Prosper EDA & Sample Model Fit:

Overview of Data

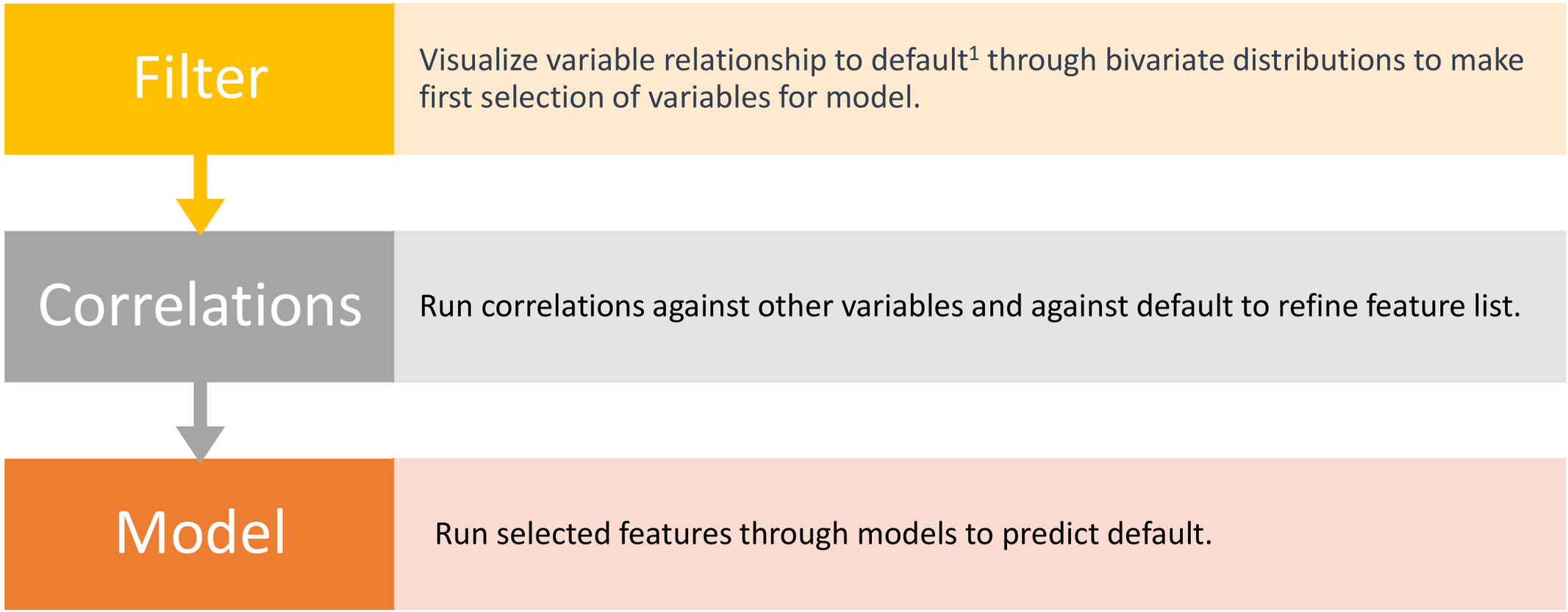
Time Series Completed Loans:
1/2006 – 3/2014

