trad", Arm), ]
    assign(paste0(dd, "NTs", addchar), xNTs)
    # active members in all arms: trad vs. nontrad
    xTNTs ← xdd[Active == 1L, ]
    xTNTs[, TradArm := 1L]; xTNTs[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "TNTs", addchar), xTNTs)
    # active members: cow vs. noncow
    xCNCs ← xdd[!grepl("floo", BStatus) & Active == 1L, ]
    xCNCs[, CowArm := 1L]; xCNCs[!grepl("cattle", Arm), CowArm := 0L]
    assign(paste0(dd, "CNCs", addchar), xCNCs)
    # active members: cow vs. lsge grace
    xCGs ← xdd[!grepl("floo", BStatus) & grepl("cattle|gr", Arm) & Active == 1L, ]
    xCGs[, CowArm := 1L]; xCGs[!grepl("cattle", Arm), CowArm := 0L]
    assign(paste0(dd, "CGs", addchar), xCGs)
    # all rejection all arms: rejected vs. nonrejected
    xr ← xdd
    assign(paste0(dd, "r", addchar), xr)
    # all rejection in trad: rejected vs. nonrejected
    xTr ← xdd[grepl("trad", Arm), ]
    assign(paste0(dd, "Tr", addchar), xTr)
```

```
    # all rejection in nontrad: rejected vs. nonrejected
    xNTr ← xdd[!grepl("trad", Arm), ]
    assign(paste0(dd, "NTr", addchar), xNTr)
    # all rejection: trad rejecetd vs. nontrad rejected
    xTNTr ← xdd[Rejected == 1L, ]
    xTNTr[, TradArm := 1L]; xTNTr[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "TNTr", addchar), xTNTr)
    # all rejection: cattle rejecetd vs. noncattle rejected
    xCNCr ← xdd[Rejected == 1L, ]
    xCNCr[, CowArm := 1L]; xCNCr[!grepl("cattle", Arm), CowArm := 0L]
    assign(paste0(dd, "CNCr", addchar), xCNCr)
    # all rejection: cattle rejecetd vs. large grace rejected
    xCLGr ← xdd[grepl("cattle|gr", Arm) & Rejected == 1L, ]
    xCLGr[, CowArm := 1L]; xCLGr[!grepl("cattle", Arm), CowArm := 0L]
    assign(paste0(dd, "CLGr", addchar), xCLGr)
    # all acceptance: cattle accepted vs. noncattle accepted
    xCNCa ← xdd[Rejected == 0L, ]
    xCNCa[, CowArm := 1L]; xCNCa[!grepl("cattle", Arm), CowArm := 0L]
    assign(paste0(dd, "CNCa", addchar), xCNCa)
    # all acceptance: cattle accepted vs. large grace accepted
    xCLGa ← xdd[grepl("cattle|gr", Arm) & Rejected == 0L, ]
    xCLGa[, CowArm := 1L]; xCLGa[!grepl("cattle", Arm), CowArm := 0L]
    assign(paste0(dd, "CLGa", addchar), xCLGa)
    # group rejection in all arms: rejected vs. nonrejected
    xgr ← xdd
    assign(paste0(dd, "gr", addchar), xgr)
    # group rejection in trad: rejecters vs. nonrejecters
    xTgr ← xdd[grepl("tra", Arm), ]
    assign(paste0(dd, "Tgr", addchar), xTgr)
    # group rejection in nontrad: rejecters vs. nonrejecters
    xNTgr ← xdd[!grepl("tra", Arm), ]
    assign(paste0(dd, "NTgr", addchar), xNTgr)
    # group rejection: trad rejecters vs. nontrad rejecters
    xTNTgr ← xdd[GRejected == 1L, ]
    xTNTgr[, TradArm := 1L]; xTNTgr[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "TNTgr", addchar), xTNTgr)
    # individual rejection in all arms: rejected vs. nonrejected
    # individual rejecters vs. all except group rejecters
    # group rejecters are excluded because they preceded indiv rejection
    xir ← xdd[!grepl("gr", BStatus), ]
    assign(paste0(dd, "ir", addchar), xir)
    # individual rejection in trad: rejecters vs. nonrejecters
    xTir ← xdd[grepl("tra", Arm) & !grepl("gr", BStatus), ]
    assign(paste0(dd, "Tir", addchar), xTir)
    # individual rejection in nontrad: rejecters vs. nonrejecters
    xNTir ← xdd[!grepl("tra", Arm) & !grepl("gr", BStatus), ]
    assign(paste0(dd, "NTir", addchar), xNTir)
    # individual rejection: trad rejecters vs. nontrad rejecters
    xTNTir ← xdd[!grepl("gr", BStatus) & Rejected == 1L, ]
    xTNTir[, TradArm := 1L]; xTNTir[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "TNTir", addchar), xTNTir)
    # trad group rejecters vs. nontrad participants
    xTNTgrp ← xdd[(grepl("gr", BStatus) & grepl("trad", Arm) & Rejected == 1L) |
      (grepl("bo", BStatus) & !grepl("trad", Arm)), ]
    xTNTgrp[, TradArm := 1L]; xTNTgrp[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "TNTgrp", addchar), xTNTgrp)
```

```
    # trad group vs. nontrad group
    xTNTrandom ← xdd
    xTNTrandom[, TradArm := 1L]; xTNTrandom[!grepl("trad", Arm), TradArm := 0L]
    assign(paste0(dd, "TNTrandom", addchar), xTNTrandom)
  }
}

# data names: ..af, ..rf  (full), ..at, ..rt (drop 2 loan receivers), ..aj, ..rj (drop gro
# data to use: datalist (full), datalist1 (drop 2 loan receivers), datalist2 (drop group n
library(coin)
PM ← vector(mode = "list", length = 3)
for (k in 1:3) {
  addchar ← c("f", "t", "j")[k]
  dataList ← eval(parse(text=paste0("datalist", c("", 1:2))[k]))
  if (addchar == "j") M ← 9 else M ← length(selection.criteria)
  Pm ← vector(mode = "list", length = M)
  for (m in 1:M) {
    set.seed(100+m)
    if (grepl("^Attrited$", addtofilename[m]))
      DataList ← gsub("$", paste0("a", addchar), dataList) else
    if (grepl("^AttritedInTrad", addtofilename[m]))
      DataList ← gsub("$", paste0("Ta", addchar), dataList) else
    if (grepl("^AttritedInNonTrad", addtofilename[m]))
      DataList ← gsub("$", paste0("NTa", addchar), dataList) else
    if (grepl("^TradNonTradAttrited$", addtofilename[m]))
      DataList ← gsub("$", paste0("TNTa", addchar), dataList) else
    if (grepl("^NonFloodAttrited$", addtofilename[m]))
      DataList ← gsub("$", paste0("NFa", addchar), dataList) else
    if (grepl("^NonFloodAttritedInTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("NFTa", addchar), dataList) else
    if (grepl("^NonFloodAttritedInNonTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("NFNTa", addchar), dataList) else
    if (grepl("^NonFloodTradNonTradAttrited$", addtofilename[m]))
      DataList ← gsub("$", paste0("NFTNTa", addchar), dataList) else
    if (grepl("^NonFloodAttritedCowN", addtofilename[m]))
      DataList ← gsub("$", paste0("NFCNCa", addchar), dataList) else
    if (grepl("^NonFloodAttritedCowL", addtofilename[m]))
      DataList ← gsub("$", paste0("NFCGa", addchar), dataList) else
    if (grepl("^Active$", addtofilename[m]))
      DataList ← gsub("$", paste0("s", addchar), dataList) else
    if (grepl("^ActiveInTrad", addtofilename[m]))
      DataList ← gsub("$", paste0("Ts", addchar), dataList) else
    if (grepl("^ActiveInNonTrad", addtofilename[m]))
      DataList ← gsub("$", paste0("NTs", addchar), dataList) else
    if (grepl("^ActiveTradNonTrad", addtofilename[m]))
      DataList ← gsub("$", paste0("TNTs", addchar), dataList) else
    if (grepl("^ActiveCowN", addtofilename[m]))
      DataList ← gsub("$", paste0("CNCs", addchar), dataList) else
    if (grepl("^ActiveCowL", addtofilename[m]))
      DataList ← gsub("$", paste0("CGs", addchar), dataList) else
    if (grepl("^Random", addtofilename[m]))
      DataList ← gsub("$", paste0("TNTrandom", addchar), dataList) else
    if (grepl("^Rejected$", addtofilename[m]))
      DataList ← gsub("$", paste0("r", addchar), dataList) else
    if (grepl("^Rej.*InTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("Tr", addchar), dataList) else
```

