

On the left side of the slide, there are four large, overlapping circles in bright blue, dark blue, pink, and orange, creating a decorative background element.

# Payoff

**OC R User Group  
Lending Club Cash Flow in R  
27 October 2016**

# EXPECTATIONS

CONVERSATION

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PROBLEM & SOLUTION

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R SNIPPETS & OUTPUTS

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R-MARKDOWN POSTED ON GROUP

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# WARNINGS

I believe in pipes with the same fanatical vigor that some people believe in God.

- Bryan Travis Smith

# LENDING DATA: PROBLEM STATEMENT

I am investing in Lending Club notes, and I want to generate expected cash flows for my investment.

Currently I am limiting myself to grade A loans with 36 months terms.

# AGENDA

LENDING CLUB DATA

CASHFLOW

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CASHFLOW WITH CHARGEOFF

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CASHFLOW WITH CHARGEOFF & PREPAYMENT

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# LENDING DATA: EXAMPLE

loan\_amnt - 2500  
funded\_amnt - 2500  
funded\_amnt\_inv - 2500  
term - 60 months  
int\_rate - 15.27%  
installment - 59.83  
grade - C  
sub\_grade - C4  
emp\_title - Ryder  
emp\_length - < 1 year  
home\_ownership - RENT  
annual\_inc - 30000  
verification\_status - Source Verified  
issue\_d - Dec-2011  
loan\_status - Charged Off  
pymnt\_plan - n  
url - https://lendingclub.com/browse/loanDetail.action?loan\_id=1077430  
title - bike  
zip\_code - 309xx  
addr\_state - GA

dti - 1  
delinq\_2yrs - 0  
earliest\_cr\_line - Apr-1999  
fico\_range\_low - 740  
fico\_range\_high - 744  
inq\_last\_6mths - 5  
mths\_since\_last\_delinq - NA  
mths\_since\_last\_record - NA  
open\_acc - 3  
pub\_rec - 0  
revol\_bal - 1687  
revol\_util - 9.4%  
total\_acc - 4  
initial\_list\_status - f  
out\_prncp - 0  
out\_prncp\_inv - 0  
total\_pymnt - 1008.71  
total\_pymnt\_inv - 1008.71  
total\_rec\_prncp - 456.46  
total\_rec\_int - 435.17  
total\_rec\_late\_fee - 0

recoveries - 117.08  
collection\_recovery\_fee - 1.11  
last\_pymnt\_d - Apr-2013  
last\_pymnt\_amnt - 119.66  
next\_pymnt\_d -  
last\_credit\_pull\_d - Sep-2013  
last\_fico\_range\_high - 534  
last\_fico\_range\_low - 530

desc - I plan to use this money to finance the motorcycle i am looking at. I plan to have it paid off as soon as possible/when i sell my old bike. I only need this money because the deal im looking at is too good to pass up. I have finished college with an associates degree in business and its taking me places

<https://www.lendingclub.com/info/download-data.action>

# LENDING CLUB: GRADE A - 36 MONTHS

```
library(dplyr)
library(reshape2)
library(ggplot2)
library(zoo)
library(stringr)
library(DT)

load("/opt/science/Datasets/LendingClub/2016-06-30/lcCombined.RData")

lcA <- lc %>% filter(term == " 36 months", grade == "A")
```

<https://www.lendingclub.com/info/download-data.action>

# AGENDA

LENDING CLUB DATA

CASHFLOW

CASHFLOW WITH CHARGEOFF

---

CASHFLOW WITH CHARGEOFF & PREPAYMENT

---



# FIX TERM LOANS

```
payment_value <- function(loan_amount,interest_rate,term_number) {  
  loan_amount*interest_rate/12/(1 - (1+interest_rate/12)^(-1*term_number))  
}  
  
get_amortization <- function(term_number,interest_rate){  
  amortization <- data.frame(statement=seq(0,term_number,1),  
    payment=c(0,rep(payment_value(1,interest_rate,term_number),term_number)),  
    interest_payment = 0,  
    principal_payment=0,  
    start_balance=0,  
    end_balance=1)  
  
  for(i in (1:term_number+1)){  
    amortization[i,'start_balance'] = amortization[i-1,'end_balance']*(1+interest_rate/12)  
    amortization[i,'interest_payment'] = interest_rate*amortization[i-1,'end_balance']/12  
    amortization[i,'principal_payment'] = amortization[i,'payment'] - amortization[i,'interest_payment']  
    amortization[i,'end_balance'] = amortization[i,'start_balance']-amortization[i,'payment']  
  }  
  amortization[term_number+1,'end_balance']=0  
  return(amortization)  
}  
  
round_df <- function(df, digits) {  
  nums <- vapply(df, is.numeric, FUN.VALUE = logical(1))  
  df[,nums] <- round(df[,nums], digits = digits)  
  (df)  
}  
  
get_amortization(36,0.078) %>%  
  round_df(4) %>%  
  datatable(rownames=F)
```

# FIX TERM LOANS

statement ↕	payment ↕	interest_payment ↕	principal_payment ↕	start_balance ↕	end_balance ↕
0	0	0	0	0	1
1	0.0312	0.0065	0.0247	1.0065	0.9753
2	0.0312	0.0063	0.0249	0.9816	0.9504
3	0.0312	0.0062	0.0251	0.9565	0.9253
4	0.0312	0.006	0.0252	0.9313	0.9001
5	0.0312	0.0059	0.0254	0.9059	0.8747
6	0.0312	0.0057	0.0256	0.8803	0.8491
7	0.0312	0.0055	0.0257	0.8546	0.8234
8	0.0312	0.0054	0.0259	0.8287	0.7975
9	0.0312	0.0052	0.0261	0.8027	0.7714