Mean Estimated Return:
9.2%

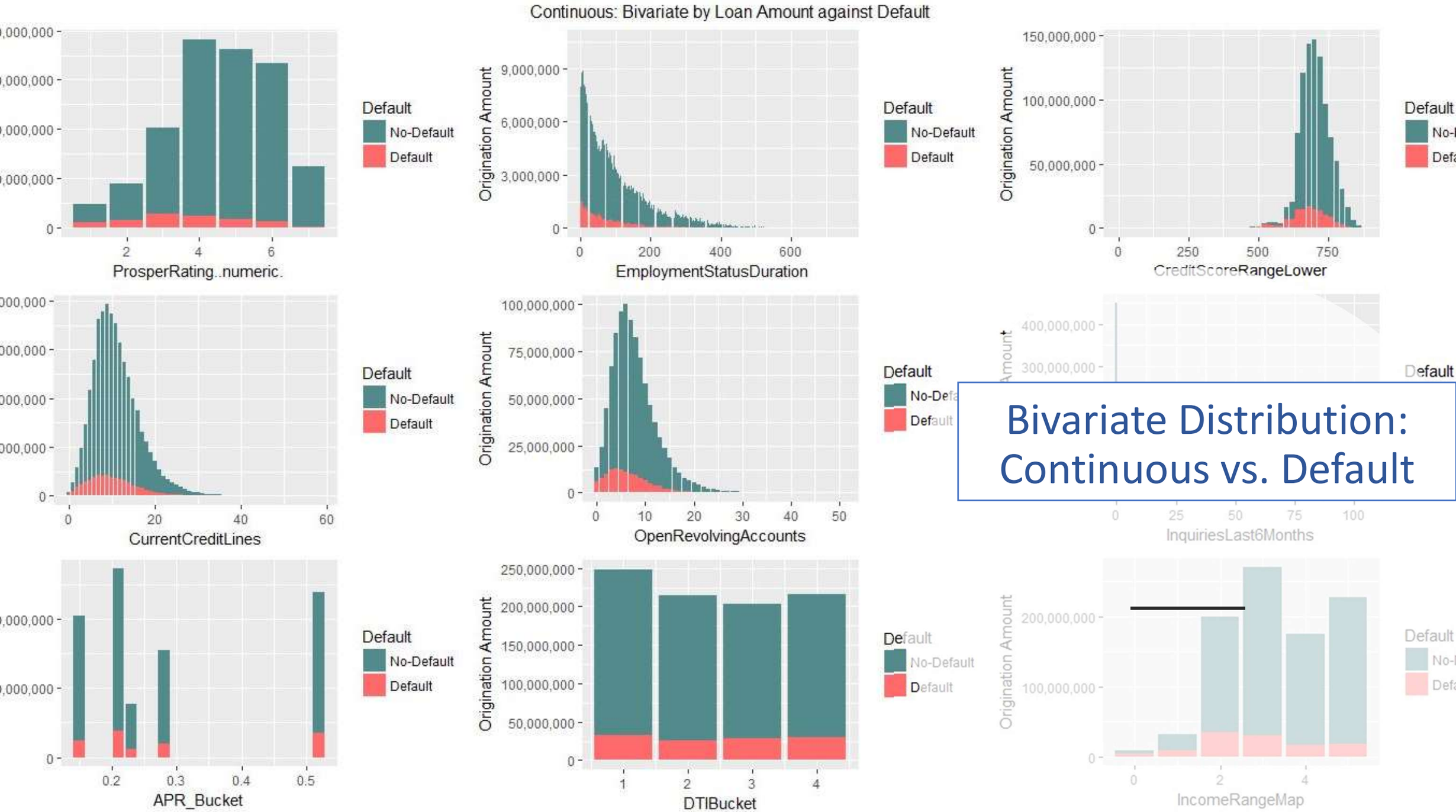
Default/Delinquency Rate:
16.93%

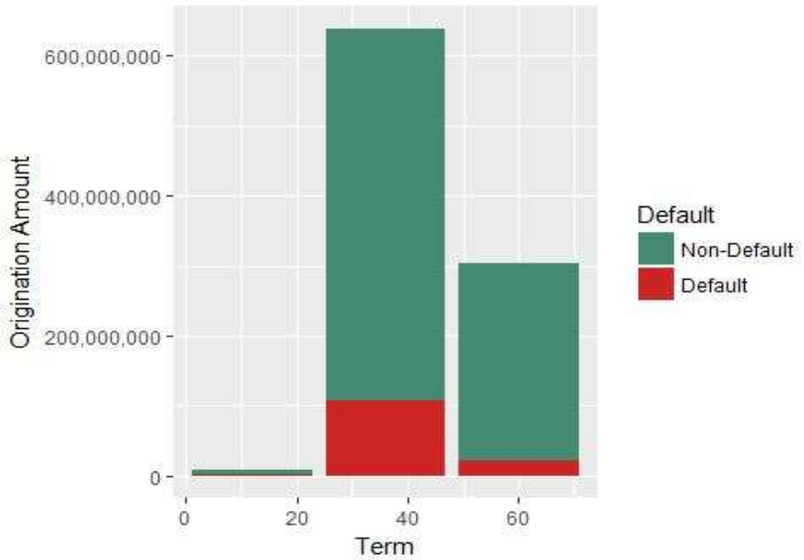
Sample Size:
~114,000 Loans

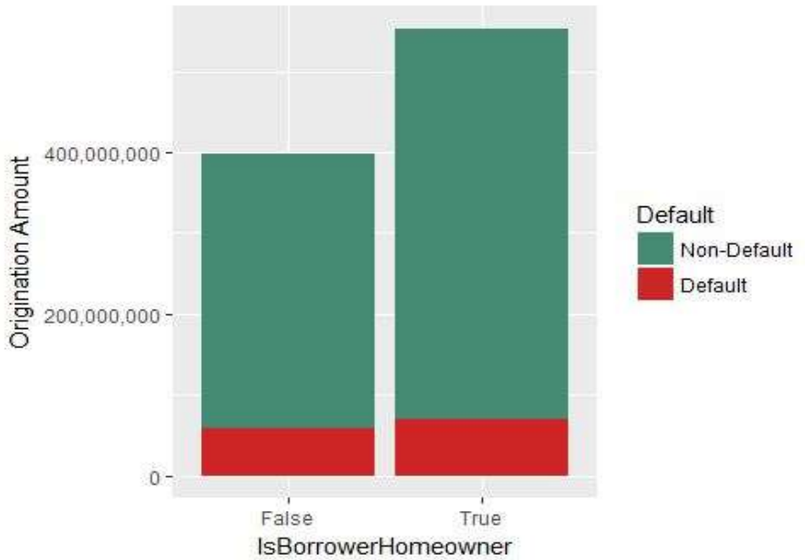
Exploration and Model Fit Overview

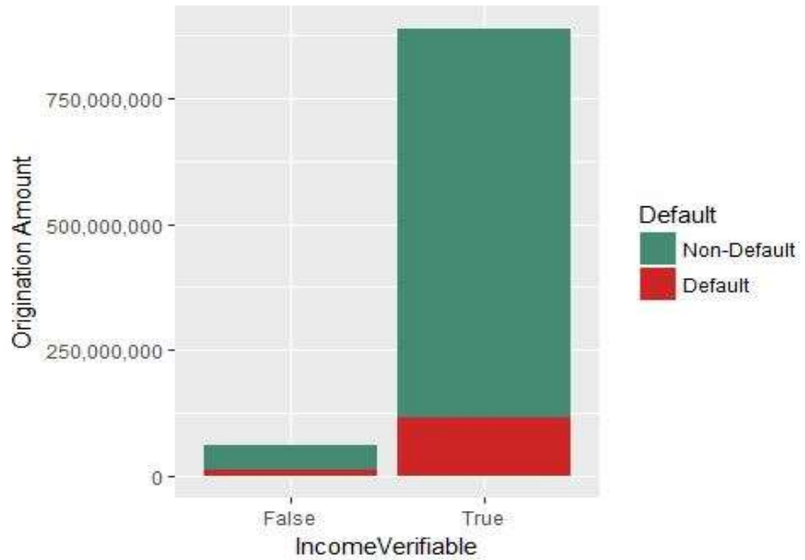


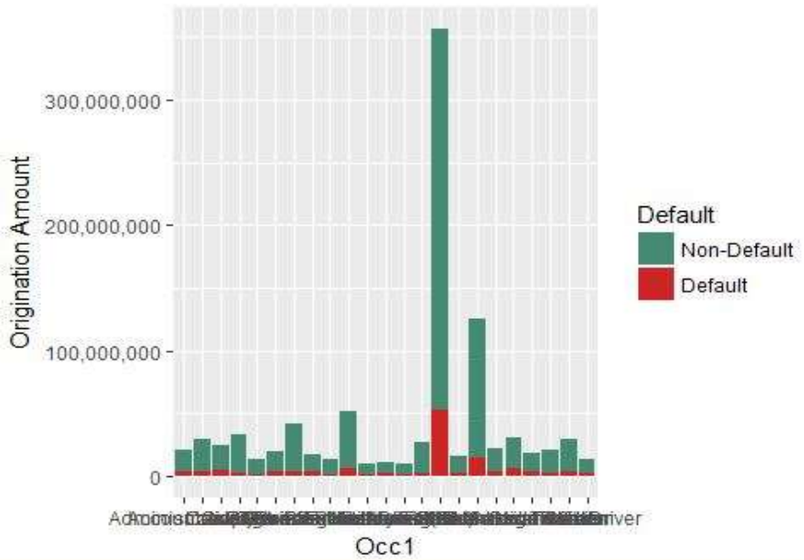
[1] Default defined as any loan status that is **not** "Current," "Completed," or "Final Payment in Progress."

