DAR F21 Project Status

DeFi

Soumya Mishra

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Contents


```
#load Rds (binary version of csv file) into dataframe
# Assumes this notebook is in: ~/IDEA-Blockchain/DefiResearch/StudentNotebooks/Assignment02
df<-read_rds('../../Data/transactions.Rds')

# Let's take a quick look at the first few observation
head(df)
```

```
##       amount borrowRate borrowRateMode   onBehalfOf         pool reserve
## 1   41501.63   6.274937       Variable 8.502518e+47 1.034668e+48     DAI
## 2 7000000.00   2.589628       Variable 4.635974e+47 1.034668e+48    USDT
## 3   15000.00   8.802541       Variable 3.735263e+47 1.034668e+48    USDC
## 4    8193.19  48.747052         Stable 6.896232e+47 1.034668e+48    USDC
## 5   11000.00   3.225055       Variable 1.089455e+48 1.034668e+48    USDT
## 6   40000.00   5.739208       Variable 2.178337e+47 1.034668e+48    USDT
##    timestamp         user   type reservePriceETH reservePriceUSD  amountUSD
## 1 1621340435 8.502518e+47 borrow    2.852900e+14       0.9948044   41286.00
## 2 1622477822 4.635974e+47 borrow    3.812835e+14       1.0000000 7000000.00
## 3 1619775984 3.735263e+47 borrow    3.611000e+14       1.0043389   15065.08
## 4 1615481632 6.896232e+47 borrow    5.562201e+14       0.9993909    8188.20
## 5 1626914745 1.089455e+48 borrow    4.971100e+14       1.0000000   11000.00
## 6 1620936688 2.178337e+47 borrow    2.725248e+14       1.0000000   40000.00
##   collateralAmount collateralReserve principalAmount principalReserve
## 1               NA                                NA
## 2               NA                                NA
## 3               NA                                NA
## 4               NA                                NA
## 5               NA                                NA
## 6               NA                                NA
##   reservePriceETHPrincipal reservePriceUSDPrincipal reservePriceETHCollateral
## 1                       NA                       NA                        NA
## 2                       NA                       NA                        NA
## 3                       NA                       NA                        NA
## 4                       NA                       NA                        NA
## 5                       NA                       NA                        NA
## 6                       NA                       NA                        NA
##   reservePriceUSDCollateral amountUSDPincipal amountUSDCollateral
```

```
## 1                          NA                NA                  NA
## 2                          NA                NA                  NA
## 3                          NA                NA                  NA
## 4                          NA                NA                  NA
## 5                          NA                NA                  NA
## 6                          NA                NA                  NA
##   borrowRateModeFrom borrowRateModeTo stableBorrowRate variableBorrowRate
## 1                                                  NA                 NA
## 2                                                  NA                 NA
## 3                                                  NA                 NA
## 4                                                  NA                 NA
## 5                                                  NA                 NA
## 6                                                  NA                 NA
```

```
#load borrows
borrow.df<-df%>% filter(type=="borrow")%>%
  select(user, timestamp, amountUSD)
head(borrow.df)
```

```
##           user  timestamp  amountUSD
## 1 8.502518e+47 1621340435   41286.00
## 2 4.635974e+47 1622477822 7000000.00
## 3 3.735263e+47 1619775984   15065.08
## 4 6.896232e+47 1615481632    8188.20
## 5 1.089455e+48 1626914745   11000.00
## 6 2.178337e+47 1620936688   40000.00
```