# LENDING CLUB ACTUALS

issue_year ♦	DollarsFunded ♦	Prepays ♦	Chargeoffs ♦	Interest ♦	Yield ♦	ExpectedYield ♦
2008	1899800	49.4%	6%	8.5%	7.6%	13.6%
2009	8700550	49.7%	6.7%	8.8%	7.6%	14.1%
2010	20650050	53.1%	4.4%	7.2%	7.4%	11.5%
2011	49784200	50.9%	6.4%	7.2%	6.4%	11.5%
2012	119545400	52.4%	7.2%	7.7%	6.4%	12.3%

# LENDING CLUB ACTUALS

```
lcA %>% mutate(issue_yearmon = as.Date(as.yearmon(issue_d,format="%b-%Y")),
               issue_year = as.numeric(as.character(issue_yearmon,format="%Y")),
               last_pymnt_yearmon = as.Date(as.yearmon(last_pymnt_d,format="%b-%Y")),
               interest = as.numeric(str_replace(int_rate,"%","")) %>%
  filter(issue_year <= 2012,issue_year > 2007,term==" 36 months") %>%
  mutate(AgeBucket = cut(as.numeric((last_pymnt_yearmon-issue_yearmon)/365),
                        breaks=seq(0,6,1/12),
                        include.lowest=T,
                        right=F)) %>%
  mutate(Age = match(AgeBucket,levels(AgeBucket))) %>%
  mutate(total_rec = total_rec_prncp+total_rec_int) %>%
  group_by(issue_year) %>%
  summarise(Count = n(),
            DollarsFunded = sum(funded_amnt),
            DollarsRecieved = sum(total_rec),
            Chargeoffs = round(sum(ifelse(grepl("Charged Off",loan_status),1,0))/Count*100,1),
            Prepays = round(sum(ifelse(grepl("Fully Paid",loan_status)&(Age < 36),1,0))/Count*100,1),
            Yield = round(100*(DollarsRecieved/DollarsFunded-1),1),
            Interest = round(weighted.mean(interest,funded_amnt),1)) %>%
  mutate(ExpectedYield = apply(.,
                               1,
                               function(x) sum(get_amortization(36,
                                                                    as.numeric(x['Interest'])/100)$payment))) %>%
  mutate(ExpectedYield = round(100*(ExpectedYield-1),1)) %>%
  select(issue_year,DollarsFunded,Prepays,Chargeoffs,Interest,Yield,ExpectedYield) %>%
  mutate(Prepays=paste0(Prepays,"%"),
         Chargeoffs=paste0(Chargeoffs,"%"),
         Interest=paste0(Interest,"%"),
         Yield=paste0(Yield,"%"),
         ExpectedYield = paste0(ExpectedYield,"%")) %>%
  datatable(rownames=F)
```

# AGENDA

LENDING CLUB DATA

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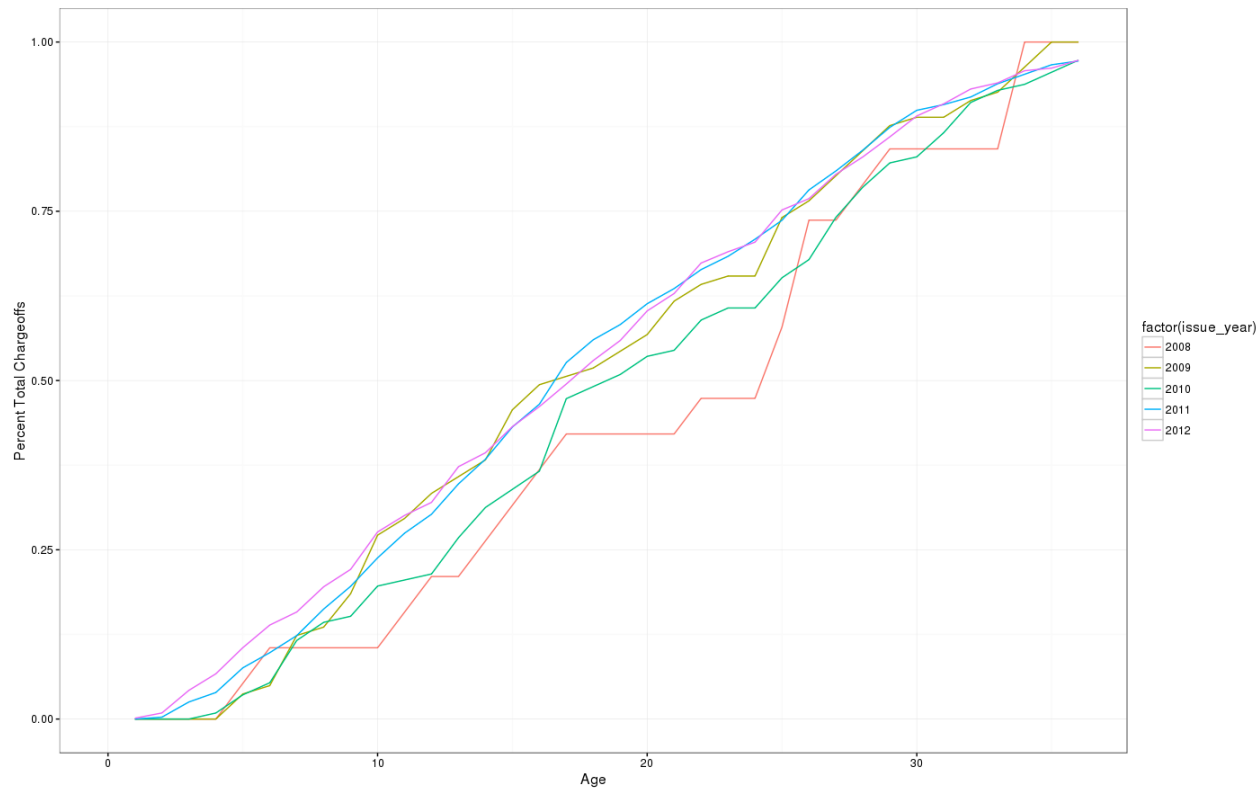
CASHFLOW