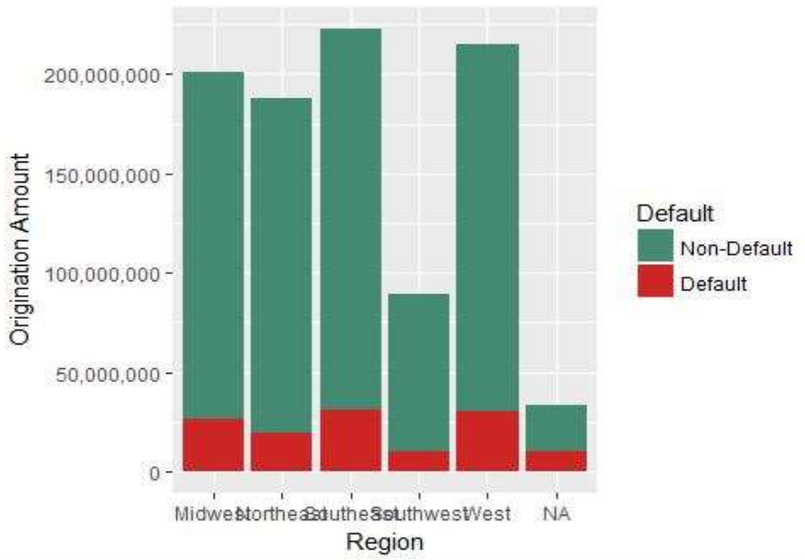

Continuous: Bivariate by Loan Amount against Default
Origination Amount
Default
No-Default
Default
ProsperRating..numeric.
EmploymentStatusDuration
CreditScoreRangeLower
CurrentCreditLines
OpenRevolvingAccounts
InquiriesLast6Months
APR_Bucket
DTIBucket
IncomeRangeMap
Bivariate Distribution:
Continuous vs. Default