```
    if (grepl("^Rej.*InNonTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("NTr", addchar), dataList) else
    if (grepl("^TradNonTradR", addtofilename[m]))
      DataList ← gsub("$", paste0("TNTr", addchar), dataList) else
    if (grepl("^GRejected$", addtofilename[m]))
      DataList ← gsub("$", paste0("gr", addchar), dataList) else
    if (grepl("^GRej.*InTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("Tgr", addchar), dataList) else
    if (grepl("^GRej.*InNonTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("NTgr", addchar), dataList) else
    if (grepl("^TradNonTradGR", addtofilename[m]))
      DataList ← gsub("$", paste0("TNTgr", addchar), dataList) else
    if (grepl("^IRejected$", addtofilename[m]))
      DataList ← gsub("$", paste0("ir", addchar), dataList) else
    if (grepl("^IRej.*InTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("Tir", addchar), dataList) else
    if (grepl("^IRej.*InNonTrad$", addtofilename[m]))
      DataList ← gsub("$", paste0("NTir", addchar), dataList) else
    if (grepl("^TradNonTradIR", addtofilename[m]))
      DataList ← gsub("$", paste0("TNTir", addchar), dataList) else
    if (grepl("^GRejectedTradPar", addtofilename[m]))
      DataList ← gsub("$", paste0("TNTgrp", addchar), dataList) else
    if (grepl("^RejectedCowN", addtofilename[m]))
      DataList ← gsub("$", paste0("CNCr", addchar), dataList) else
    if (grepl("^RejectedCowLa", addtofilename[m]))
      DataList ← gsub("$", paste0("CLGr", addchar), dataList) else
    if (grepl("^AcceptedCowN", addtofilename[m]))
      DataList ← gsub("$", paste0("CNCa", addchar), dataList) else
    if (grepl("^AcceptedCowLa", addtofilename[m]))
      DataList ← gsub("$", paste0("CLGa", addchar), dataList) else
      DataList ← gsub("$", addchar, dataList)
    pmresults ← permmedian ← vector(mode = "list", length(vartobetested))
    for (i in 1:length(vartobetested)) {
      # if specific arm is selected, Arm is not compared in permutation
      if (grepl("Trad$|TradArm|Cow", addtofilename[m]) &
        vartobetested[i] == "Arm") next
      pmdata ← get(DataList[i])
      # drop NAs in vartobetested[i]
      pmdata ← pmdata[!is.na(eval(parse(text=vartobetested[i]))), ]
      # NULL if vartobetested[i] has uniform values or
      # selection.criteria[m] has has uniform values (otherwise returns an error)
      if (length(unique(unlist(pmdata[, vartobetested[i], with = F]))) == 1|
          length(unique(unlist(pmdata[, selection.criteria[m], with = F]))) == 1)
        pmresults[[i]] ← NULL else
        pmresults[[i]] ← independence_test(eval(parse(text=
          paste(vartobetested[i], "~ as.factor(", selection.criteria[m], ")")
          )),
          data = pmdata,
          distribution = approximate(nresample=PermRepTimes))
      if (!TestMedian) next
      if (vartobetested[i] == "Arm" |
        length(unique(unlist(pmdata[, vartobetested[i], with = F]))) == 1 |
        length(unique(unlist(pmdata[, selection.criteria[m], with = F]))) == 1)
        permmedian[[i]] ← NULL else
        permmedian[[i]] ← median_test(eval(parse(text=
          paste(vartobetested[i], "~ as.factor(", selection.criteria[m], ")"))),
```

```
        data = pmdata,
        mid.score = "0.5",
        distribution = approximate(nresample=PermRepTimes))
  }
  #pmresults[[1]]@statistic@teststatistic
  Pmtresults ← NULL
  for (i in 1:length(vartobetested))
  {
    if (grepl("Trad$|TradArm|Cow", addtofilename[m]) &
      vartobetested[i] == "Arm") next
    z ← get(DataList[i])
    z ← z[!is.na(eval(parse(text=vartobetested[i]))), ]
    if (vartobetested[i] == "Arm") {
      Pmtresults ← rbind(Pmtresults,
        c(vartobetested[i],
          sum(!grepl("trad", unlist(z[eval(parse(text = selection.criteria[m])) == 0L,
            vartobetested[i], with = F])))/
            nrow(z[eval(parse(text = selection.criteria[m])) == 0L, ]),
          sum(!grepl("trad", unlist(z[eval(parse(text = selection.criteria[m])) == 1L,
            vartobetested[i], with = F])))/
            nrow(z[eval(parse(text = selection.criteria[m])) == 1L, ]),
          midpvalue(pmresults[[i]]),
          pvalue_interval(pmresults[[i]])))
    } else if (length(unique(unlist(z[, vartobetested[i], with = F]))) == 1)
    {
      # if both groups have no different values,
      # use 0 for all zero entries or 1 for unique nonzero entries
      if (allzerovalues ← unique(unlist(z[, vartobetested[i], with = F])) == 0)
        Pmtresults ← rbind(Pmtresults,
          c(vartobetested[i], 0, 0, rep(NA, 3))) else
        Pmtresults ← rbind(Pmtresults,
          c(vartobetested[i], 1, 1, rep(NA, 3)))
    } else if (length(unique(unlist(pmdata[, selection.criteria[m], with = F]))) == 1)
    {
      # if there is only 1 group for selection criteria, use -1
        Pmtresults ← rbind(Pmtresults,
          c(vartobetested[i], -1, -1, rep(NA, 3)))
    } else {
      Pmtresults ← rbind(Pmtresults,
        c(vartobetested[i],
          mean(unlist(z[eval(parse(text = selection.criteria[m])) == 0L,
            vartobetested[i], with = F]), na.rm = T),
          mean(unlist(z[eval(parse(text = selection.criteria[m])) == 1L,
            vartobetested[i], with = F]), na.rm = T),
          midpvalue(pmresults[[i]]),
          pvalue_interval(pmresults[[i]])))
      if (TestMedian)
        Pmtresults ← rbind(Pmtresults,
          c("",
            median(unlist(z[eval(parse(text = selection.criteria[m])) == 0L,
              vartobetested[i], with = F]), na.rm = T),
            median(unlist(z[eval(parse(text = selection.criteria[m])) == 1L,
              vartobetested[i], with = F]), na.rm = T),
            midpvalue(permmedian[[i]]),
            pvalue_interval(permmedian[[i]])
          ))
```

```
    }
  }
  Pmtresults ← data.table(Pmtresults)
  setnames(Pmtresults, c("variables", paste0(c("Non", ""), selection.criteria[m]),
    "p-value.mid", "p-value.lower", "p-value.upper"))
  Pmtresults[grepl("Impute", variables),
    variables := gsub("To.*", "LivestockValue", variables)]
  cols ← grepout("er|ttr|eje|TradArm|CowA|Activ", colnames(Pmtresults))
  Pmtresults[, (cols) := lapply(.SD, as.numeric), .SDcols = cols]
  Pmtresults[, (cols) := lapply(.SD, formatC, digits = 3, format = "f"), .SDcols = cols
  cols ← grepout("^p", colnames(Pmtresults))
  Pmtresults[, (cols) := lapply(.SD, as.numeric), .SDcols = cols]
  Pmtresults[, (cols) := lapply(.SD,
    function(x) paste0("(", formatC(x*100, digits = 1, format = "f"), ")")), .SDcols = c
  cols ← grepout("ed$|TradArm|CowA|Activ", colnames(Pmtresults))
  Pmtresults[grepl("Ass|Liv|NetV|Val", variables),
    (cols) := lapply(.SD, function(x) formatC(as.numeric(x), digits = 0, format = "f")),
    .SDcols = cols]
  setcolorder(Pmtresults, c("variables", paste0(c("Non", ""), selection.criteria[m]),
    "p-value.lower", "p-value.mid", "p-value.upper"))
  obs0L ← nrow(get(DataList[1])[eval(parse(text = selection.criteria[m])) == 0L, ])
  obs1L ← nrow(get(DataList[1])[eval(parse(text = selection.criteria[m])) == 1L, ])
  nobs ← t(c(NA, obs0L, obs1L, NA, obs1L/(obs0L+obs1L), NA))
  # rename variables to understandable description subst.tablePerm is in SubstTablePerm.
  rn ← unlist(Pmtresults[, variables])
  for (i in 1:nrow(subst.tablePerm))
    rn ← gsub(subst.tablePerm[i, 1], subst.tablePerm[i, 2], rn)
  Pmtresults[, variables := rn]
  Pmtresults[, variables := paste0("\\makebox[3.75cm]{\\hfill ", variables, "}")]
  Pmtresults0 ← rbind(Pmtresults, nobs, use.names = F)
  Pmtresults0[nrow(Pmtresults0), variables := "\\makebox[2.85cm]{\\hfill n}"]
  Pm[[m]] ← Pmtresults0
  if (grepl("InNon|InTra|^TradNon|Cow", addtofilename[m]))
    #Pmtresults ← Pmtresults[!grepl("Arm", variables), ]
    Pmtresults ← Pmtresults[!grepl("^Propo", variables), ]
  # CowArm => Cattle arm
  # This is a legacy part. We already use "Cattle" as its name.
  if (any(grepl("Cow", names(Pmtresults)))) {
    setnames(Pmtresults,
      grepout("Cow", names(Pmtresults))
      , gsub("Cow", "Cattle", grepout("Cow", names(Pmtresults))))
  }
  pmt ← latextab(as.matrix(Pmtresults),
    hleft = "\\scriptsize\\hfil$",
    hcenter = c(3.75, rep(1.5, ncol(Pmtresults)-1)),
    hright = "$",
    headercolor = "gray80", adjustlineskip = "-.2ex", delimiterline= NULL,
    alternatecolor = "gray90")
  pmt ← rbind(pmt[1:(nrow(pmt)-1), , drop = F],
      paste(c("\\makebox[3.75cm]{\\hfill n}",
       obs0L, obs1L, paste0("\\multicolumn{3}{l}{\\makebox[4.5cm]{\\scriptsize (rate: "
       formatC(obs1L/(obs0L+obs1L), digits = 3, format = "f"), ")\\hfill}}")),
       collapse = " & "),
      pmt[nrow(pmt), , drop = F]
    )
  write.tablev(pmt,
```

```
      paste0(pathsavePerm, addtofilename[m],
        c("Full", "", "DropGroupRejecters")[k], "PermutationTestResultso800.tex")
    , colnamestrue = F)
  }
  names(Pm) ← addtofilename[1:M]
  PM[[k]] ← Pm
}
names(PM) ← c("Full", "Drop2LoanReceivers", "DropGroupRejecters")
saveRDS(PM, paste0(pathsavePerm, "AllPermutationTestResults.rds"))