```
#load repays
repay.df<-df%>% filter(type=="repay")%>%
  select(user, timestamp, amountUSD)
head(borrow.df)
```

```
##           user  timestamp  amountUSD
## 1 8.502518e+47 1621340435   41286.00
## 2 4.635974e+47 1622477822 7000000.00
## 3 3.735263e+47 1619775984   15065.08
## 4 6.896232e+47 1615481632    8188.20
## 5 1.089455e+48 1626914745   11000.00
## 6 2.178337e+47 1620936688   40000.00
```

```
#create table for borrow repay
borrowRepay <- left_join(borrow.df,repay.df,by="user")%>%
  arrange(user)%>%
  rename(borrowTime=timestamp.x)%>%
  rename(repayTime = timestamp.y)%>%
  rename(borrowAmt = amountUSD.x)%>%
  rename(repayAmt = amountUSD.y)%>%
  mutate(timeDiff = repayTime-borrowTime)%>%
  mutate(amtPercent = 100*repayAmt/borrowAmt)%>%
  filter(timeDiff>0)

head(borrowRepay)
```

```
##           user borrowTime  borrowAmt  repayTime repayAmt timeDiff amtPercent
## 1 6.663597e+34 1622302530 44815.1502 1622568103 61540.53   265573  137.32082
## 2 6.663597e+34 1622302530 44815.1502 1622335351 42497.56    32821   94.82857
## 3 6.663597e+34 1622545243 62537.4385 1622568103 61540.53    22860   98.40590
```

```
## 4 1.358443e+37 1627228884  1687.9211 1627464322  1163.21   235438   68.91378
## 5 1.358443e+37 1627248073   363.2541 1627464322  1163.21   216249  320.21947
## 6 3.732290e+40 1622033167 53663.6642 1622727454 19970.94   694287   37.21502
```

```
#load deposits
deposits.df<-df%>% filter(type=="deposit")%>%
  select(user, timestamp, amountUSD)
head(deposits.df)
```

```
##           user  timestamp    amountUSD
## 1 2.283965e+47 1626855185 1.304095e+00
## 2 1.168069e+48 1627601050 1.195084e-15
## 3 1.168069e+48 1628959994 1.504533e-12
## 4 6.746263e+47 1618692791 7.504617e+03
## 5 5.509841e+47 1610390681 2.799124e+04
## 6 1.168069e+48 1627178698 3.858521e-12
```

```
#load redeems
redeem.df<-df%>% filter(type=="redeem")%>%
  select(user, timestamp,amountUSD)
head(redeem.df)
```

```
##           user  timestamp    amountUSD
## 1 1.366513e+48 1619717013 2.093817e+06
## 2 1.369699e+48 1626670785 9.498922e+01
## 3 5.688464e+47 1624224687 2.007690e+04
## 4 2.616844e+46 1623371599 2.002713e+04
## 5 1.436485e+48 1628694237 9.520282e+05
## 6 1.202126e+48 1611177170 3.556651e+03
```

```
#create table for redeems and deposits
redeemDeposit <- left_join(deposits.df, redeem.df,by="user")%>%
  arrange(user)%>%
  rename(depositTime=timestamp.x)%>%
  rename(redeemTime = timestamp.y)%>%
  rename(depositAmt = amountUSD.x)%>%
  rename(redeemAmt = amountUSD.y)%>%
  mutate(amtPercent = 100*redeemAmt/depositAmt)%>%
  mutate(timeDiff = depositTime-redeemTime)%>%
  filter(timeDiff>0)%>%
  filter(amtPercent>0)
head(redeemDeposit)
```

```
##           user depositTime   depositAmt redeemTime    redeemAmt amtPercent
## 1 2.577533e+33  1619480176 5.263387e-16 1619287347 5.568063e-16   105.7886
## 2 2.577533e+33  1619480176 5.263387e-16 1617908913 8.336109e-16   158.3792
## 3 2.577533e+33  1619480176 5.263387e-16 1618136199 8.622652e-16   163.8233
## 4 2.577533e+33  1619480176 5.263387e-16 1617829361 9.051789e-16   171.9765
## 5 2.577533e+33  1619480176 5.263387e-16 1615913946 8.103306e-16   153.9561
## 6 2.577533e+33  1619480176 5.263387e-16 1616141439 1.179976e-15   224.1857
##   timeDiff
## 1   192829
## 2  1571263
## 3  1343977
## 4  1650815
## 5  3566230
```

```
## 6  3338737
```

```
#load liquidation data
liquidation.df<-df%>% filter(type=="liquidation")%>%
  select(user, timestamp)
head(liquidation.df)
```

```
##           user  timestamp
## 1 2.976865e+47 1626124715
## 2 3.748214e+47 1619145033
## 3 1.130833e+48 1621319875
## 4 9.560356e+45 1614324006
## 5 6.451374e+45 1621788289
## 6 1.460589e+48 1621429473
```