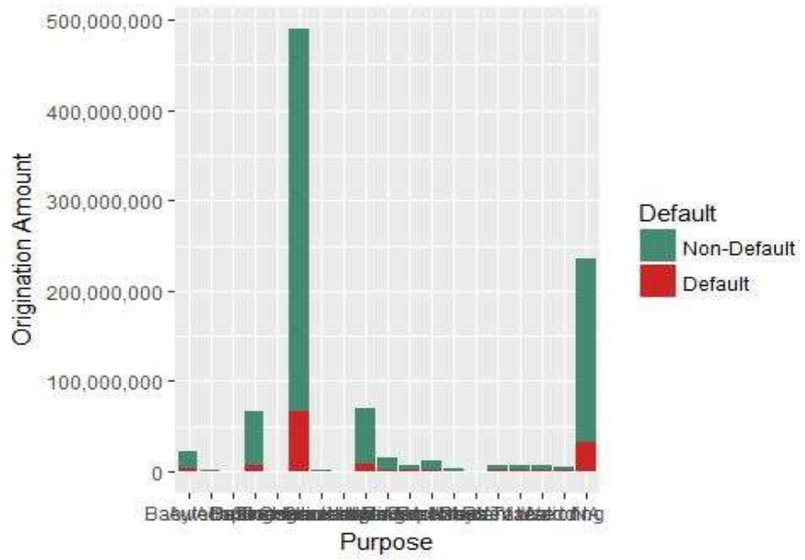












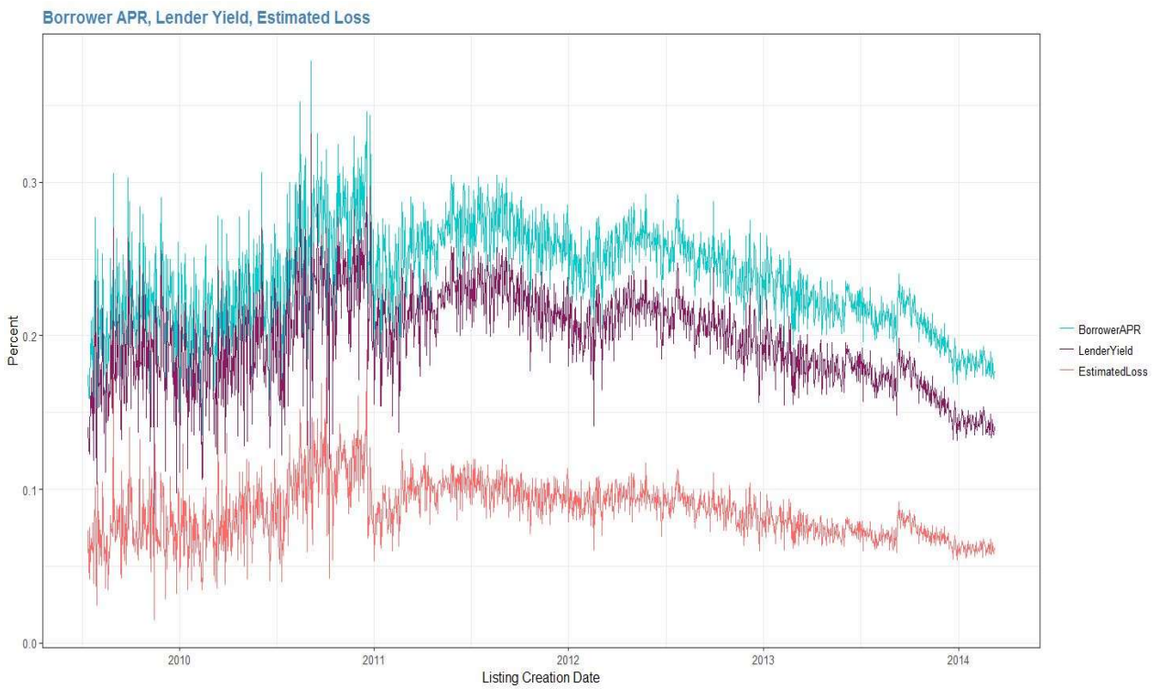
Categorical Distribution vs. Default

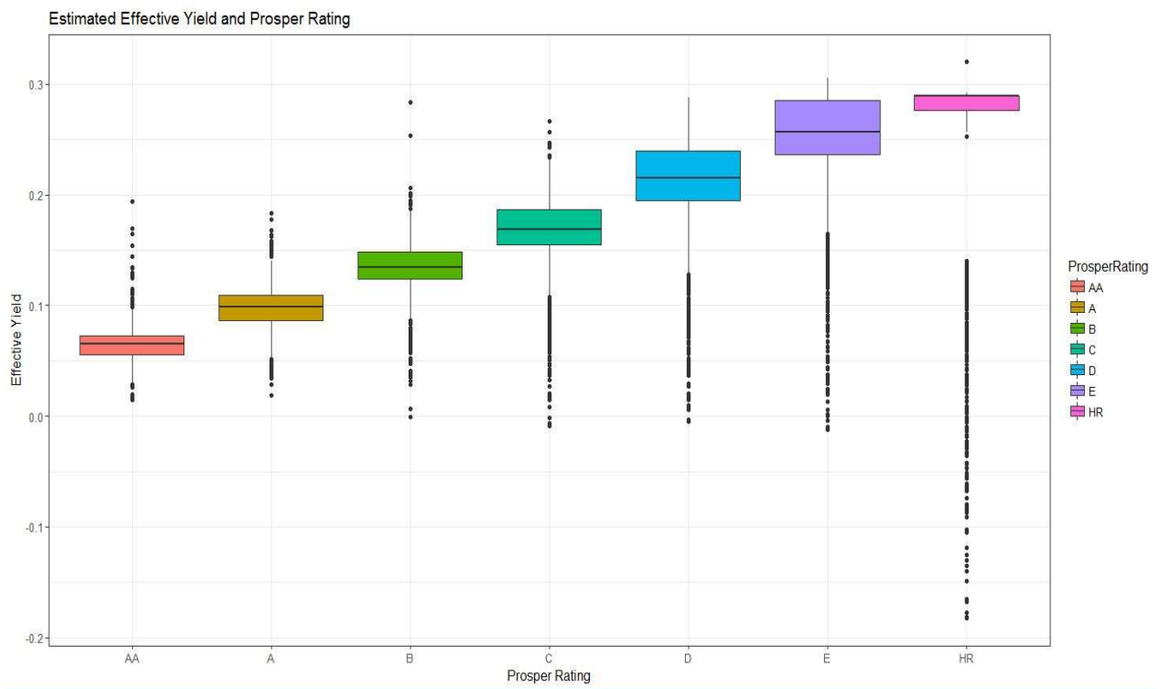
Examining the distributions

```
  value mean_default count  mean
2    36   0.19584634 87778 19.6%
3    60   0.08123854 24545  8.1%
1    12   0.06319703  1614  6.3%
[1] "EmploymentStatus"
          value mean_default count  mean
4 Not available   0.42453712  5347 42.5%
1                 0.36186253  2255 36.2%
8       Retired   0.30691824   795 30.7%
5  Not employed   0.29101796   835 29.1%
3     Full-time   0.28996395 26355 29.0%
7     Part-time   0.24816176  1088 24.8%
9 Self-employed   0.20639061  6134 20.6%
6         Other   0.12480294  3806 12.5%
2      Employed   0.09003001 67322  9.0%
[1] "IsBorrowerHomeowner"
  value mean_default count   mean
1 False    0.1871624 56459 18.72%
2  True    0.1517102 57478 15.17%
[1] "IncomeVerifiable"
  value mean_default  count   mean
1 False    0.2012920   8669 20.13%
2  True    0.1666413 105268 16.66%
[1] "Occ1"
                            value mean_default count  mean
6                        Clerical    0.2477876  3164 24.8%
1                                    0.2318841  3588 23.2%
19              Sales - Commission    0.2231573  3446 22.3%
12                         Laborer    0.2169279  1595 21.7%
20                  Sales - Retail    0.2091527  2797 20.9%
3          Administrative Assistant    0.2060738  3688 20.6%
```

Continuous	Categorical
Borrower APR	Employment Status
Credit Range Score : Lower	Income Verified
Current Credit Lines	isHomeowner
Debt to Income	Occupation
Delinquencies - 7 years	Purpose
Delinquencies - Current	Region
Employment Duration	Term
Income	
Inquiries Last 6 Months	
Investment from Friends	
Number of Investors	
Open Revolving Accounts	
Percent Funded	
Prosper Rating	
Public Inquiries	

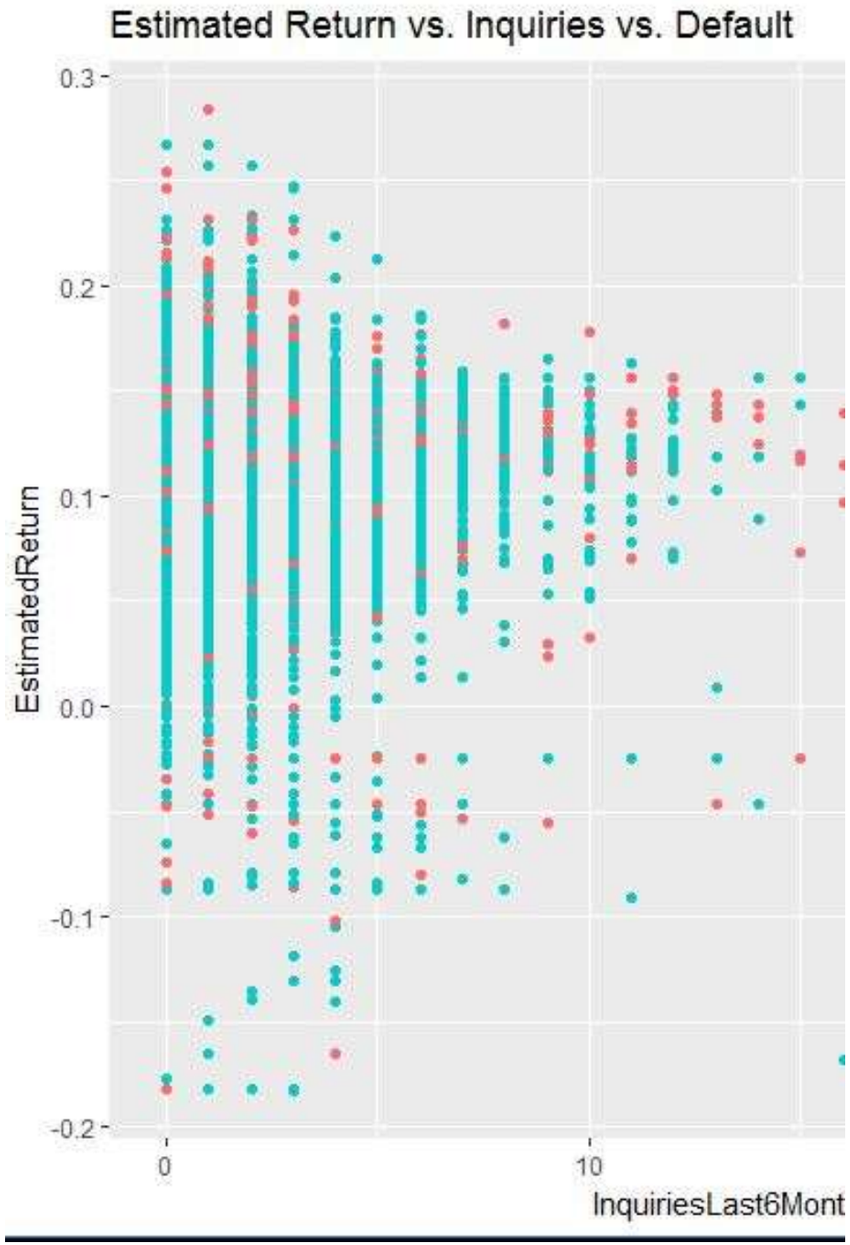
- Create table of defaults
- Select preliminary set of features
  - Split into Continuous and Categorical (Nominal) variables
  - Select based on table & bivariate distributions