PM ← readRDS(paste0(pathsavePerm, "AllPermutationTestResults.rds"))
# indiv rejecters
Irej ← c("IRejectedInTrad", "IRejectedInNonTrad", "^IRejected$")
ir12 ←  cbind(
    PM[[2]][[grep(Irej[1], addtofilename)]][, c(1:3, 5)],
    PM[[2]][[grep(Irej[2], addtofilename)]][, c(2:3, 5)])
setnames(ir12, c("variables", 1:(ncol(ir12)-1)))
ir3 ← PM[[2]][[grep(Irej[3], addtofilename)]][, c(1:3, 5)]
setnames(ir3, c("variables", 10+1:(ncol(ir3)-1)))
ir3rows ← data.table(variables = ir3[, variables])
setkey(ir12, variables)
setkey(ir3, variables)
ir123 ← ir12[ir3]
ir123 ← ir123[ir3rows]
setnames(ir123, c("variables", paste0("v", 1:(ncol(ir123)-1))))
for (i in paste0("v", c(3, 6, 9)))
  ir123[nrow(ir123), (i) :=
    paste0("(\\mbox{rate }", formatC(as.numeric(eval(parse(text=i))), digits = 3, format =
#cnm ← t(c("\\makebox[3cm]{\\hfil variables}",
#  paste0("\\makebox[1.5cm]{\\hfil ", rep(c("Yes", "No", "$p$ value"), 3), "}")))
cnm ← t(c("\\makebox[2.5cm]{\\hfil }",
  paste0("\\makebox[1.2cm]{(", 1:(ncol(ir123)-1), ")}")))
irj ← as.matrix(rbind(cnm, ir123, use.names = F))
irj[is.na(irj)] ← ""
colnames(irj) ← c("variables", rep(c("Not rejected", "Rejected", "$p$ value"), 3))
irj ← latextab(irj,
  hleft = "\\scriptsize\\hfil$",
  hcenter = c(2.5, rep(1.2, ncol(irj)-1)),
  hright = "$",
  headercolor = "gray80", adjustlineskip = "-.2ex", delimiterline= NULL,
  alternatecolor = "gray90",
  addseparatingcols = c(3, 6),
  separatingcolwidth = rep(.1, 2),
  separatingcoltitle = c("\\textsf{Traditional} arm", "non-\\textsf{Traditional} arms", "A
  addsubcoltitlehere = T
  )
write.tablev(irj,
  paste0(pathsavePerm, "IndividualRejectionTestResults.tex")
, colnamestrue = F)
# active members
Suv ← c("Acc.*NonCow", "Act.*NonCow")
sv12 ←  cbind(
    PM[[2]][[grep(Suv[1], addtofilename)]][, c(1, 3, 2, 5)],
    PM[[2]][[grep(Suv[2], addtofilename)]][, c(3, 2, 5)])
setnames(sv12, c("variables", paste0("v", 1:(ncol(sv12)-1))))
for (i in paste0("v", c(3, 6)))
```

```
  sv12[nrow(sv12), (i) :=
    paste0("(\\mbox{rate }", formatC(as.numeric(eval(parse(text=i))), digits = 3, format =
cnm ← t(c("\\makebox[2.5cm]{\\hfil }",
  paste0("\\makebox[1.2cm]{(", 1:(ncol(sv12)-1), ")}")))
suv ← as.matrix(rbind(cnm, sv12, use.names = F))
colnames(suv) ← c("variables", rep(c("Cattle arm", "Other arms", "$p$ value"), 2))
suv ← latextab(suv,
  hleft = "\\scriptsize\\hfil$",
  hcenter = c(2.5, rep(1.2, ncol(suv)-1)),
  hright = "$",
  headercolor = "gray80", adjustlineskip = "-.2ex", delimiterline= NULL,
  alternatecolor = "gray90",
  addseparatingcols = 3,
  separatingcolwidth = .1,
  separatingcoltitle = c("Borrowers", "Non-attriting borrowers"),
  addsubcoltitlehere = T
  )
write.tablev(suv,
  paste0(pathsavePerm, "CowVsNonCowTestResults.tex")
, colnamestrue = F)
```

```
X ← qread(paste0(pathsaveEstimationMemo, "ShortFallRegressionData.qs"))
jds ← fread(paste0(pathreceived, "DataForJDS.prn"))
X1 ← X[gnum == 1, ]
X[, o800 := 0L]
# need to use groupid because some hhid in admin record is missing in jds data
X[groupid %in% jds[grepl("trea", treat), groupid], o800 := 1L]
X2 ← X[o800 == 1L, ]
addmargins(table0(X2[, .(TeeInLY = 1:.N), by = .(groupid, LoanYear)][
  TeeInLY == 1, LoanYear]))
```

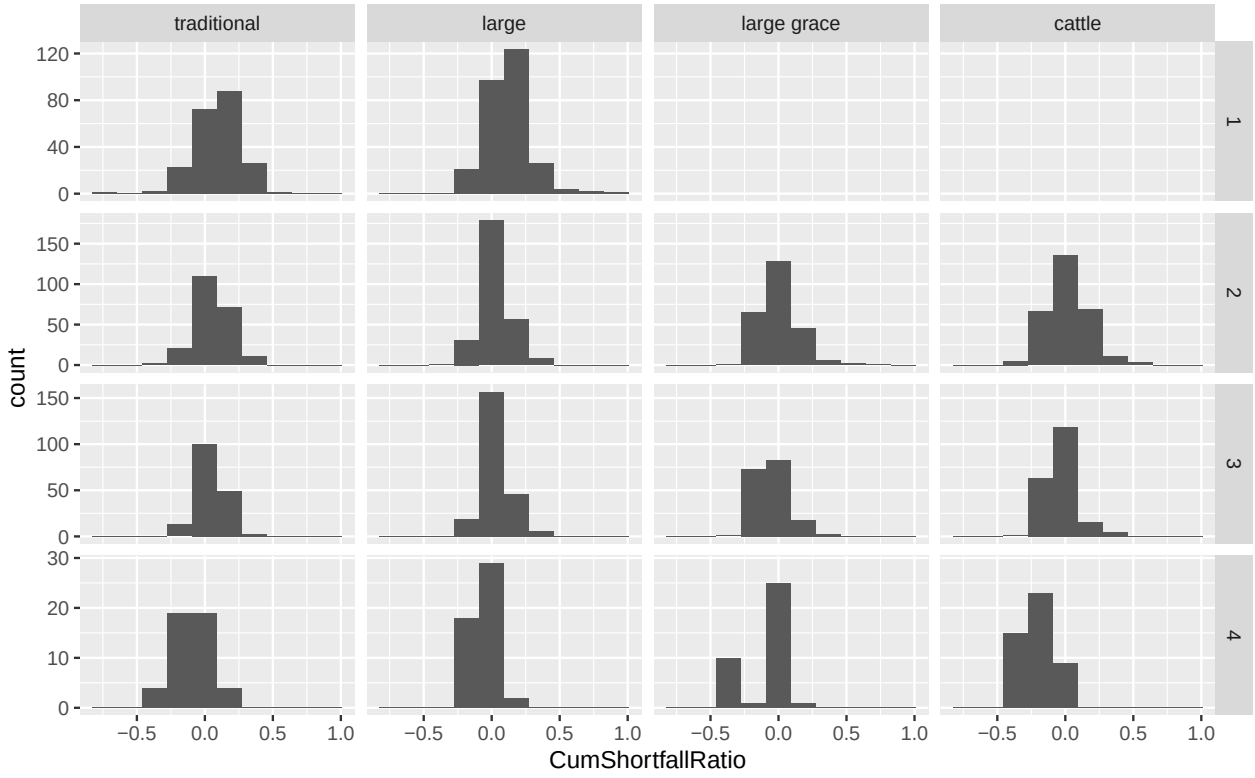
```
x
  1   2   3   4 Sum
 69  69  69  69 276
```

```
addmargins(table0(X2[, TeeInLY := 1:.N, by = .(hhid, LoanYear)][,
  .(maxTee = max(TeeInLY)), LoanYear]))
```

```
        maxTee
LoanYear 12 Sum
     1    1   1
     2    1   1
     3    1   1
     4    1   1
     Sum  4   4
```

```
# Repayment + net saving
library(ggplot2)
p ← ggplot(data = X2[TeeInLY == 12 & !is.na(CumShortfallRatio), ], aes(CumShortfallRatio)
  geom_histogram(bins = 10) + facet_grid(LoanYear ~ Arm, scales = "free_y")
p
library(coin)
X2[, cnc := "Cattle"]
X2[!grepl("cat", Arm), cnc := "NonCattle"]
X2[, cnc := factor(cnc)]
X2[, tradnontrad := "Traditional"]
```

```
X2[!grepl("rad", Arm), tradnontrad := "NonTraditional"]
X2[, tradnontrad := factor(tradnontrad, levels = c("Traditional", "NonTraditional"))]
X2[, poor := "UltraPoor"]
X2[hhid %in% hhid[ModeratelyPoor == 1], poor := "ModeratelyPoor"]
X2[, poor := factor(poor)]
RepayPermTestByPoor ← vector(mode = "list", 4)
RepayPermTestByArm ← vector(mode = "list", 3)
RepayPermTestByArm ← list(Traditional = RepayPermTestByArm, Cattle = RepayPermTestByArm)
#### TeeInLY = 7 is chosen because there are fewer obs at TeeInLY = 12 in LoanYear = 4
for (i in 2:4) {
  RepayPermTestByArm[[1]][[i-1]] ←  independence_test(
      CumShortfallRatio ~ tradnontrad,
      data = X2[LoanYear == i & TeeInLY == 6 & !is.na(CumShortfallRatio), ],
      distribution = approximate(nresample=PermRepTimes)
    )
  RepayPermTestByArm[[2]][[i-1]] ←  independence_test(
      CumShortfallRatio ~ cnc,
      data = X2[LoanYear == i & TeeInLY == 6 & !is.na(CumShortfallRatio), ],
      distribution = approximate(nresample=PermRepTimes)
    )
}
for (i in 1:4)
  RepayPermTestByPoor[[i]] ←  independence_test(
      CumShortfallRatio ~ poor,
      data = X2[LoanYear == i & TeeInLY == 6 & !is.na(CumShortfallRatio), ],
      distribution = approximate(nresample=PermRepTimes)
    )
qsave(RepayPermTestByArm,
  paste0(pathsaveEstimationMemo, "RepayPermTestByArm.qs"))
qsave(RepayPermTestByPoor,
  paste0(pathsaveEstimationMemo, "RepayPermTestByPoor.qs"))
```




```
RepayPermTestByPoor ← qread(paste0(pathsaveEstimationMemo, "RepayPermTestByPoor.qs"))
```