CASHFLOW WITH CHARGEOFF

CASHFLOW WITH CHARGEOFF & PREPAYMENT

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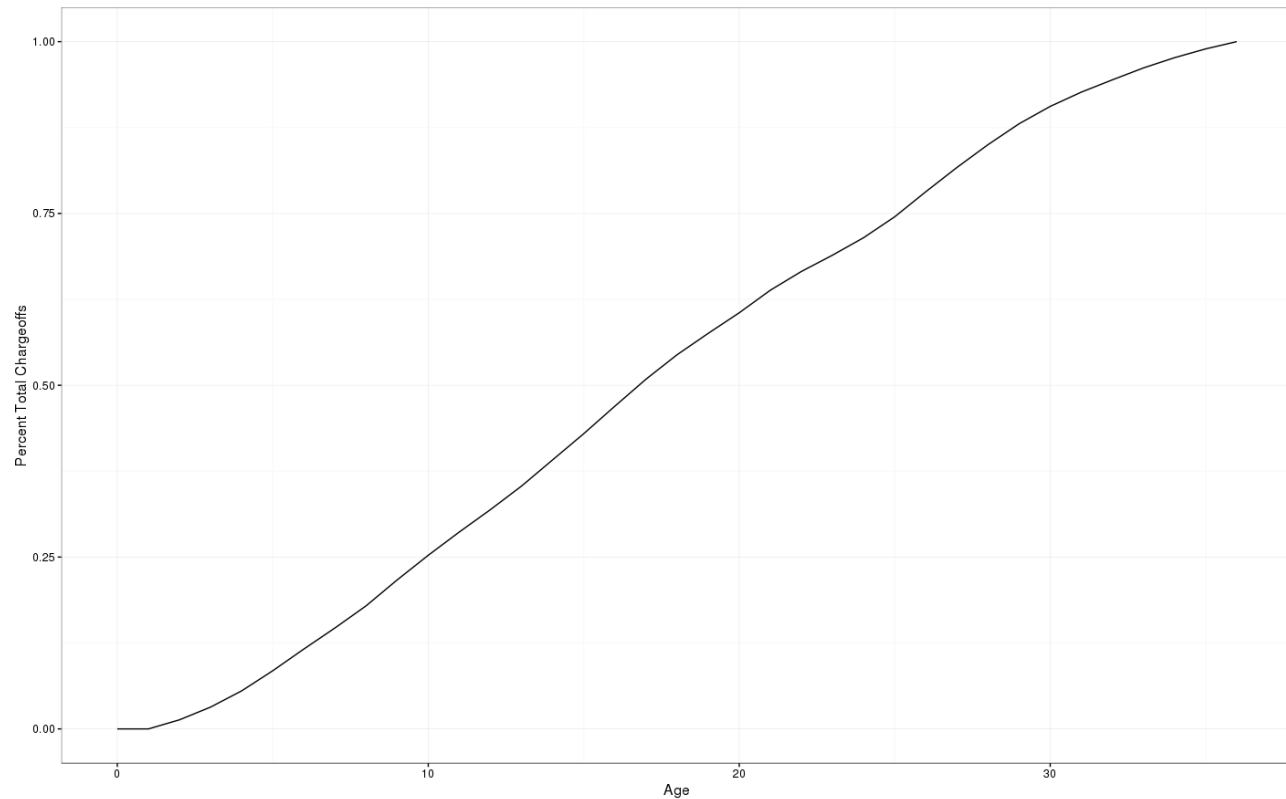
# LENDING CLUB CHARGE OFFS