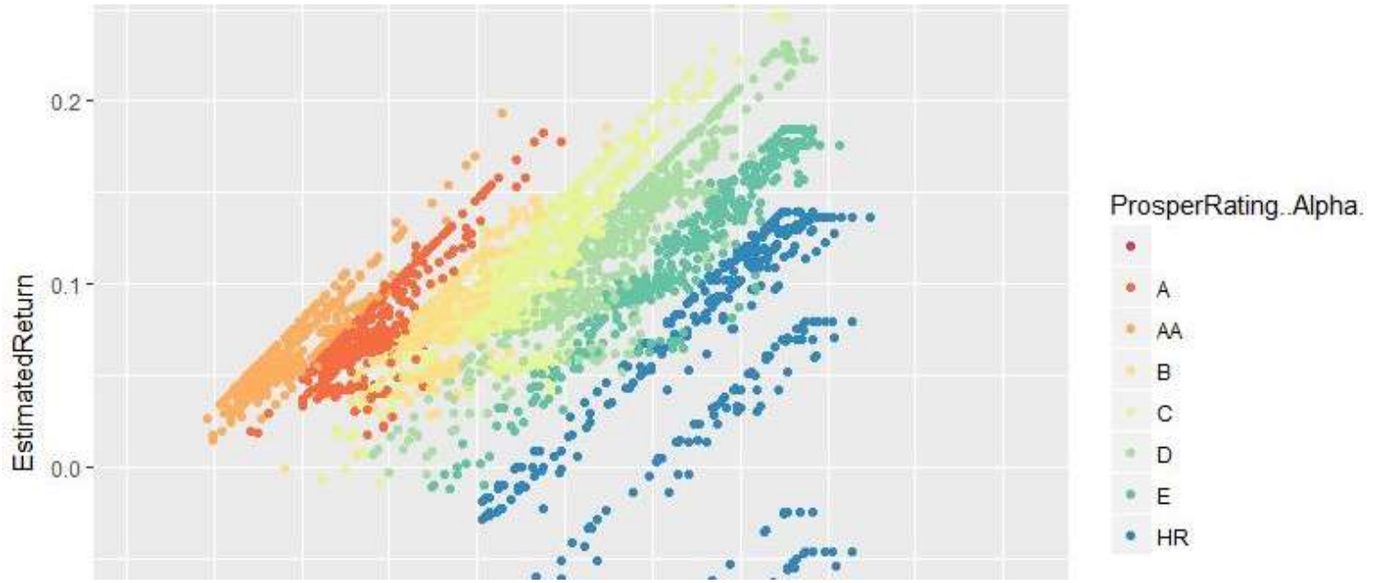




Yield Analysis I:

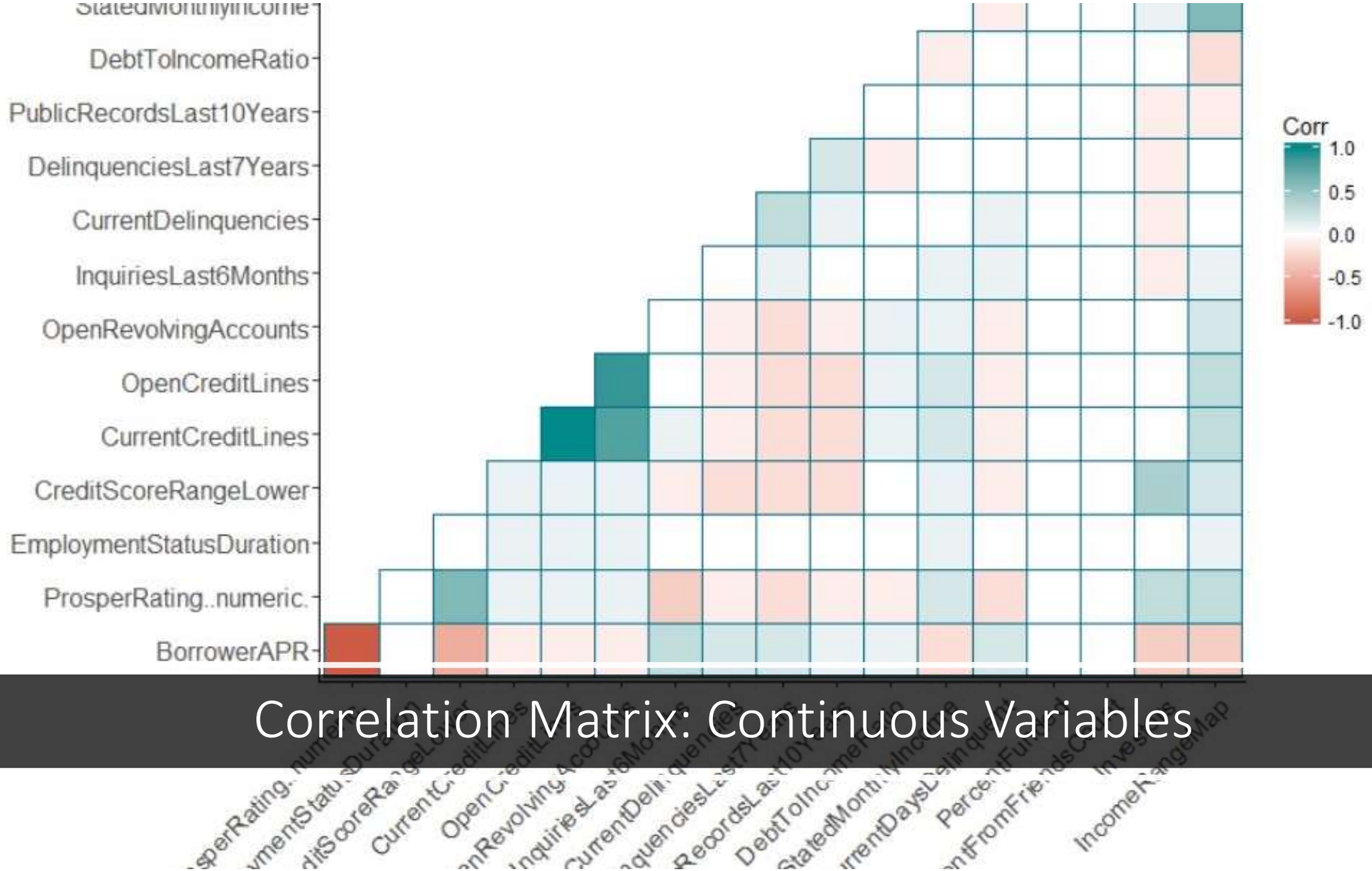
- Stabilizing returns post-2011
- Higher returns with lower rating, but much higher volatility