```
X2m ← X2[TeeInLY == 6, .(mean = round(mean(CumShortfallRatio, na.rm = T), 3)), by = .(Loa
X2mW ← reshape(X2m, direction = "wide", idvar = "LoanYear", timevar = "poor")
X2mW[, pvalue := unlist(lapply(RepayPermTestByPoor,
  function(x) paste0(formatC(coin::midpvalue(x)[1]*100, format = "f", digits = 2), "\\%"))
numcol ← c("mean.UltraPoor", "mean.ModeratelyPoor")
X2mW[, (numcol) := lapply(.SD, formatC, format = "f", digits = 3), .SDcol = numcol]
X2mW[1:3, mean.UltraPoor := paste0("\\phantom{-}", mean.UltraPoor)]
X2mW[1:3, mean.ModeratelyPoor := paste0("\\phantom{-}", mean.ModeratelyPoor)]
x2mw ← as.matrix(X2mW)
colnames(x2mw) ← c("Loan year", "Ultra poor", "Moderately poor", "")
x2tab ← latextab(x2mw,
  hleft = "\\scriptsize\\hfil$",
  hcenter = c(1, rep(2.25, ncol(x2mw)-1)),
  hright = "$",
  headercolor = "gray80", adjustlineskip = "-.2ex", delimiterline= NULL,
  alternatecolor = "gray90",
  addseparatingcols = 2,
  separatingcolwidth = .1,
  separatingcoltitle = c("Mean cumulative shortfall ratio", "$p$ value"),
  addsubcoltitlehere = T
  )
write.tablev(x2tab,
  paste0(pathsavePerm, "UltraPoorVsModeratelyPoorRepaymentPermTestResults.tex")
, colnamestrue = F)
```

```
asv ← readRDS(paste0(pathsaveHere, "DestatData.rds"))
jds ← fread(paste0(pathreceived, "DataForJDS.prn"))
asv[, poor := "Moderately poor"]
asv[hhid %in% jds[grepl("up", pov), hhid], poor := "Ultra poor"]
asv[, poor := factor(poor)]
# asv already dropped anomalous disbursements under trad (776)
asv1 ← asv[!grepl("tw|dou", TradGroup), ]
# drop 2 loan receivers and group rejecters (706)
asv3 ← asv[!grepl("gr", BStatus) & !grepl("tw|dou", TradGroup), ]
X = copy(asv1)
#
library(coin)
X2[, tradnontrad := "Traditional"]
X2[!grepl("rad", Arm), tradnontrad := "NonTraditional"]
X2[, tradnontrad := factor(tradnontrad, levels = c("Traditional", "NonTraditional"))]

RepayPermTestByArm ← vector(mode = "list", 3)
RepayPermTestByArm ← list(Traditional = RepayPermTestByArm, Cattle = RepayPermTestByArm)

VarsUP ← c("NetValue", "NumCows", "IRejected", "HHsize")
VarsPermTestByPoor ← vector(mode = "list", length(VarsUP))
for (i in 1:length(VarsUP))
  VarsPermTestByPoor[[i]] ← independence_test(
      eval(parse(text=paste0(VarsUP[i], " ~ poor"))),
      data = X, distribution = approximate(nresample=PermRepTimes)
    )
qsave(VarsPermTestByPoor,
  paste0(pathsaveEstimationMemo, "VarsPermTestByPoor.qs"))

VarsPermTestByPoor ← qread(paste0(pathsaveEstimationMemo, "VarsPermTestByPoor.qs"))
```

```
Xm ← X[, .(lapply(.SD,  function(x) round(mean(x, na.rm = T), 3))),
  .SDcols = VarsUP, by = poor]
Xo ← X[, .(lapply(.SD,  function(x) round(mean(x, na.rm = T), 3))),
  .SDcols = VarsUP]
setnames(Xm, "V1", "val")
setnames(Xo, "V1", "valo")
Xm[, val := as.numeric(val)]
Xm[, vars := rep(VarsUP, 2)]
XmW ← reshape(Xm, direction  = "wide", idvar = "poor",
  timevar = "vars", v.names = "val")
x2 ← t(XmW)
x2 ← cbind(x2, c("overall", unlist(Xo)))
x2[grepl("NetV", rownames(x2)), ] ←
  formatC(as.numeric(x2[grepl("NetV", rownames(x2)), ]), format = "f", digits = 0)
x2 ← data.table(variables = rownames(x2), x2)
setnames(x2, c("Variables", "Ultra poor", "Moderately poor", "Overall"))
x2 ← x2[-1, ]
x2[, Variables := gsub("val.", "", Variables)]
x2[, pvalue := unlist(lapply(VarsPermTestByPoor,
  function(x) paste0(formatC(coin::midpvalue(x)[1]*100, format = "f", digits = 2), "\\%"))
rn ← x2[, Variables]
source(paste0(pathprogram, "SubstTableANCOVA.R"))
for (i in 1:nrow(subst.tableA))
  rn ← gsub(subst.tableA[i, 1], subst.tableA[i, 2], rn)
rn ← paste0("\\makebox[3cm]{\\hfill ", rn, "}")
x2[, Variables := rn]
x2 ← as.matrix(x2)
colnames(x2)[grep("pv", colnames(x2))] ← " "
x2tab ← latextab(x2,
  hleft = c("\\hfill\\scriptsize ", rep("\\scriptsize\\hfil$", ncol(x2)-1)),
  hcenter = c(3, rep(1.75, ncol(x2)-1)),
  hright = c("", rep("$", ncol(x2)-1)),
  headercolor = "gray80", adjustlineskip = "-.2ex", delimiterline= NULL,
  alternatecolor = "gray90",
  addseparatingcols = 3,
  separatingcolwidth = .1,
  separatingcoltitle = c("Mean", "$p$ value"),
  addsubcoltitlehere = T
  )
write.tablev(x2tab,
  paste0(pathsavePerm, "UltraPoorVsModeratelyPoorBaselineVarsPermTestResults.tex")
, colnamestrue = F)
```

```
ar ← readRDS(paste0(pathsaveHere, DataFileNames[3], "Trimmed.rds"))
if (!UseTrimmedSample) ar ← ar[!grepl("tw|dou", TradGroup), ]
if (Only800) ar ← ar[o800 == 1L, ]
# "ar" is roster
# below is what was processed in AttritionTestsContents2.rnw
ar[, Attrited := 1L]
ar[hhid %in% hhid[Time == 4], Attrited := 0L]
ar[, c("Rejected", "GRejected", "IRejected") := 0L]
ar[grepl("^[ig].*rej", BStatus), Rejected := 1L]
ar[grepl("^i.*rej", BStatus), IRejected := 1L]
ar[grepl("^g.*rej", BStatus), GRejected := 1L]
ar[, En := 1:.N, by = .(hhid, Time)]
ar[, Tee := .N, by = .(hhid, mid, Time)]
```

```
ar ← ar[En == 1 & Time == 1, ]
```

Among 776 observations, there are 40 whose villages are washed away and 70 who by group rejected the assigned arms (traditional, large, large grace with 40, 20, 10 individuals, respectively). There are 31, 9, 13, 37 individuals who individually rejected traditional, large, large grace, cattle, respectively.

```
table(ar[Attrited == 1L, Tee])
```

```
table0(ar[Attrited == 1L, .(FloodInRd1, BStatus)])
table0(ar[Attrited == 1L, .(Arm, BStatus)])
```

```
TabLabelStrings ←
c(
  "Per.* of rejection$", "of rej.*ng traditional arm$", "of rej.*ng non-traditional arm$",
  "of rej.*l vs", "p rejection$", "p rej.* traditional arm$",
  "p rej.*g non-traditional arm$", "p rejecters.*vs", "l rejection$",
  "l rej.*g tra", "l rej.*g non-", "l rej.*vs",
  "bo.*non-ca",
  "of attrition$", "of attri.* traditional arm$",
  "of attri.* non-traditional arm$", "of attri.* of",
  "active status$", "active.*race$", "active.*other"
  )
```

Use coin package's independence_test: Approximate permutation tests by randomly resampling 100000 times.

```
tb1 ← "\\hfil\\begin{minipage}[t]{14cm}\\hfil\\textsc{\\normalsize Table \\refstepcounter
tb2 ← "}\\\\\\\setlength{\\tabcolsep}{.5pt}\\setlength{\\baselineskip}{8pt}\\renewcommand{
tb3 ← "}};\\end{tikzpicture}\\\\\\\begin{tabular}{>{\\hfill\\scriptsize}p{1cm}<{}>{\\hfill
#tb4 ← ". Step-down method is used to adjust for multiple testing of a multi-factor group
\\\\& 3. & See the footnote of \\textsc{Table \\ref{tab MainTextIRjecters}} for descriptio
tb42 ← ". Step-down method is used to adjust for multiple testing of a multi-factor group
tb41 ← paste(tb42, "See the footnote of \\textsc{Table \\ref{tab MainTextIRjecters}} for
tb43 ← ".\\\\& 2. & See footnotes of \\textsc{Table \\ref{tab1 Permutation test results
tb44 ← ".\\\\& 2. & See footnotes of \\textsc{Table \\ref{tab1 Permutation test results
tb45 ← paste(tb42, "Contrasts between \\textsf{cattle} arm and other arms. See the footno
for (k in 1:3)
  for (i in 1:length(HeaderDescription))
    assign(paste0("Tb", k, i),
      paste0(
        tb1
        ,
        HeaderDescription[i]
        ,
        paste0("\\label{", get(paste0("TabLabel", k))[i], "}")
        ,
        tb2
        ,
        paste0(pathsavePerm, addtofilename[i], c("", "Full", "DropGroupRejecters")[k],
          "PermutationTestResultso800.tex")
        ,
        tb3
        ,
        PermRepTimes
        ,
        #if (i %in% c(1, 5, 11, 17, 21, 25)) tb42 else tb41
        if (i==17)
```