# LENDING CLUB CHARGE OFFS

```
# Charge Offs
lcA %>% mutate(issue_yearmon = as.Date(as.yearmon(issue_d,format="%b-%Y")),
               issue_year = as.numeric(as.character(issue_yearmon,format="%Y")),
               last_pymnt_yearmon = as.Date(as.yearmon(last_pymnt_d,format="%b-%Y")),
               interest = as.numeric(str_replace(int_rate,"%","")) %>%
  filter(issue_year <= 2012,issue_year > 2007,term==" 36 months") %>%
  mutate(AgeBucket = cut(as.numeric((last_pymnt_yearmon-issue_yearmon)/365),
                        breaks=seq(0,6,1/12),
                        include.lowest=T,
                        right=F)) %>%
  mutate(Age = match(AgeBucket,levels(AgeBucket))) %>%
  group_by(issue_year) %>%
  mutate(count=n()) %>%
  group_by(issue_year,Age) %>%
  summarise(bad = sum(ifelse(grepl("Charged Off",loan_status),1,0)),
            count = max(count)) %>%
  arrange(Age) %>%
  mutate(total_bad = cumsum(bad)) %>%
  group_by(issue_year) %>%
  mutate(max_total_bad = max(total_bad)) %>%
  ggplot(aes(Age,total_bad/max_total_bad,color=factor(issue_year)))+
  geom_line()+
  theme_bw()+
  xlim(0,36)+
  ylab('Percent Total Chargeoffs')
```

# LENDING CLUB CHARGE OFFS EXPECTATIONS





# LENDING CLUB CHARGE OFFS EXPECTATIONS

```
percentChargeoffFunc <- lcA %>% mutate(issue_yearmon = as.Date(as.yearmon(issue_d,format="%b-%Y")),
                                     issue_year = as.numeric(as.character(issue_yearmon,format="%Y")),
                                     last_pymnt_yearmon = as.Date(as.yearmon(last_pymnt_d,format="%b-%Y")),
                                     interest = as.numeric(str_replace(int_rate,"%",""))) %>%
  filter(issue_year <= 2012,issue_year > 2007,term==" 36 months") %>%
  mutate(AgeBucket = cut(as.numeric((last_pymnt_yearmon-issue_yearmon)/365),
                        breaks=seq(0,6,1/12),
                        include.lowest=T,
                        right=F)) %>%
  mutate(Age = match(AgeBucket,levels(AgeBucket))) %>%
  group_by(issue_year) %>%
  mutate(count=n()) %>%
  group_by(issue_year,Age) %>%
  summarise(bad = sum(iffelse(grepl("Charged Off",loan_status),1,0)),
            count = max(count)) %>%
  arrange(Age) %>%
  filter(Age <= 36) %>%
  mutate(total_bad = cumsum(bad)) %>%
  group_by(issue_year) %>%
  mutate(max_total_bad = max(total_bad)) %>%
  mutate(percent_bad = total_bad/max_total_bad) %>%
  group_by(Age) %>%
  summarise(avg_percent_total_bad = weighted.mean(percent_bad,count)) %>%
  (function(df) {
    mod <- loess(avg_percent_total_bad ~ Age,df,span=1/4)
    pred <- predict(mod,df)
    tmp <- data.frame(Age = df$Age,pred_percent_total_bad=pred)
    tmp$pred_percent_total_bad = tmp$pred_percent_total_bad-min(tmp$pred_percent_total_bad)
    tmp$pred_percent_total_bad = tmp$pred_percent_total_bad/max(tmp$pred_percent_total_bad)
    approxfun(tmp$Age,tmp$pred_percent_total_bad,method='linear',yleft = 0,yright=1)
  })
```

# LENDING CLUB CASHFLOW W/ CHARGE OFFS

```
get_amortization_chargeoff <- function(term_number, interest_rate, percent_chargeoff){
  amortization <- data.frame(statement=seq(0, term_number, 1),
                             payment=c(0, rep(payment_value(1, interest_rate, term_number), term_number)),
                             interest_payment = 0,
                             principal_payment=0,
                             start_balance=0,
                             end_balance=1,
                             unit_chargeoff = percent_chargeoff*percentChargeoffFunc(seq(0, 36)))

  for(i in (1:term_number+1)){
    amortization[i, 'start_balance'] = amortization[i-1, 'end_balance']*(1+interest_rate/12)
    amortization[i, 'interest_payment'] = interest_rate*amortization[i-1, 'end_balance']/12
    amortization[i, 'principal_payment'] = amortization[i, 'payment'] - amortization[i, 'interest_payment']
    amortization[i, 'end_balance'] = amortization[i, 'start_balance']-amortization[i, 'payment']
  }
  amortization[term_number+1, 'end_balance']=0
  amortization <- amortization %>% mutate(payment_recieved = (1-unit_chargeoff)*payment)
  return(amortization)
}

get_amortization_chargeoff(36, 0.07, 0.06) %>%
  round_df(4) %>%
  datatable(rownames=F)
```

# LENDING CLUB CASHFLOW W/ CHARGE OFFS

statement ⚡	payment ⚡	interest_payment ⚡	principal_payment ⚡	start_balance ⚡	end_balance ⚡	unit_chargeoff ⚡	payment_recieved ⚡
0	0	0	0	0	1	0	0
1	0.0309	0.0058	0.025	1.0058	0.975	0	0.0309
2	0.0309	0.0057	0.0252	0.9806	0.9498	0.0008	0.0309
3	0.0309	0.0055	0.0253	0.9553	0.9244	0.0019	0.0308
4	0.0309	0.0054	0.0255	0.9298	0.8989	0.0033	0.0308
5	0.0309	0.0052	0.0256	0.9042	0.8733	0.0051	0.0307
6	0.0309	0.0051	0.0258	0.8784	0.8475	0.007	0.0307
7	0.0309	0.0049	0.0259	0.8525	0.8216	0.0088	0.0306
8	0.0309	0.0048	0.0261	0.8264	0.7955	0.0107	0.0305
9	0.0309	0.0046	0.0262	0.8002	0.7693	0.013	0.0305