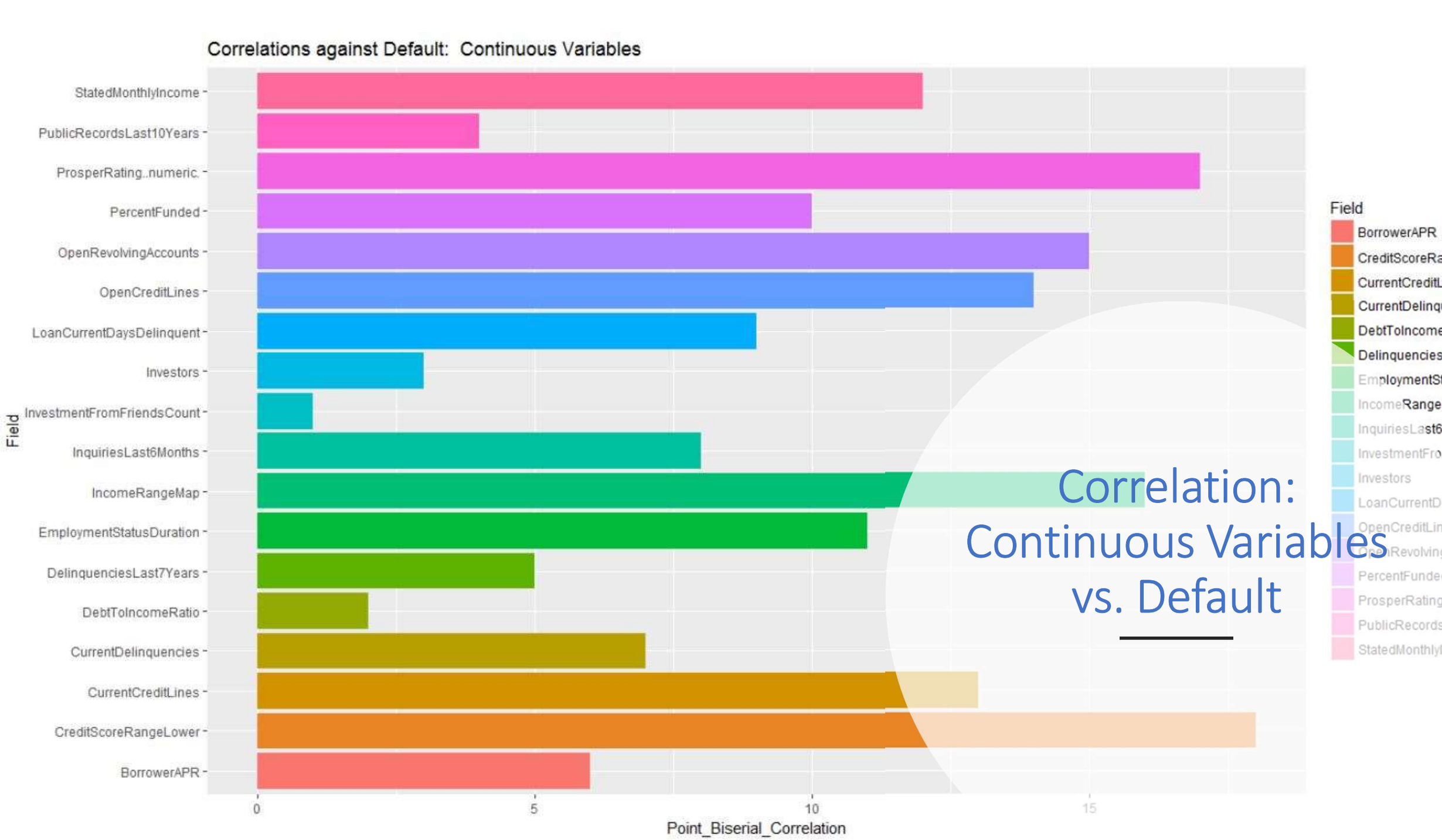


Yield Analysis II: Multivariate Examples

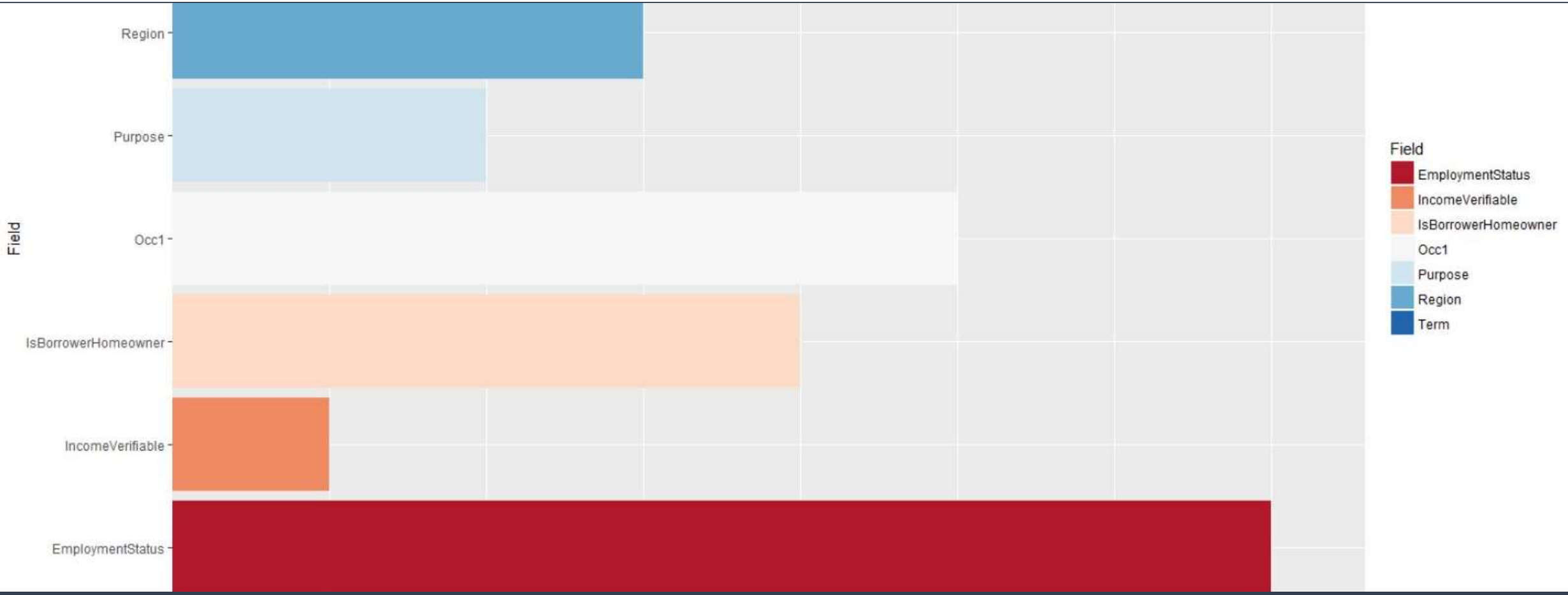
- Defaults increase with inquiries, but often still produce high returns.
- Highest loss-adjusted returns for B-E rated notes.