```
        paste0(tb42, TabVariableDescription, PrefTestsDefinitions1, "\\end{tabular}\\enc
      if (i %in% grep("non-catt", HeaderDescription)) # 30, 32
        tb45 else
      if (i %in% c(1, 5, 11, 18, 21, 25))
        tb43 else
        tb44
      )
    )
```

The variables usded: Head literate is an indicator variable of household head literacy. Head age is age of household head. Household size is total number of household members. Flood at baseline is an indicator variable of flood exposure. Household asset amount and Productive asset amount are amount of non-livestock household and productive assets, respectively, in BDT. Livestock value is BDT value of all livestock holding beyond cattle. Number of cattle holding is number of cattle holding. Net asset value is net asset values in BDT using asset items observed in all 4 rounds. Broad net asset value is net asset values in BDT for all asset items. Attrited indicates attrition rates in the household survey, and GRejected and IRejected show group rejection rates and individual rejection rates to the lending program. Non-attriting borrowers indicates the ratio of non-attriting borrowers to all borrowers. Because attrition and rejection are separate events, a household can reject and attrit, so non-attrited borrowers $\geqslant$ total - (rejected members + attrited members). USD 1 is about BDT 80. Risk preference is the respondent's choice of the acceptable minimum excess monetary value of the risky option over a certainty option. Lower values indicate a greater risk tolerance. Time preference 1 is the respondent's choice of the acceptable minimum excess monetary value in 3 months that is no smaller than present monetary benefit, and Time preference 2 is the the minimum excess value in 1 year and 3 months that is no smaller than monetary benefits of 1 year from now. Lower values indicate a greater patience. If a respondent's Time preference 1 is greater than Time preference 2, the respondent is considered to be present-biased. Present bias is an indicator function that takes the value of 1 if the respondent is considered to be present-biased, 0 otherwise. Risk preference is an index where a larger number is associated with more risk tolerance. Time preference 1 is an index where a larger number is associated with greater future discounting in a 3 month time frame, and Time preference 2 is in a 1 year and 3 month time frame.

I Rejection