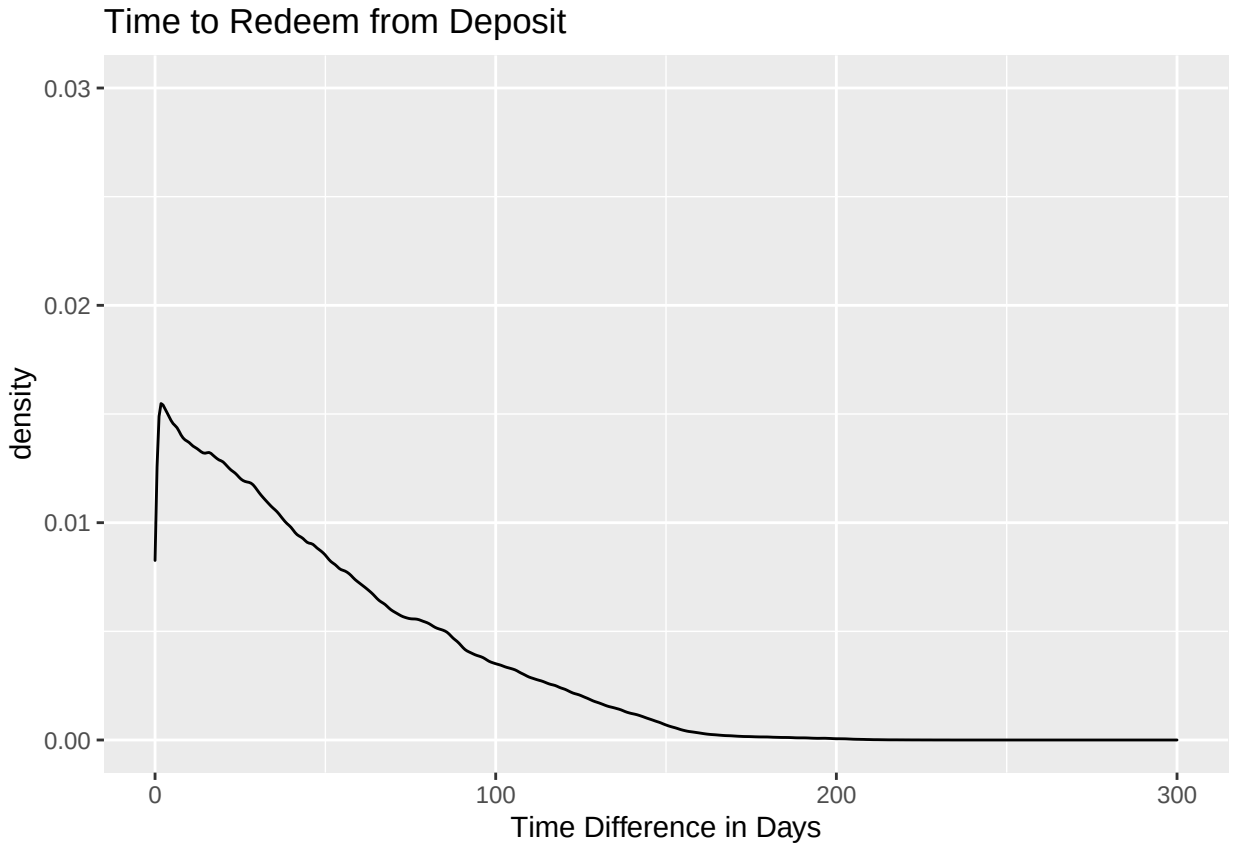
```
#load borrows
borrow.df<-df%>% filter(type=="borrow")%>%
  select(onBehalfOf, timestamp)%>%
  rename(user = onBehalfOf)
head(borrow.df)
```

```
##           user  timestamp
## 1 8.502518e+47 1621340435
## 2 4.635974e+47 1622477822
## 3 3.735263e+47 1619775984
## 4 6.896232e+47 1615481632
## 5 1.089455e+48 1626914745
## 6 2.178337e+47 1620936688
```