## LENDING CLUB ACTUALS (Previous)

issue_year ♦	DollarsFunded ♦	Prepays ♦	Chargeoffs ♦	Interest ♦	Yield ♦	ExpectedYield ♦
2008	1899800	49.4%	6%	8.5%	7.6%	13.6%
2009	8700550	49.7%	6.7%	8.8%	7.6%	14.1%
2010	20650050	53.1%	4.4%	7.2%	7.4%	11.5%
2011	49784200	50.9%	6.4%	7.2%	6.4%	11.5%
2012	119545400	52.4%	7.2%	7.7%	6.4%	12.3%

# LENDING CLUB ACTUALS (w/Chargeoffs)

issue_year ♦	DollarsFunded ♦	Prepays ♦	Chargeoffs ♦	Interest ♦	Yield ♦	ExpectedYield ♦
2008	1899800	49.4%	6%	8.5%	7.6%	10%
2009	8700550	49.7%	6.7%	8.8%	7.6%	10.1%
2010	20650050	53.1%	4.4%	7.2%	7.4%	8.9%
2011	49784200	50.9%	6.4%	7.2%	6.4%	7.7%
2012	119545400	52.4%	7.2%	7.7%	6.4%	8%

# LENDING CLUB ACTUALS (w/Chargeoffs)

```
lca %>% mutate(issue_yearmon = as.Date(as.yearmon(issue_d,format="%b-%Y")),
              issue_year = as.numeric(as.character(issue_yearmon,format="%Y")),
              last_pymnt_yearmon = as.Date(as.yearmon(last_pymnt_d,format="%b-%Y")),
              interest = as.numeric(str_replace(int_rate,"%","")) %>%
filter(issue_year <= 2012,issue_year > 2007,term==" 36 months") %>%
mutate(AgeBucket = cut(as.numeric((last_pymnt_yearmon-issue_yearmon)/365),
                      breaks=seq(0,6,1/12),
                      include.lowest=T,
                      right=F)) %>%
mutate(Age = match(AgeBucket,levels(AgeBucket))) %>%
mutate(total_rec = total_rec_prncp+total_rec_int) %>%
group_by(issue_year) %>%
summarise(Count = n(),
          DollarsFunded = sum(funded_amnt),
          DollarsRecieved = sum(total_rec),
          Chargeoffs = round(sum(ifelse(grepl("Charged Off",loan_status),1,0))/Count*100,1),
          Prepays = round(sum(ifelse(grepl("Fully Paid",loan_status)&(Age < 36),1,0))/Count*100,1),
          Yield = round(100*(DollarsRecieved/DollarsFunded-1),1),
          Interest = round(weighted.mean(interest,funded_amnt),1)) %>%
mutate(ExpectedYield = apply(.,|
                            1,
                            function(x) sum(get_amortization_chargeoff(36,
                                                                    as.numeric(x['Interest'])/100,
                                                                    as.numeric(x['Chargeoffs'])/100
                                                                    )$payment_recieved)))%>%
mutate(ExpectedYield = round(100*(ExpectedYield-1),1)) %>%
select(issue_year,DollarsFunded,Prepays,Chargeoffs,Interest,Yield,ExpectedYield) %>%
mutate(Prepays=paste0(Prepays,"%"),
      Chargeoffs=paste0(Chargeoffs,"%"),
      Interest=paste0(Interest,"%"),
      Yield=paste0(Yield,"%"),
      ExpectedYield = paste0(ExpectedYield,"%")) %>%
datatable(rownames=F)
```