Correlation Matrix: Continuous Variables



Correlation: Continuous Variables vs. Default



Correlation: Categorical Variables vs. Default

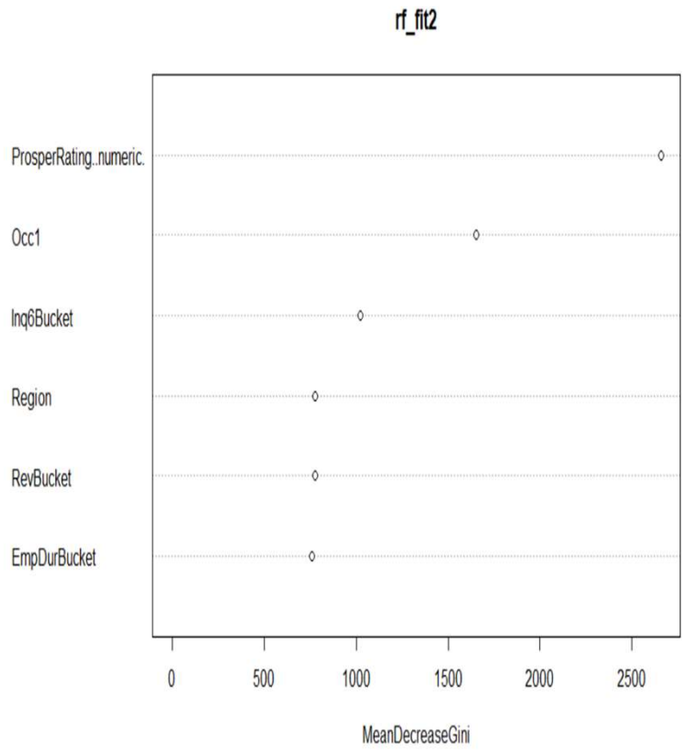
Correlation: Refining the Feature Set

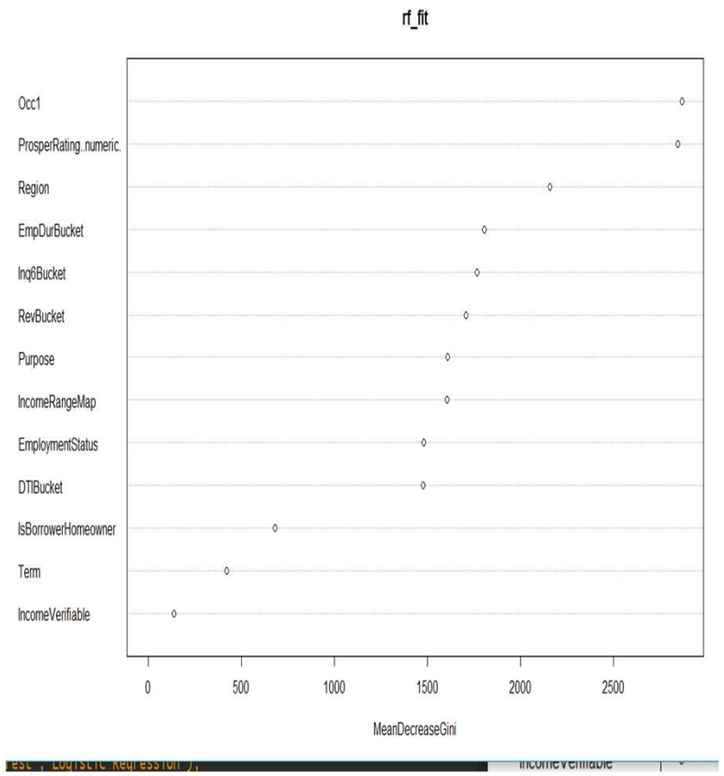
Default Correlation

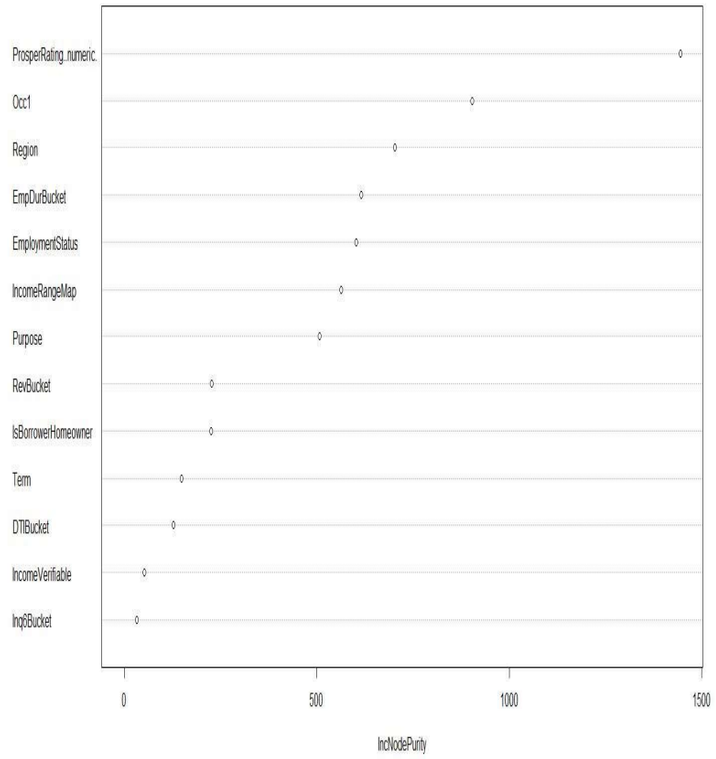
- Measures
  - Continuous Variables: Point Biserial
  - Categorical: Cramer's V (Chi-Square)
- Refine feature set by removing
  - Low correlation
  - Unclear relation to returns