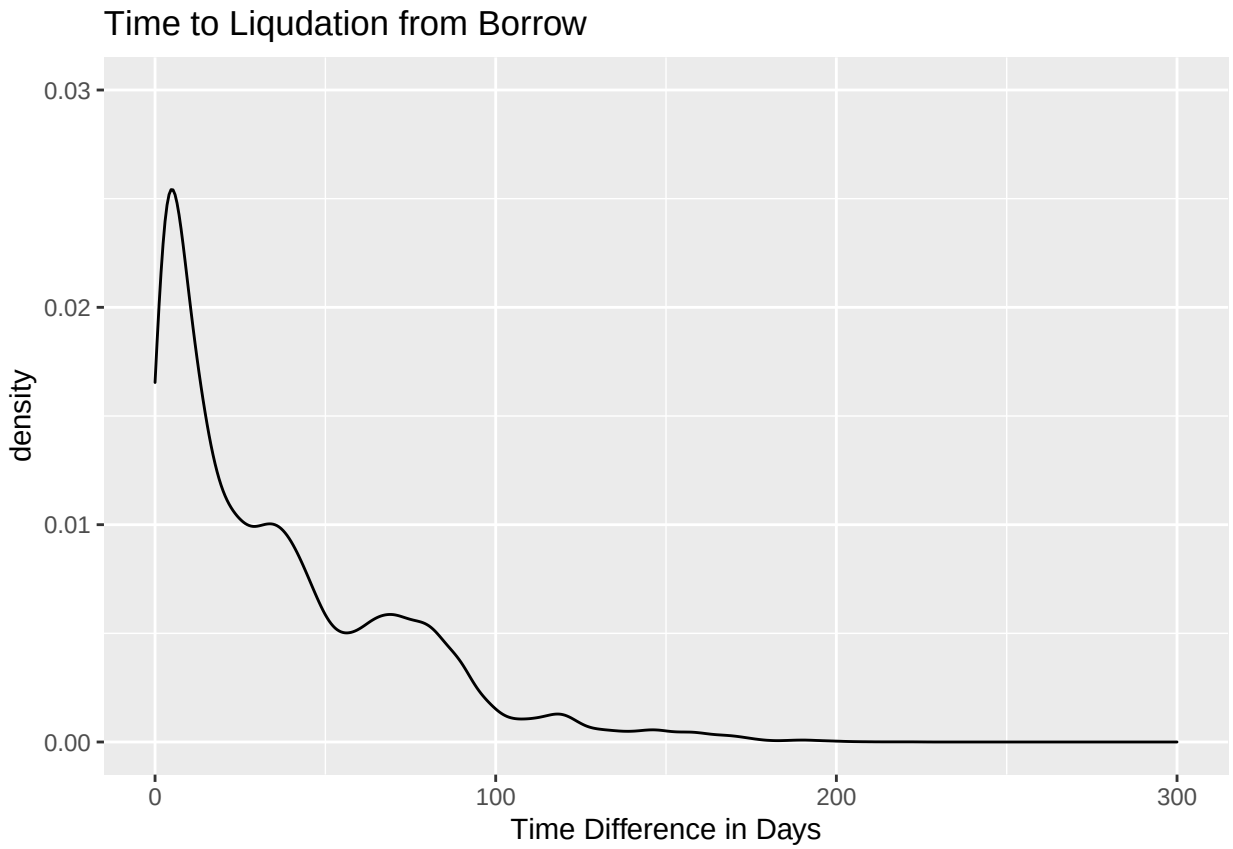
```
#join table
liqTable <- left_join(borrow.df,liquidation.df,by="user")%>%
  arrange(user)%>%
  rename(borrowTime=timestamp.x)%>%
  rename(liquidationTime = timestamp.y)%>%
  mutate(timeDiff = borrowTime-liquidationTime)%>%
  filter(timeDiff>0)

head(liqTable)
```

```
##           user borrowTime liquidationTime timeDiff
## 1 1.325103e+44 1623286150      1621468415  1817735
## 2 1.325103e+44 1623286150      1621398995  1887155
## 3 1.325103e+44 1623286150      1621426665  1859485
## 4 1.325103e+44 1625426662      1621468415  3958247
## 5 1.325103e+44 1625426662      1621398995  4027667
## 6 1.325103e+44 1625426662      1621426665  3999997
```