# AGENDA

LENDING CLUB DATA

---

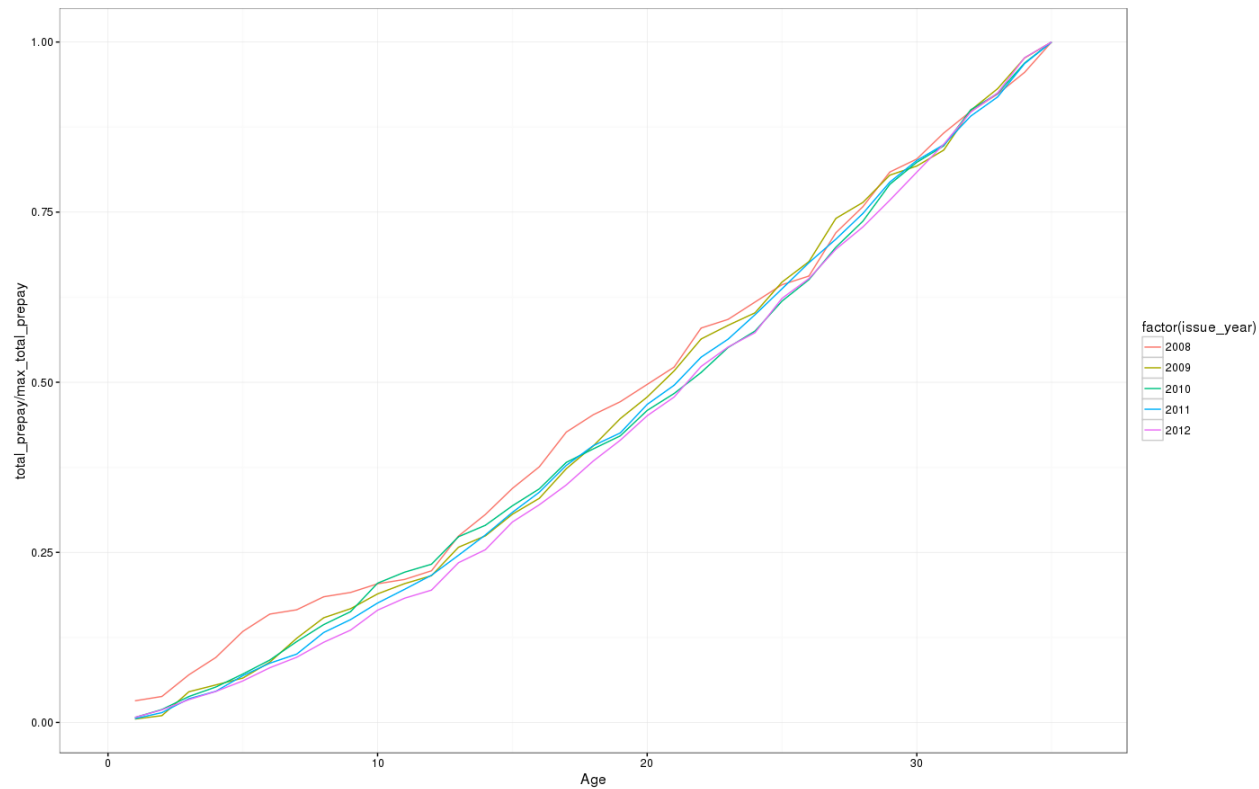
CASHFLOW

---

CASHFLOW WITH CHARGEOFF

CASHFLOW WITH CHARGEOFF & PREPAYMENT

# LENDING CLUB PREPAYMENTS

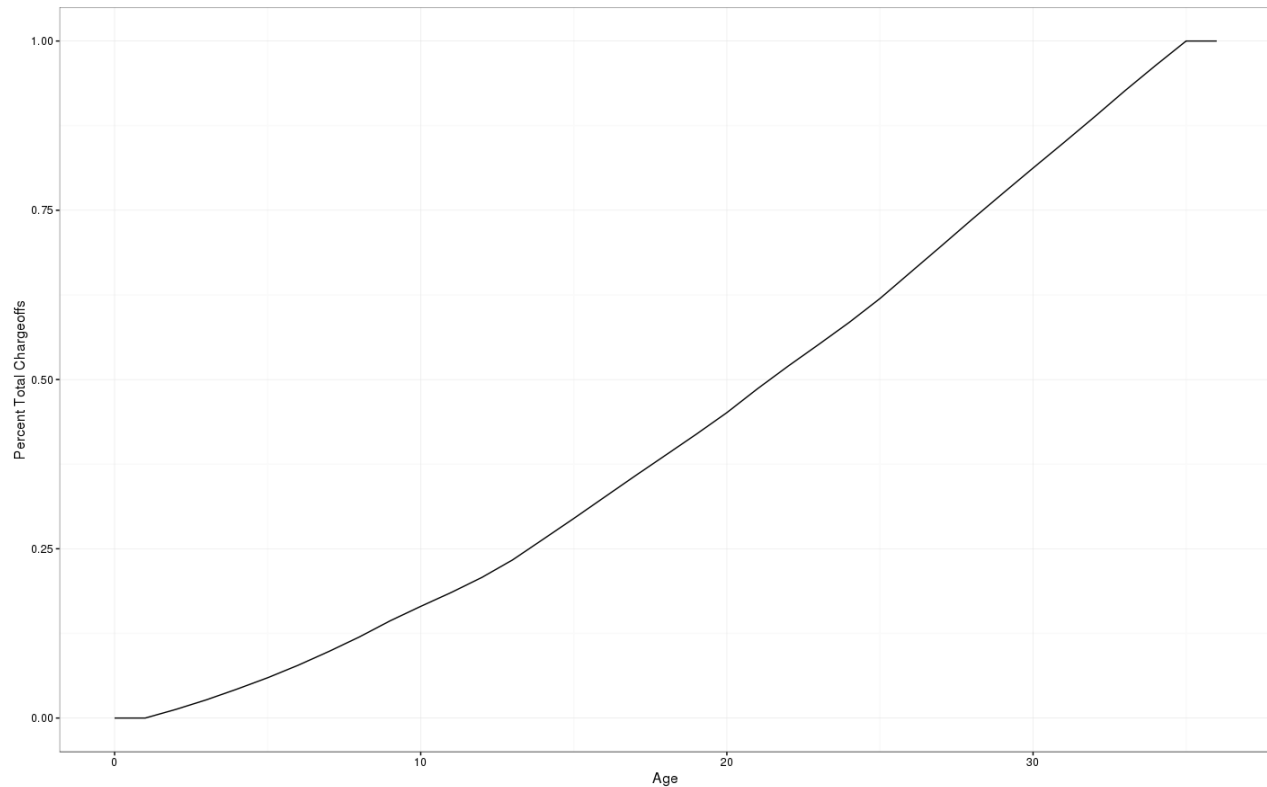




# LENDING CLUB PREPAYMENTS

```
lca %>% mutate(issue_yearmon = as.Date(as.yearmon(issue_d,format="%b-%Y")),
               issue_year = as.numeric(as.character(issue_yearmon,format="%Y")),
               last_pymnt_yearmon = as.Date(as.yearmon(last_pymnt_d,format="%b-%Y")),
               interest = as.numeric(str_replace(int_rate,"%",""))) %>%
  filter(issue_year <= 2012,issue_year > 2007,term==" 36 months") %>%
  mutate(AgeBucket = cut(as.numeric((last_pymnt_yearmon-issue_yearmon)/365),
                        breaks=seq(0,6,1/12),
                        include.lowest=T,
                        right=F)) %>%
  mutate(Age = match(AgeBucket,levels(AgeBucket))) %>%
  group_by(issue_year) %>%
  mutate(count=n()) %>%
  group_by(issue_year,Age) %>%
  summarise(prepay = sum(ifelse(grepl("Fully Paid",loan_status),1,0)),
            count = max(count)) %>%
  arrange(Age) %>%
  filter(Age < 36) %>%
  mutate(total_prepay = cumsum(prepay)) %>%
  group_by(issue_year) %>%
  mutate(max_total_prepay = max(total_prepay)) %>%
  ggplot(aes(Age,total_prepay/max_total_prepay,color=factor(issue_year)))+
  geom_line()+
  theme_bw()+
  xlim(0,36)
```

# LENDING CLUB PREPAYMENT EXPECTATIONS



# LENDING CLUB PREPAYMENT EXPECTATIONS

```
percentPrepaymentFunc <- lcA %>% mutate(issue_yearmon = as.Date(as.yearmon(issue_d,format="%b-%Y")),
  issue_year = as.numeric(as.character(issue_yearmon,format="%Y")),
  last_pymnt_yearmon = as.Date(as.yearmon(last_pymnt_d,format="%b-%Y")),
  interest = as.numeric(str_replace(int_rate,"",""))) %>%
  filter(issue_year <= 2012,issue_year > 2007,term==" 36 months") %>%
  mutate(AgeBucket = cut(as.numeric((last_pymnt_yearmon-issue_yearmon)/365),
    breaks=seq(0,6,1/12),
    include.lowest=T,
    right=F)) %>%
  mutate(Age = match(AgeBucket,levels(AgeBucket))) %>%
  group_by(issue_year) %>%
  mutate(count=n()) %>%
  group_by(issue_year,Age) %>%
  summarise(prepay = sum(ifelse(grepl("Fully Paid",loan_status),1,0)),
    count = max(count)) %>%
  arrange(Age) %>%