```
for (i in 1:13) {
  ii ← grep(TabLabelStrings[i], TabLabel1)
  cat(eval(parse(text=paste0("Tb1", ii))))
}
```

TABLE 1: PERMUTATION TEST RESULTS OF REJECTION

variables	NonRejected	Rejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.127	0.081	(9.6)	(11.2)	(12.8)
Head age	38.145	37.763	(66.9)	(67.1)	(67.3)
Household size	4.255	3.938	(1.4)	(1.5)	(1.5)
Prop. of non-textsfTraditional arms	0.830	0.556	(0.0)	(0.0)	(0.0)
Flood at baseline	0.475	0.585	(1.3)	(1.5)	(1.7)
Household asset amount	1420	1235	(7.5)	(7.5)	(7.5)
Productive asset amount	1434	932	(25.3)	(25.3)	(25.3)
Livestock value	5700	2685	(0.7)	(0.8)	(0.8)
Number of cattle holding	0.285	0.134	(0.6)	(0.7)	(0.7)
Net asset value	9114	5339	(4.8)	(4.8)	(4.8)
NetBroadValue	10080	5618	(2.2)	(2.2)	(2.2)
Risk preference	110	117	(2.1)	(2.4)	(2.7)
Time preference 1	383	383	(94.5)	(95.9)	(97.3)
Time preference 2	493	474	(13.1)	(14.1)	(15.1)
Present bias	0.451	0.519	(14.6)	(16.1)	(17.6)
n	616	160	(rate: 0.206)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000. Step-down method is used to adjust for multiple testing of a multi-factor grouping variable. The second and third columns show means of each group. For Arm, proportions of non-traditional arm between two groups are tested.

2. p-value.lower, p-value.mid, p-value.upper indicate lower-bound, mid point value, and upper-bound of the p values for observed test statistic and the null distribution, expressed in per centage units.

3. Head literate is an indicator variable of household head literacy. Head age is age of household head. Household size is total number of household members. Flood at baseline is an indicator variable of flood exposure. Household asset amount and Productive asset amount are amount of non-livestock household and productive assets, respectively, in BDT. Livestock value is BDT value of all livestock holding beyond cattle. Number of cattle holding is number of cattle holding. Net asset value is net asset values in BDT using asset items observed in all 4 rounds. Broad net asset value is net asset values in BDT for all asset items. Attrited indicates attrition rates in the household survey, and GRejected and IRejected show group rejection rates and individual rejection rates to the lending program. Non-attriting borrowers indicates the ratio of non-attriting borrowers to all borrowers. Because attrition and rejection are separate events, a household can reject and attrit, so non-attrited borrowers $\geqslant$ total - (rejected members + attrited members). USD 1 is about BDT 80.Risk preference is the respondent's choice of the acceptable minimum excess monetary value of the risky option over a certainty option. Lower values indicate a greater risk tolerance. Time preference 1 is the respondent's choice of the acceptable minimum excess monetary value in 3 months that is no smaller than present monetary benefit, and Time preference 2 is the the minimum excess value in 1 year and 3 months that is no smaller than monetary benefits of 1 year from now. Lower values indicate a greater patience. If a respondent's Time preference 1 is greater than Time preference 2, the respondent is considered to be present-biased. Present bias is an indicator function that takes the value of 1 if the respondent is considered to be present-biased, 0 otherwise.

TABLE 2: PERMUTATION TEST RESULTS OF REJECTION AMONG TRADITIONAL ARM

variables	NonRejected	Rejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.095	0.099	(79.5)	(89.7)	(100.0)
Head age	38.848	37.800	(49.8)	(50.3)	(50.8)
Household size	4.181	3.958	(31.8)	(33.1)	(34.4)
Flood at baseline	0.514	0.386	(9.0)	(10.6)	(12.2)
Household asset amount	1538	1291	(18.6)	(18.7)	(18.8)
Productive asset amount	1016	1024	(99.0)	(99.0)	(99.0)
Livestock value	6095	1714	(0.7)	(0.8)	(1.0)
Number of cattle holding	0.305	0.086	(0.7)	(0.9)	(1.0)
Net asset value	11103	4076	(1.6)	(1.6)	(1.6)
NetBroadValue	12547	4513	(0.6)	(0.6)	(0.6)
Risk preference	115	116	(74.6)	(80.8)	(87.1)
Time preference 1	376	370	(77.2)	(79.1)	(81.0)
Time preference 2	485	480	(70.7)	(75.6)	(80.5)
Present bias	0.465	0.477	(87.5)	(93.7)	(100.0)
n	105	71	(rate: 0.403)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.

2. See footnotes of TABLE 1.

Table 3: Permutation test results of rejection among non-traditional arm

variables	NonRejected	Rejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.133	0.067	(8.3)	(9.9)	(11.5)
Head age	38.000	37.733	(81.9)	(82.1)	(82.3)
Household size	4.270	3.921	(3.6)	(3.8)	(3.9)
Flood at baseline	0.467	0.742	(0.0)	(0.0)	(0.0)
Household asset amount	1400	1185	(11.3)	(11.4)	(11.4)
Productive asset amount	1521	859	(19.5)	(19.5)	(19.5)
Livestock value	5619	3544	(15.8)	(17.5)	(19.1)
Number of cattle holding	0.281	0.177	(15.7)	(17.4)	(19.0)
Net asset value	8773	6473	(37.4)	(37.4)	(37.4)
NetBroadValue	9656	6612	(24.7)	(24.7)	(24.7)
Risk preference	109	118	(2.6)	(3.1)	(3.7)
Time preference 1	385	395	(59.0)	(60.6)	(62.1)
Time preference 2	495	468	(12.6)	(13.9)	(15.2)
Present bias	0.449	0.561	(6.3)	(7.5)	(8.8)
n	511	89	(rate: 0.148)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.

2. See footnotes of Table 2.

Table 4: Permutation test results of rejecters, traditional vs. non-traditional arm

variables	NonTradArm	TradArm	p-value.lower	p-value.mid	p-value.upper
Head literate	0.067	0.099	(38.6)	(47.4)	(56.2)
Head age	37.733	37.800	(96.7)	(96.9)	(97.2)
Household size	3.921	3.958	(88.1)	(90.1)	(92.0)
Prop. of non-textsfTraditional arms	1.000	0.000	(0.0)	(0.0)	(0.0)
Flood at baseline	0.742	0.386	(0.0)	(0.0)	(0.0)
Household asset amount	1185	1291	(47.0)	(47.3)	(47.5)
Productive asset amount	859	1024	(24.8)	(24.8)	(24.8)
Livestock value	3544	1714	(17.3)	(20.5)	(23.8)
Number of cattle holding	0.177	0.086	(17.2)	(20.6)	(23.9)
Net asset value	6473	4076	(25.6)	(25.6)	(25.6)
NetBroadValue	6612	4513	(32.0)	(32.0)	(32.0)
Risk preference	118	116	(56.0)	(62.9)	(69.9)
Time preference 1	395	370	(25.2)	(26.7)	(28.2)
Time preference 2	468	480	(51.5)	(60.6)	(69.6)
Present bias	0.561	0.477	(29.6)	(34.0)	(38.4)
n	89	71	(rate: 0.444)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.

2. See footnotes of Table 2.

Table 5: Permutation test results of group rejection

variables	NonGRejected	GRejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.123	0.057	(7.7)	(9.8)	(11.9)
Head age	38.188	36.841	(28.7)	(28.8)	(29.0)
Household size	4.201	4.071	(46.4)	(47.8)	(49.2)
Prop. of non-textsfTraditional arms	0.807	0.429	(0.0)	(0.0)	(0.0)
Flood at baseline	0.490	0.571	(16.8)	(19.0)	(21.2)
Household asset amount	1397	1246	(30.4)	(30.4)	(30.4)
Productive asset amount	1357	1070	(62.7)	(62.7)	(62.7)
Livestock value	5377	2000	(3.9)	(4.3)	(4.8)
Number of cattle holding	0.269	0.100	(4.0)	(4.4)	(4.9)
Net asset value	8852	3333	(4.1)	(4.1)	(4.1)
NetBroadValue	9749	3464	(2.3)	(2.3)	(2.3)
Risk preference	111	114	(51.5)	(55.8)	(60.1)
Time preference 1	382	393	(59.3)	(61.0)	(62.7)
Time preference 2	493	454	(3.7)	(4.1)	(4.5)
Present bias	0.451	0.610	(1.3)	(1.6)	(2.0)
n	706	70	(rate: 0.090)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.

2. See footnotes of Table 1.

TABLE 6: PERMUTATION TEST RESULTS OF GROUP REJECTION AMONG TRADITIONAL ARM

variables	NonGRejected	GRejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.110	0.050	(22.2)	(29.3)	(36.5)
Head age	38.257	39.026	(67.4)	(67.7)	(68.0)
Household size	4.059	4.200	(57.7)	(59.9)	(62.0)
Flood at baseline	0.519	0.275	(0.3)	(0.5)	(0.7)
Household asset amount	1500	1257	(22.9)	(23.0)	(23.2)
Productive asset amount	984	1147	(60.4)	(60.4)	(60.4)
Livestock value	5481	500	(0.9)	(1.0)	(1.1)
Number of cattle holding	0.274	0.025	(1.0)	(1.1)	(1.2)
Net asset value	10397	2171	(1.0)	(1.0)	(1.0)
NetBroadValue	11798	2191	(0.3)	(0.3)	(0.3)
Risk preference	116	111	(34.8)	(40.0)	(45.3)
Time preference 1	369	389	(40.0)	(43.2)	(46.3)
Time preference 2	487	472	(47.2)	(52.0)	(56.9)
Present bias	0.449	0.538	(27.3)	(31.9)	(36.5)
n	136	40	(rate: 0.227)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.

2. See footnotes of TABLE 2.

TABLE 7: PERMUTATION TEST RESULTS OF GROUP REJECTION AMONG NON-TRADITIONAL ARM

variables	NonGRejected	GRejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.126	0.067	(24.7)	(33.0)	(41.3)
Head age	38.171	34.000	(2.8)	(2.8)	(2.8)
Household size	4.235	3.900	(19.6)	(20.8)	(22.1)
Flood at baseline	0.483	0.967	(0.0)	(0.0)	(0.0)
Household asset amount	1377	1221	(53.6)	(53.6)	(53.7)
Productive asset amount	1447	970	(55.9)	(55.9)	(55.9)
Livestock value	5352	5000	(85.9)	(93.0)	(100.0)
Number of cattle holding	0.268	0.250	(85.5)	(92.8)	(100.0)
Net asset value	8549	6141	(60.8)	(60.8)	(60.8)
NetBroadValue	9348	6541	(56.4)	(56.4)	(56.4)
Risk preference	110	119	(20.1)	(24.6)	(29.0)
Time preference 1	386	400	(66.3)	(70.2)	(74.2)
Time preference 2	494	420	(1.5)	(1.8)	(2.2)
Present bias	0.451	0.750	(0.5)	(0.8)	(1.1)
n	570	30	(rate: 0.050)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.

2. See footnotes of TABLE 2.

TABLE 8: PERMUTATION TEST RESULTS OF GROUP REJECTERS, TRADITIONAL VS. NON-TRADITIONAL ARM

variables	NonTradArm	TradArm	p-value.lower	p-value.mid	p-value.upper
Head literate	0.067	0.050	(62.7)	(81.4)	(100.0)
Head age	34.000	39.026	(2.7)	(2.7)	(2.8)
Household size	3.900	4.200	(34.2)	(36.6)	(39.0)
Prop. of non-textsfTraditional arms	1.000	0.000	(0.0)	(0.0)	(0.0)
Flood at baseline	0.967	0.275	(0.0)	(0.0)	(0.0)
Household asset amount	1221	1257	(88.1)	(88.4)	(88.6)
Productive asset amount	970	1147	(50.4)	(50.4)	(50.5)
Livestock value	5000	500	(0.1)	(0.7)	(1.3)
Number of cattle holding	0.250	0.025	(0.1)	(0.7)	(1.3)
Net asset value	6141	2171	(9.7)	(9.7)	(9.7)
NetBroadValue	6541	2191	(5.7)	(5.7)	(5.7)
Risk preference	119	111	(23.3)	(31.3)	(39.3)
Time preference 1	400	389	(56.7)	(67.4)	(78.0)
Time preference 2	420	472	(12.0)	(14.9)	(17.9)
Present bias	0.750	0.538	(9.3)	(12.7)	(16.0)
n	30	40	(rate: 0.571)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.

2. See footnotes of TABLE 2.

Table 9: Permutation test results of individual rejection

variables	NonIRejected	IRejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.127	0.100	(38.7)	(44.3)	(49.9)
Head age	38.145	38.494	(76.2)	(76.4)	(76.7)