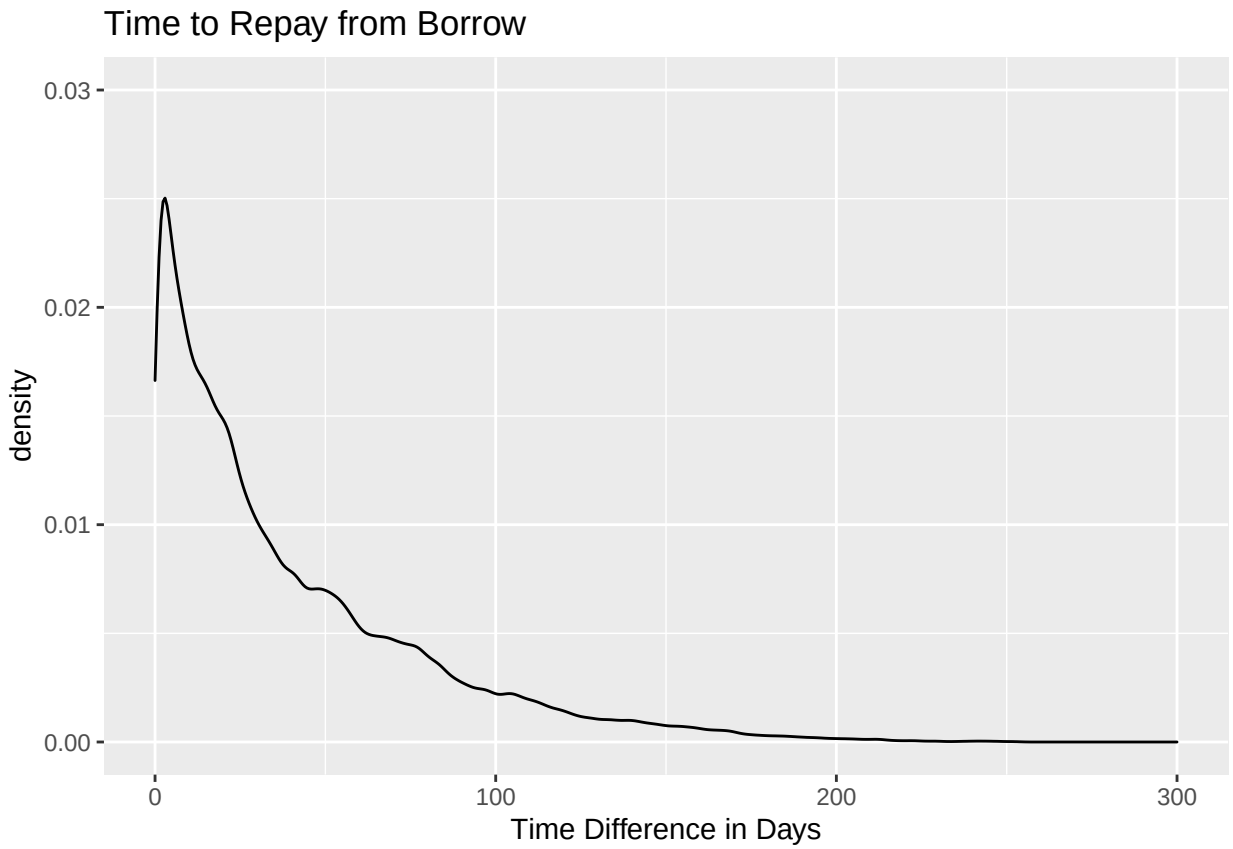
```
# Basic density for time to redeem
p <- ggplot(redeemDeposit, aes(x=timeDiff/86400)) +
  xlim(0,300) +
  ylim(0,0.03)+
  xlab("Time Difference in Days")+
  geom_density()+
  ggtitle("Time to Redeem from Deposit")
p
```