  filter(Age < 36) %>%
  mutate(total_prepay = cumsum(prepay)) %>%
  group_by(issue_year) %>%
  mutate(max_total_prepay = max(total_prepay)) %>%
  mutate(percent_prepay = total_prepay/max_total_prepay) %>%
  group_by(Age) %>%
  summarise(avg_percent_total_prepay = weighted.mean(percent_prepay,count)) %>%
  (function(df) {
    mod <- loess(avg_percent_total_prepay ~ Age,df,span=1/4)
    pred <- predict(mod,df)
    tmp <- data.frame(Age = df$Age,pred_percent_total_prepay=pred)
    tmp$pred_percent_total_prepay = tmp$pred_percent_total_prepay-min(tmp$pred_percent_total_prepay)
    tmp$pred_percent_total_prepay = tmp$pred_percent_total_prepay/max(tmp$pred_percent_total_prepay)
    approxfun(tmp$Age,tmp$pred_percent_total_prepay,method='linear',yleft = 0,yright=1)
  })
```

# LENDING CLUB CASHFLOW W/ CHARGE OFFS & PREPAYMENTS

```
get_amortization_chargeoff_prepay <- function(term_number, interest_rate, percent_chargeoff, percent_prepay){
  amortization <- data.frame(statement=seq(0, term_number, 1),
                             payment=c(0, rep(payment_value(1, interest_rate, term_number), term_number)),
                             interest_payment = 0,
                             principal_payment=0,
                             start_balance=0,
                             end_balance=1,
                             unit_chargeoff = percent_chargeoff*percentChargeoffFunc(seq(0, 36)),
                             unit_prepay = percent_prepay*percentPrepaymentFunc(seq(0, 36)))
  for(i in (1:term_number+1)){
    amortization[i, 'start_balance'] = amortization[i-1, 'end_balance']*(1+interest_rate/12)
    amortization[i, 'interest_payment'] = interest_rate*amortization[i-1, 'end_balance']/12
    amortization[i, 'principal_payment'] = amortization[i, 'payment'] - amortization[i, 'interest_payment']
    amortization[i, 'end_balance'] = amortization[i, 'start_balance']-amortization[i, 'payment']
  }
  amortization[term_number+1, 'end_balance']=0
  amortization <- amortization %>%
    mutate(monthly_prepay = ifelse(is.na(lag(unit_prepay)), 0, unit_prepay-lag(unit_prepay))) %>%
    mutate(payment_recieved = (1-unit_chargeoff-unit_prepay)*payment+monthly_prepay*(end_balance+payment))
  return(amortization)
}
```