Household size	4.255	3.833	(0.9)	(1.0)	(1.1)
Prop. of non-textsfTraditional arms	0.830	0.656	(0.0)	(0.0)	(0.0)
Flood at baseline	0.475	0.596	(3.0)	(3.5)	(4.0)
Household asset amount	1420	1226	(14.8)	(14.8)	(14.9)
Productive asset amount	1434	826	(16.8)	(16.8)	(16.8)
Livestock value	5700	3146	(7.7)	(8.5)	(9.2)
Number of cattle holding	0.285	0.157	(7.7)	(8.5)	(9.2)
Net asset value	9114	6921	(38.6)	(38.6)	(38.6)
NetBroadValue	10080	7317	(27.7)	(27.7)	(27.7)
Risk preference	110	120	(1.9)	(2.2)	(2.5)
Time preference 1	383	375	(64.5)	(66.0)	(67.6)
Time preference 2	493	490	(85.2)	(88.8)	(92.4)
Present bias	0.451	0.444	(90.0)	(95.0)	(100.0)
n	616	90	(rate: 0.127)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of Table 1.

Table 10: Permutation test results of individual rejection among traditional arm

variables	NonIRejected	IRejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.095	0.161	(19.0)	(26.1)	(33.1)
Head age	38.848	36.258	(21.2)	(21.3)	(21.5)
Household size	4.181	3.645	(6.1)	(6.6)	(7.2)
Flood at baseline	0.514	0.533	(83.9)	(91.9)	(100.0)
Household asset amount	1538	1360	(56.1)	(56.5)	(56.9)
Productive asset amount	1016	869	(71.7)	(71.7)	(71.8)
Livestock value	6095	3333	(24.2)	(28.4)	(32.6)
Number of cattle holding	0.305	0.167	(24.0)	(28.1)	(32.3)
Net asset value	11103	7761	(51.0)	(51.0)	(51.0)
NetBroadValue	12547	9001	(47.8)	(47.8)	(47.8)
Risk preference	115	123	(16.8)	(21.5)	(26.3)
Time preference 1	376	342	(23.9)	(25.0)	(26.0)
Time preference 2	485	492	(72.5)	(79.1)	(85.8)
Present bias	0.465	0.385	(37.7)	(44.4)	(51.2)
n	105	31	(rate: 0.228)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of Table 2.

Table 11: Permutation test results of individual rejection among non-traditional arm

variables	NonIRejected	IRejected	p-value.lower	p-value.mid	p-value.upper
Head literate	0.133	0.068	(14.9)	(18.1)	(21.2)
Head age	38.000	39.732	(22.3)	(22.4)	(22.5)
Household size	4.270	3.932	(9.2)	(9.6)	(10.1)
Flood at baseline	0.467	0.627	(2.1)	(2.4)	(2.8)
Household asset amount	1400	1174	(13.6)	(13.7)	(13.8)
Productive asset amount	1521	804	(16.0)	(16.0)	(16.0)
Livestock value	5619	3051	(13.6)	(15.3)	(17.0)
Number of cattle holding	0.281	0.153	(13.4)	(15.0)	(16.6)
Net asset value	8773	6580	(45.9)	(45.9)	(45.9)
NetBroadValue	9656	6634	(31.3)	(31.3)	(31.3)
Risk preference	109	118	(6.4)	(7.6)	(8.9)
Time preference 1	385	393	(68.3)	(70.1)	(72.0)
Time preference 2	495	489	(73.9)	(78.2)	(82.5)
Present bias	0.449	0.478	(64.1)	(69.8)	(75.5)
n	511	59	(rate: 0.104)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of Table 2.

TABLE 12: PERMUTATION TEST RESULTS OF INDIVIDUAL REJECTERS, TRADITIONAL VS. NON-TRADITIONAL ARM

variables	NonTradArm	TradArm	p-value.lower	p-value.mid	p-value.upper
Head literate	0.068	0.161	(15.7)	(21.1)	(26.5)
Head age	39.732	36.258	(21.9)	(22.0)	(22.2)
Household size	3.932	3.645	(44.5)	(46.5)	(48.4)
Prop. of non-textsfTraditional arms	1.000	0.000	(0.0)	(0.0)	(0.0)
Flood at baseline	0.627	0.533	(36.9)	(43.2)	(49.5)
Household asset amount	1174	1360	(39.9)	(40.3)	(40.8)
Productive asset amount	804	869	(68.1)	(68.1)	(68.1)
Livestock value	3051	3333	(82.3)	(91.1)	(100.0)
Number of cattle holding	0.153	0.167	(82.4)	(91.2)	(100.0)
Net asset value	6580	7761	(70.1)	(70.1)	(70.1)
NetBroadValue	6634	9001	(53.5)	(53.5)	(53.5)
Risk preference	118	123	(40.1)	(49.2)	(58.2)
Time preference 1	393	342	(10.3)	(13.1)	(16.0)
Time preference 2	489	492	(86.4)	(93.2)	(100.0)
Present bias	0.478	0.385	(32.4)	(39.8)	(47.1)
n	59	31	(rate: 0.344)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 2.

TABLE 13: PERMUTATION TEST RESULTS OF BORROWERS, CATTLE VS. NON-CATTLE ARMS

variables	NonCattleArm	CattleArm	p-value.lower	p-value.mid	p-value.upper
Head literate	0.110	0.172	(3.9)	(4.7)	(5.4)
Head age	38.325	37.642	(44.4)	(44.6)	(44.7)
Household size	4.287	4.166	(33.3)	(34.1)	(35.0)
Flood at baseline	0.479	0.463	(71.7)	(75.1)	(78.5)
Household asset amount	1349	1623	(1.2)	(1.3)	(1.3)
Productive asset amount	1561	1083	(40.1)	(40.1)	(40.1)
Livestock value	6150	4444	(14.6)	(15.7)	(16.7)
Number of cattle holding	0.308	0.222	(14.6)	(15.7)	(16.8)
Net asset value	10287	5762	(2.8)	(2.8)	(2.8)
NetBroadValue	11017	7400	(8.3)	(8.3)	(8.3)
Risk preference	110	109	(66.3)	(69.6)	(72.9)
Time preference 1	373	411	(0.6)	(0.6)	(0.6)
Time preference 2	486	512	(3.9)	(4.2)	(4.6)
Present bias	0.444	0.472	(51.7)	(54.7)	(57.8)
n	453	163	(rate: 0.265)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000. Step-down method is used to adjust for multiple testing of a multi-factor grouping variable. The second and third columns show means of each group. For Arm, proportions of non-traditional arm between two groups are tested.
2. p-value.lower, p-value.mid, p-value.upper indicate lower-bound, mid point value, and upper-bound of the p values for observed test statistic and the null distribution, expressed in per centage units.
3. Contrasts between cattle arm and other arms. See the footnote of TABLE **??** for description of variables.

TABLE 1 shows test results of independence between loan receivers and nonreceivers (group, individual rejecters) on the analysis sample of 776 members. It shows that lower head literacy, smaller household size, being affected by flood at the baseline, smaller cattle/livestock holding, and smaller net assets are correlated with opting out the offered type of lending. Smaller net assets based on broader items also show a tendency to reject a participation offer. Risk preference indicates that the minimum expected payoff to choose a risky option is greater, albeit to a small degree, for the rejecters. Time preference variables show statistically indistinguishable differences. Ratio of PresentBias is high but there is no statistically large difference between the two groups. TABLE 2 indicates that contrasts of smaller net asset holding and cattle/livestock holding are more pronounced among traditional rejecters than in the case of all rejecters of TABLE 1. It also shows that flood exposure among the rejecters is less frequent than in TABLE 1. TABLE 3 indicates that lower head literacy, smaller household size, higher flood exposure, are more pronounced among non-traditional rejecters than in the case of all rejecters of TABLE 1. Risk preference shows greater risk torelance among non-rejeceters than rejecters of the non-traditional arms. It also shows that asset and livestock holding is not statistically different between rejecters and non-rejecters. The only difference between rejecters of traditional and non-traditiona arms we observe in TABLE 4is lower flood exposure of the former. Due possibly to a small sample size, smaller asset and livestock holding of the traditional

arm rejecters is merely suggestive.

Group rejecters and non-group rejecters are compared in Table 5. Marked differences are found in arm (traditional vs. non-traditional) and net asset values and head literacy are noted. We see more PresentBias in the group-rejecters. This is difficult to understand but is consistent with the situation that the rejection decision was made because procrastination of some members can lead to loan defaults which causes a problem to the group as a whole. As we will see later, the comparison of individual rejecters and non-rejecters do not show such a difference in PresentBias. This is also consistent with such a 'group wariness' interpretation. Table 6 compares group rejecters in traditional arm and finds smaller flood exposure and lower livestock and net asset holding are associated with group rejection. Group rejecters in non-traditional arm are examined in Table 7 and younger head age, flood at baseline, and smaller household asset holding are correlated with rejection. Comparing group rejecters between traditional and non-traditional arms in Table 8, younger head age, higher flood exposure, larger net asset values and livestock holding are noted among the non-traditional group rejecters. These hint that for non-traditional arm group rejecters, it is the smaller household size and the baseline flood that may have constrained them from participation, and for traditional group rejecters, it is the low asset levels.

Acknowledging the reasons for rejection can be different, we tested the independence of each characteristics for individual rejecters (vs. participants) in Table 9. Smaller HHsize, being affected with FloodInRd1, and smaller LivestockValue, NumCows, and NetValue are associated with individual rejecters. Individual decisions not to participate may be more straightforward: Smaller household size may indicate difficulty in securing the cattle production labour in a household, being hit with a flood may have resulted in lower livestock levels that would prompt them to reconsider partaking in another livestock project. Individual rejecters exhibit smaller risk tolerance, which was not observed among the group rejecters. This also fortifies the disadvantages of having less favourable conditions in terms of household size, asset positions, and shocks.

Table 10 and Table 11 compare individual rejecters and nonrejecters in traditional arm and non-traditional arms, respectively. For traditional rejecters, livestock and other asset values are not correlated with rejection, but the values are similar to non-traditional and higher p values may be due to smaller sample size. For non-traditional arm rejecters, household size and flood exposure are correlated. Comparison of individual rejecters between traditional and non-traditional arms show no detectable difference (Table 12). This suggests that indvidual rejecters in all arms were constrained with small household size and small asset holding. In Table 13, we compare if the cattle arm participants (borrowers) differ from participants in other arms at the baseline. It is worth noting that partcipants of cattle arm differ from other arms in having less cattle rearing experience as observed in smaller initial cattle holding (p value = .156) and in having lower net asset values (p value = .058), weakly hinting that the cattle arm's managerial support programs may have encouraged participation of inexperienced or lower asset holders.

II Attrition