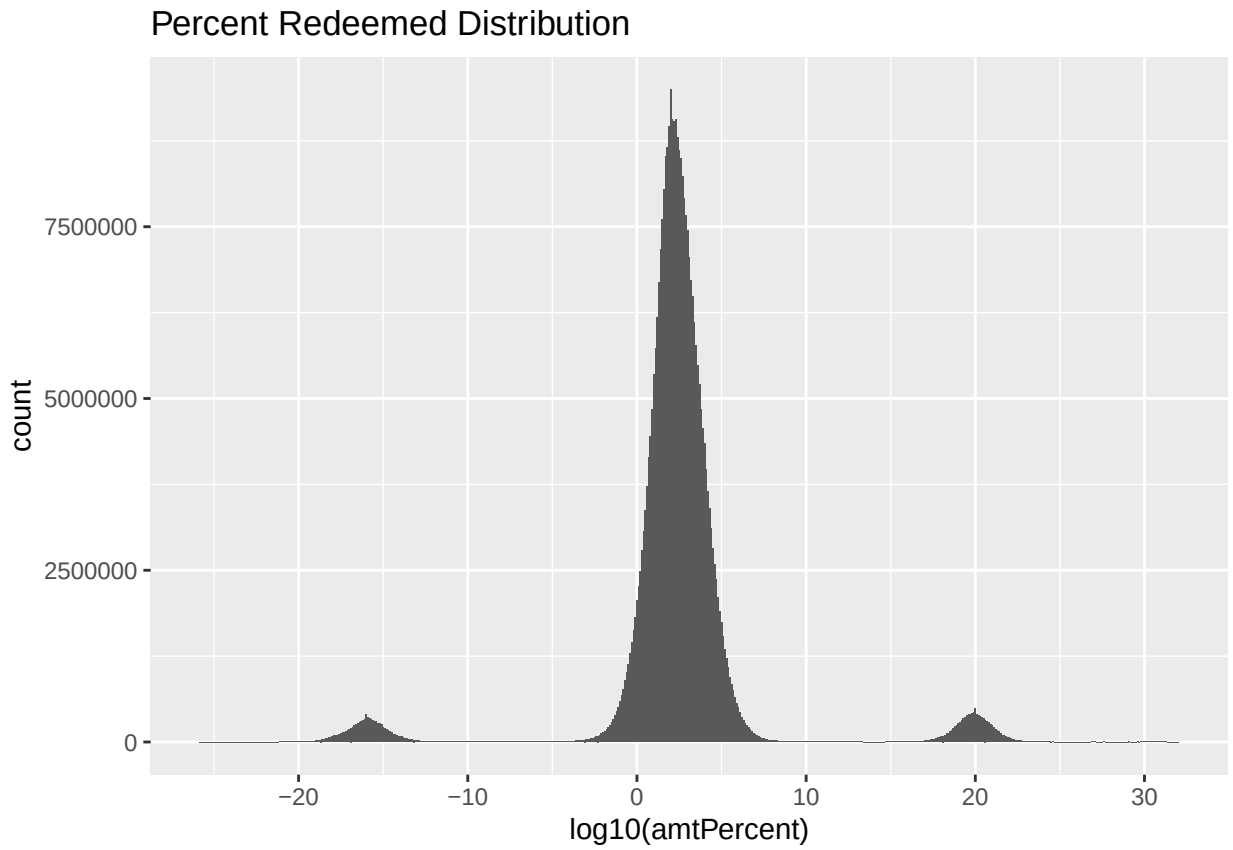

```
# Basic density for liquidation
p <- ggplot(liqTable, aes(x=timeDiff/86400)) +
  xlim(0,300) +
  ylim(0,0.03)+
  xlab("Time Difference in Days")+
  geom_density()+
  ggtitle("Time to Liqudation from Borrow")
p
```