# LENDING CLUB CASHFLOW

## W/ CHARGE OFFS & PREPAYMENTS

statement ♣	payment ♣	interest_payment ♣	principal_payment ♣	start_balance ♣	end_balance ♣	unit_chargeoff ♣	unit_prepay ♣	monthly_prepay ♣	payment_recieved ♣
0	0	0	0	0	1	0	0	0	0
1	0.0309	0.0058	0.025	1.0058	0.975	0	0	0	0.0309
2	0.0309	0.0057	0.0252	0.9806	0.9498	0.0008	0.0064	0.0064	0.0369
3	0.0309	0.0055	0.0253	0.9553	0.9244	0.0019	0.0135	0.0071	0.0372
4	0.0309	0.0054	0.0255	0.9298	0.8989	0.0033	0.0214	0.0079	0.0375
5	0.0309	0.0052	0.0256	0.9042	0.8733	0.0051	0.0298	0.0084	0.0374
6	0.0309	0.0051	0.0258	0.8784	0.8475	0.007	0.039	0.0093	0.0376
7	0.0309	0.0049	0.0259	0.8525	0.8216	0.0088	0.0492	0.0101	0.0377
8	0.0309	0.0048	0.0261	0.8264	0.7955	0.0107	0.06	0.0108	0.0376
9	0.0309	0.0046	0.0262	0.8002	0.7693	0.013	0.0718	0.0118	0.0377

## LENDING CLUB ACTUALS (Previous)

issue_year ◆	DollarsFunded ◆	Prepays ◆	Chargeoffs ◆	Interest ◆	Yield ◆	ExpectedYield ◆
2008	1899800	49.4%	6%	8.5%	7.6%	13.6%
2009	8700550	49.7%	6.7%	8.8%	7.6%	14.1%
2010	20650050	53.1%	4.4%	7.2%	7.4%	11.5%
2011	49784200	50.9%	6.4%	7.2%	6.4%	11.5%
2012	119545400	52.4%	7.2%	7.7%	6.4%	12.3%

# LENDING CLUB ACTUALS (w/Chargeoffs)

issue_year ♦	DollarsFunded ♦	Prepays ♦	Chargeoffs ♦	Interest ♦	Yield ♦	ExpectedYield ♦
2008	1899800	49.4%	6%	8.5%	7.6%	10%
2009	8700550	49.7%	6.7%	8.8%	7.6%	10.1%
2010	20650050	53.1%	4.4%	7.2%	7.4%	8.9%
2011	49784200	50.9%	6.4%	7.2%	6.4%	7.7%
2012	119545400	52.4%	7.2%	7.7%	6.4%	8%

# LENDING CLUB ACTUALS (w/Chargeoffs & Prepays)

issue_year ♦	DollarsFunded ♦	Prepays ♦	Chargeoffs ♦	Interest ♦	Yield ♦	ExpectedYield ♦
2008	1899800	49.4%	6%	8.5%	7.6%	8.4%
2009	8700550	49.7%	6.7%	8.8%	7.6%	8.3%
2010	20650050	53.1%	4.4%	7.2%	7.4%	7.4%
2011	49784200	50.9%	6.4%	7.2%	6.4%	6.3%
2012	119545400	52.4%	7.2%	7.7%	6.4%	6.4%



# LENDING CLUB ACTUALS (w/ Chargeoffs & Prepays)

```
lcA %>% mutate(issue_yearmon = as.Date(as.yearmon(issue_d,format="%b-%Y")),
               issue_year = as.numeric(as.character(issue_yearmon,format="%Y")),
               last_pymnt_yearmon = as.Date(as.yearmon(last_pymnt_d,format="%b-%Y")),
               interest = as.numeric(str_replace(int_rate,"%",""))) %>%
filter(issue_year <= 2012,issue_year > 2007,term==" 36 months") %>%
mutate(AgeBucket = cut(as.numeric((last_pymnt_yearmon-issue_yearmon)/365),
                      breaks=seq(0,6,1/12),
                      include.lowest=T,
                      right=F)) %>%
mutate(Age = match(AgeBucket,levels(AgeBucket))) %>%
mutate(total_rec = total_rec_prncp+total_rec_int) %>%
group_by(issue_year) %>%
summarise(Count = n(),
          DollarsFunded = sum(funded_amnt),
          DollarsRecieved = sum(total_rec),
          Chargeoffs = round(sum(ifelse(grepl("Charged Off",loan_status),1,0))/Count*100,1),
          Prepays = round(sum(ifelse(grepl("Fully Paid",loan_status)&(Age < 36),1,0))/Count*100,1),
          Yield = round(100*(DollarsRecieved/DollarsFunded-1),1),
          Interest = round(weighted.mean(interest,funded_amnt),1)) %>%
mutate(ExpectedYield = apply(.,
                             1,
                             function(x) sum(get_amortization_chargeoff_prepay(36,
                                          as.numeric(x['Interest'])/100,
                                          as.numeric(x['Chargeoffs'])/100,
                                          as.numeric(x['Prepays'])/100
                                          )$payment_recieved)))%>%
mutate(ExpectedYield = round(100*(ExpectedYield-1),1)) %>%
select(issue_year,DollarsFunded,Prepays,Chargeoffs,Interest,Yield,ExpectedYield) %>%
mutate(Prepays=paste0(Prepays,"%"),
       Chargeoffs=paste0(Chargeoffs,"%"),
       Interest=paste0(Interest,"%"),
       Yield=paste0(Yield,"%"),
       ExpectedYield = paste0(ExpectedYield,"%")) %>%
datatable(rownames=F)
```

# REVIEW EXPECTATIONS

CONVERSATION

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PROBLEM & SOLUTION

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R SNIPPETS & OUTPUTS

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R-MARKDOWN POSTED ON GROUP

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