```
HeaderDescription[11:16] ← c(
   "Permutation test results of attrition among borrowers",
     "Permutation test results of attrition among traditional arm borrowers",
     "Permutation test results of attrition among non-traditional arm borrowers",
     "Permutation test results of non-attriting members of traditional and non-traditional
     "Permutation test results of non-attriting members of cattle and all other arm borrow
     "Permutation test results of non-attriting members of cattle and large grace arm borr
    )
TabLabel1 ← paste("tab1", HeaderDescription)

TabLabelStrings[19:20] ← c("active.*race arms$", "acti.*other arms$")
```

```
for (i in 14:length(TabLabelStrings)) {
  ii ← grep(TabLabelStrings[i], TabLabel1)
  if (grepl("active status", TabLabelStrings[i])){
   tblatt ← eval(parse(text=paste0("Tb1", ii)))
   cat(gsub("active\\\\", "attrited or rejected (NonActive) and other (Active) borrowers\\
     tblatt))
   rm(tblatt)
  } else
  if (grepl("active ra|acti.*o", TabLabelStrings[i])) {
   tblatt ← eval(parse(text=paste0("Tb1", ii)))
   cat(#gsub("active members", "non-active borrowers",
     tblatt
     #)
     )
    rm(tblatt)
  } else
   cat(eval(parse(text=paste0("Tb1", ii))))
}
```

TABLE 14: PERMUTATION TEST RESULTS OF ATTRITION

variables	NonAttrited	Attrited	p-value.lower	p-value.mid	p-value.upper
Head literate	0.115	0.130	(60.9)	(67.0)	(73.1)
Head age	37.996	38.598	(59.1)	(59.3)	(59.5)
Household size	4.178	4.272	(54.2)	(55.5)	(56.8)
Prop. of non-textsfTraditional arms	0.789	0.652	(0.0)	(0.0)	(0.0)
Flood at baseline	0.493	0.527	(50.2)	(54.0)	(57.7)
Household asset amount	1369	1515	(29.2)	(29.4)	(29.5)
Productive asset amount	1213	2239	(10.9)	(10.9)	(10.9)
Livestock value	5124	5000	(92.5)	(96.3)	(100.0)
Number of cattle holding	0.256	0.250	(92.5)	(96.3)	(100.0)
Net asset value	8309	8974	(79.4)	(79.4)	(79.4)
NetBroadValue	9072	10432	(59.9)	(59.9)	(59.9)
Risk preference	110	128	(0.0)	(0.0)	(0.1)
Time preference 1	382	404	(28.2)	(29.4)	(30.7)
Time preference 2	490	486	(82.7)	(87.0)	(91.3)
Present bias	0.459	0.531	(30.1)	(33.7)	(37.4)
n	684	92	(rate: 0.119)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 1.

TABLE 15: PERMUTATION TEST RESULTS OF ATTRITION AMONG TRADITIONAL ARM

variables	NonAttrited	Attrited	p-value.lower	p-value.mid	p-value.upper
Head literate	0.118	0.000	(1.8)	(3.2)	(4.6)
Head age	38.497	38.125	(84.8)	(85.2)	(85.6)
Household size	4.167	3.750	(13.7)	(14.7)	(15.6)
Flood at baseline	0.479	0.387	(32.6)	(37.7)	(42.8)
Household asset amount	1373	1700	(17.5)	(17.7)	(17.9)
Productive asset amount	1027	982	(88.0)	(88.0)	(88.0)
Livestock value	4722	2581	(28.0)	(33.3)	(38.5)
Number of cattle holding	0.236	0.129	(28.2)	(33.4)	(38.6)
Net asset value	8223	6979	(76.2)	(76.2)	(76.2)
NetBroadValue	9232	7938	(75.1)	(75.1)	(75.1)
Risk preference	113	131	(1.3)	(1.6)	(1.9)
Time preference 1	371	391	(49.8)	(54.6)	(59.4)
Time preference 2	485	470	(47.6)	(53.9)	(60.2)
Present bias	0.462	0.522	(50.1)	(57.7)	(65.3)
n	144	32	(rate: 0.182)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 2.

TABLE 16: PERMUTATION TEST RESULTS OF ATTRITION AMONG NON-TRADITIONAL ARM

variables	NonAttrited	Attrited	p-value.lower	p-value.mid	p-value.upper
Head literate	0.115	0.200	(3.6)	(5.1)	(6.5)
Head age	37.862	38.850	(47.0)	(47.2)	(47.4)
Household size	4.181	4.550	(6.1)	(6.4)	(6.7)
Flood at baseline	0.497	0.600	(10.2)	(12.0)	(13.8)
Household asset amount	1368	1410	(80.8)	(81.1)	(81.4)
Productive asset amount	1263	2879	(9.5)	(9.5)	(9.5)
Livestock value	5232	6531	(50.1)	(53.4)	(56.7)
Number of cattle holding	0.262	0.327	(49.8)	(53.1)	(56.3)
Net asset value	8330	10105	(57.7)	(57.7)	(57.7)
NetBroadValue	9033	11845	(38.3)	(38.3)	(38.3)
Risk preference	110	125	(2.2)	(2.8)	(3.4)
Time preference 1	385	415	(27.3)	(29.2)	(31.1)
Time preference 2	491	500	(66.3)	(71.7)	(77.1)
Present bias	0.458	0.538	(43.2)	(49.0)	(54.8)
n	540	60	(rate: 0.100)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 2.

TABLE 17: PERMUTATION TEST RESULTS OF ATTRITERS OF TRADITIONAL AND NON-TRADITIONAL ARMS

variables	NonTradArm	TradArm	p-value.lower	p-value.mid	p-value.upper
Head literate	0.200	0.000	(0.3)	(0.5)	(0.7)
Head age	38.850	38.125	(76.8)	(77.2)	(77.6)
Household size	4.550	3.750	(2.1)	(2.3)	(2.6)
Prop. of non-textsfTraditional arms	1.000	0.000	(0.0)	(0.0)	(0.0)
Flood at baseline	0.600	0.387	(4.8)	(6.2)	(7.5)
Household asset amount	1410	1700	(38.5)	(38.9)	(39.3)
Productive asset amount	2879	982	(87.3)	(87.4)	(87.4)
Livestock value	6531	2581	(17.2)	(20.5)	(23.8)
Number of cattle holding	0.327	0.129	(17.0)	(20.3)	(23.6)
Net asset value	10105	6979	(78.3)	(78.3)	(78.3)
NetBroadValue	11845	7938	(69.6)	(69.6)	(69.6)
Risk preference	125	131	(39.1)	(48.6)	(58.1)
Time preference 1	415	391	(50.4)	(57.6)	(64.8)
Time preference 2	500	470	(29.8)	(36.3)	(42.9)
Present bias	0.538	0.522	(77.7)	(88.8)	(100.0)
n	60	32	(rate: 0.348)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 2.

TABLE 18: PERMUTATION TEST RESULTS OF ACTIVE STATUS

variables	NonActive	Active	p-value.lower	p-value.mid	p-value.upper
Head literate	0.104	0.123	(38.9)	(42.7)	(46.5)
Head age	37.835	38.159	(68.8)	(69.0)	(69.1)
Household size	4.072	4.236	(14.9)	(15.3)	(15.7)
Prop. of non-textsfTraditional arms	0.581	0.850	(0.0)	(0.0)	(0.0)
Flood at baseline	0.548	0.477	(6.6)	(7.2)	(7.9)
Household asset amount	1300	1414	(22.1)	(22.2)	(22.2)
Productive asset amount	1482	1273	(69.0)	(69.0)	(69.0)
Livestock value	3714	5642	(5.0)	(5.4)	(5.8)
Number of cattle holding	0.186	0.282	(5.0)	(5.4)	(5.8)
Net asset value	7015	8877	(27.9)	(27.9)	(27.9)
NetBroadValue	7751	9743	(25.2)	(25.2)	(25.2)
Risk preference	120	109	(0.0)	(0.0)	(0.0)
Time preference 1	388	382	(60.1)	(61.2)	(62.3)
Time preference 2	476	494	(13.7)	(14.6)	(15.4)
Present bias	0.520	0.446	(7.9)	(8.7)	(9.5)
n	222	554	(rate: 0.714)		

Source: Estimated with GUK administrative and survey data.

Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 1.

TABLE 19: PERMUTATION TEST RESULTS OF ACTIVE MEMBERS OF CATTLE AND LARGE GRACE ARMS

variables	NonCattleArm	CattleArm	p-value.lower	p-value.mid	p-value.upper
Head literate	0.106	0.150	(23.6)	(27.1)	(30.6)
Head age	38.481	37.973	(64.4)	(64.7)	(64.9)
Household size	4.181	4.102	(57.3)	(58.9)	(60.4)
Flood at baseline	0.352	0.459	(4.6)	(5.5)	(6.3)
Household asset amount	1323	1657	(1.9)	(1.9)	(2.0)
Productive asset amount	1535	1105	(29.9)	(29.9)	(29.9)
Livestock value	5375	3425	(12.5)	(13.8)	(15.1)
Number of cattle holding	0.269	0.171	(12.5)	(13.8)	(15.1)
Net asset value	8666	5236	(12.4)	(12.4)	(12.4)
NetBroadValue	8972	7038	(40.5)	(40.5)	(40.5)
Risk preference	112	108	(24.3)	(26.4)	(28.6)
Time preference 1	373	412	(2.0)	(2.2)	(2.3)
Time preference 2	479	515	(2.2)	(2.5)	(2.8)
Present bias	0.462	0.466	(90.9)	(95.4)	(100.0)
n	160	147	(rate: 0.479)		

Source: Estimated with GUK administrative and survey data.
Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 2.

TABLE 20: PERMUTATION TEST RESULTS OF ACTIVE MEMBERS OF CATTLE AND ALL OTHER ARMS

variables	NonCattleArm	CattleArm	p-value.lower	p-value.mid	p-value.upper
Head literate	0.113	0.150	(24.6)	(27.5)	(30.4)
Head age	38.226	37.973	(78.6)	(78.8)	(79.0)
Household size	4.285	4.102	(16.6)	(17.1)	(17.7)
Flood at baseline	0.484	0.459	(56.1)	(59.5)	(62.9)
Household asset amount	1330	1657	(0.5)	(0.5)	(0.5)
Productive asset amount	1334	1105	(45.9)	(45.9)	(45.9)
Livestock value	6437	3425	(1.4)	(1.6)	(1.7)
Number of cattle holding	0.322	0.171	(1.5)	(1.7)	(1.8)
Net asset value	10152	5236	(1.5)	(1.5)	(1.5)
NetBroadValue	10691	7038	(7.4)	(7.4)	(7.4)
Risk preference	109	108	(64.8)	(68.2)	(71.6)
Time preference 1	371	412	(0.4)	(0.5)	(0.5)
Time preference 2	486	515	(2.8)	(3.0)	(3.3)
Present bias	0.439	0.466	(56.2)	(59.5)	(62.8)
n	407	147	(rate: 0.265)		

Source: Estimated with GUK administrative and survey data.
Notes: 1. R's package coin is used for baseline mean covariates to conduct approximate permutation tests. Number of repetition is set to 100000.
2. See footnotes of TABLE 2.

TABLE 14 shows results from tests of independence between attriters and nonattriters. Attrition is defined as attrition from household surveys, not from the lending program. We see the moderate rate of attrition is not correlated with household level characteristicsat the conventional p value level. Productive asset amounts seem to differ between attriters and nonattriters at $p = .105$, with the former being larger than the latter. This positive attrition selection can cause underestimation of impacts, if the asset values are positively correlated with entrepreneurial capacity. We also see that the attriters are less risk tolerant in terms of minimum expected payoff to choose a risky option in RiskPrefVal. TABLE 15 shows attrition in the traditional arm. Household heads of attriters are relatively less literate than nonattriters. We observe the traditional arm attriters are less risk tolerant the nonattriters. TABLE 16 compares attriters and nonattriters in the non-traditional arm. Unlike traditional arm attriters, non-traditional arm attriters have more literate household heads, have a larger household size, are more exposed to floods, and have larger productive assets. The traditional arm attriters may be less entrepreneurial, if anything, so their attrition may upwardly bias the positive gains of the arm, hence understate the impacts of non-traditional arm. These are explicitly shown in TABLE 17 where we compare attriters of traditional and non-traditional arms. Overall, attrition may have attenuated the impacts but is not likely to have inflated them.[†] We observe the non-traditional arm attriters are also less risk tolerant than the nonattriters.

[†] So one can employ the Lee bounds for stronger results, but doing so will give us less precision and require more assumptions. We will not use the Lee bounds [we can show them if necessary].

For the microfinance institutions (MFIs), attrition of the loan receiving members poses a threat to their business continuation. Financial institutions often use observable characteristics, such as collateralisable assets, and easily surveyed chracteristics, such as job experiences and schooling of borrowers, and are likely to lend if the assets levels are greater and the borrowers have relevant job experiences and more schooling. We first examine if such screening variables have any predictive power in terms of loan rejection or borrower attrition under our lending. Table 18 compares potential MFI targets (nonattriting borrowers, noted as Active) vs. non-targets (attriting borrowers or loan rejecters, noted as NonActive) in all arms. It shows potential targets at the baseline have larger values in livestock and greater number of cattle, and are less affected by the flood, which conforms the conventional wisdom of lenders in using these aspects in their loan decisions. We also see that more risk torelant members are likely to be borrowers and do not attrit. Next, we examine if the relationship of having "less favourable" values in these characteristics and attrition is mitigated under various loan characteristics. In Table 19, we restrict our attention to the potential MFI targets, or the nonattriting borrowers, and compare between cattle and large grace arms, whose difference is efffectively the presence of managerial supports that the former provides. Comparing against the large grace arm, nonattriting borrowers of the cattle arm are more exposed to the flood (p = .055), have less productive assets (p = .003), have lower net asset values (p = .046), and have fewer livestock (p = .139). This shows that the smaller livestock holders or individuals with less experienced in livestock are encouraged to participate and continue to operate in the cattle arm that has a managerial support program, with all other features being equal. This is consistent with our analysis of participation in Table 13 which weakly hints that the cattle arm's managerial support programs may have encouraged participation of inexperienced or lower asset holders. This also underscores our interpretation that the current impact estimates may be downwardly biased, if any, as people who would otherwise attrit or reject in the cattle arm stayed on. This result is confirmed with lower p values due to a larger sample size when we compare the nonattriting borrowers between cattle arm with all other arms in Table 20. At the baseline, cattle arm nonattriting borrowers have smaller baseline livestock holding (p value = .016) and smaller baseline net asset holding (p value = .007) than other arms' nonattriting borrowers.