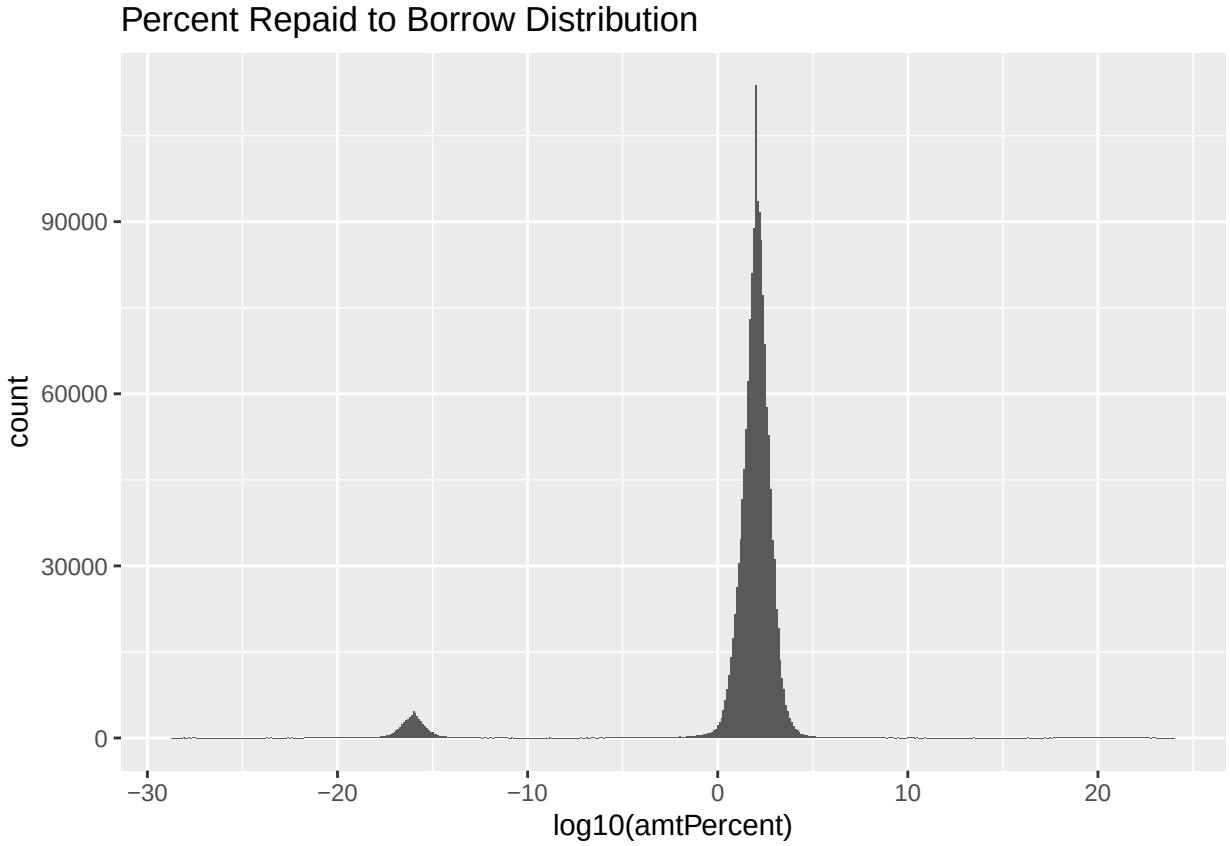

```
# Basic density for repayment
p <- ggplot(borrowRepay, aes(x=timeDiff/86400)) +
  xlab("Time Difference in Days")+
  xlim(0,300) +
  ylim(0,0.03)+
  geom_density()+
  ggtitle("Time to Repay from Borrow")
p
```




```
# Basic density of percent redeemed from Deposit

p <- ggplot(redeemDeposit, aes(x=log10(amtPercent))) +
  geom_histogram(binwidth=.1)+
  ggtitle("Percent Redeemed Distribution")
p
```




```
# Basic density of percent repaid to borrow

p <- ggplot(borrowRepay, aes(x=log10(amtPercent))) +
  geom_histogram(binwidth=.1)+
  ggtitle("Percent Repaid to Borrow Distribution")
p
```



Weekly Work Summary

- RCS ID: mishrs4
- Project Name: Defi
- Summary of work since last week

https://docs.google.com/presentation/d/1eVkf-xFs-Wm57odNED6eebXvjaKUZdA-JZ2O7r2B7Co/edit#slide=id.gf8d196e8cf_0_4

https://docs.google.com/presentation/d/1vOsP50vJIBxt_PH6GH7CHy2uFPmFkKMDnyWyr24cPk8/edit#slide=id.p

Personal Contribution

I graphed the distribution of how long it took for a repayment, redeem, or liquidation to compare the different transaction types and the time they each take

Discussion of Primary Findings

The main question I was looking to answer is "How well does DeFi replicate traditional finance? How do the transaction types differ?

I found liquidation was most likely to occur the fastest, then redeemption, then repayment of a borrow.

Currently I have analyzed how the time it takes to repay an amount borrowed looks over time, the time it takes to redeem an amount deposited looks over time, and the time it takes to reach liquidation.

I also graphed the percent redeemed and repaied to compare the two and it seems there is a lot more of a spread for redeeming than repaying.