Correlation Matrix

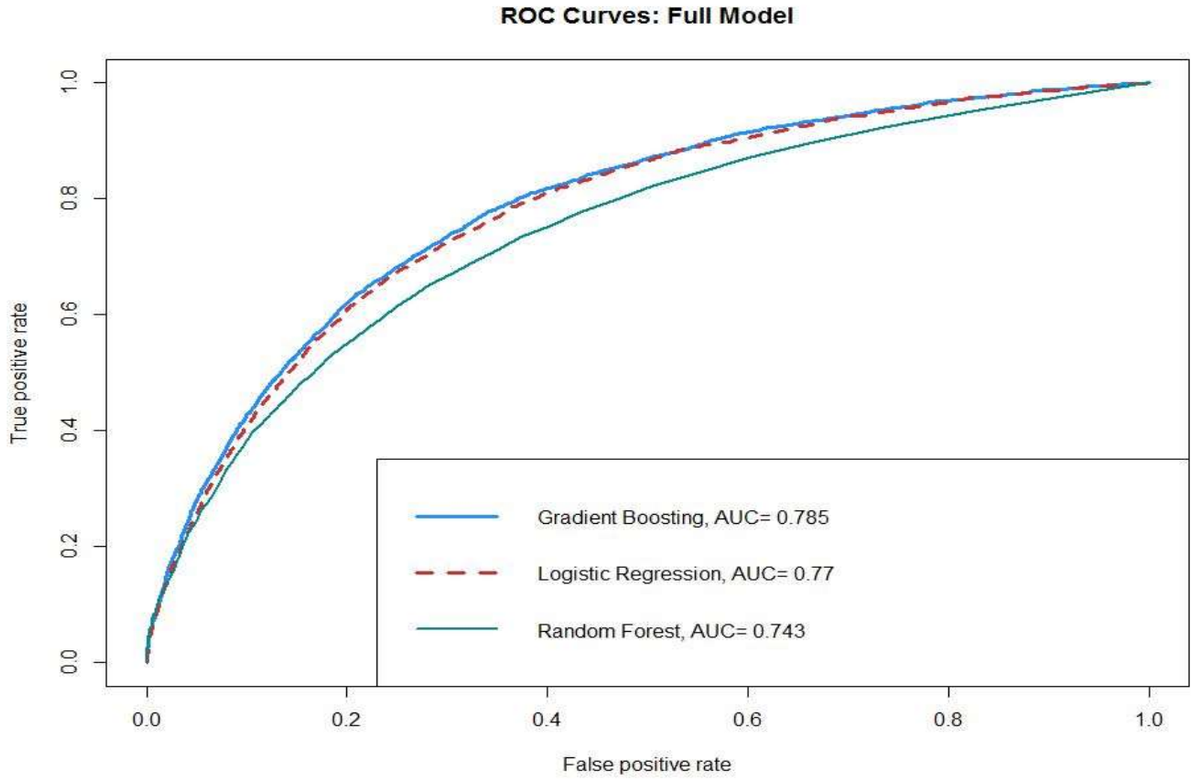
- Examine correlation between variables
- Remove features that are redundant.
  - Credit Lines (high correlation with Revolving Accounts)
  - Credit Range Lower / APR (Prosper Rating)

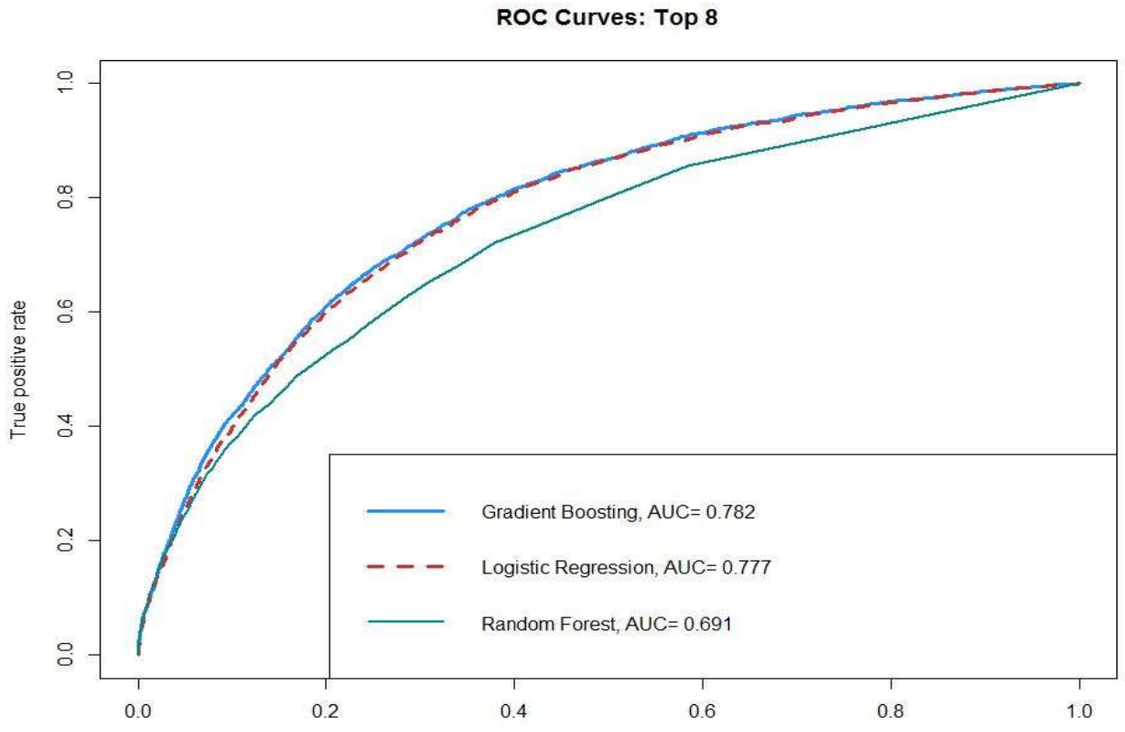






Variable Importance: Different seed & Feature Sets





Model Fit & Comparison

- Ensemble vs. Logistic Regression
- Compare different seeds for randomizesd trees and change feature mix.
- Random Forest more sensitive to # of features
- Outperformance from Gradient Boosting