Largo Loans Underwriting Simulation

Largo LLC (*not the real name*) underwrites personal loans to the working underbanked – people who lack the credit and banking history to borrow from conventional lenders such as banks. Approximately 50 million people in the U.S. are employed fulltime, but are also considered underbanked. When someone is underbanked, and for example, their car breaks down, or they face some medical bills, they often obtain, for lack of alternatives, help from payday lenders who charge high fees (see chart) to provide a small cash advance on their paycheck. Borrowers must pay back the advance in a very short timeframe. The timeframe seldom addresses the cash crunch, and 4 out of 5 payday borrowers pay additional fees to extend their original loan, on average 8 times.

Companies in the Financial Wellness industry work to educate the underbanked to manage their money well, and some companies, such as Largo, also provide loan alternatives with reasonable payment terms, interest rates and the possibility to build credit history, which cash advances do not do. Largo receives, through its referral network in the financial wellness space, about 900 applications per day for an $800, 8-month loan. Internally, Largo employees refer to this popular loan as the "*Double 8 Loan*." Largo's underwriting model for approving/denying *Double 8* loans is in the worksheet *LoanApplications* in the file *LargoLoanData*.

The steps below instruct you to simulate the profit implications of Largo's approval policy for *Double 8* loans. Please follow the steps carefully and submit (via Canvas) your working simulation file when you are done.

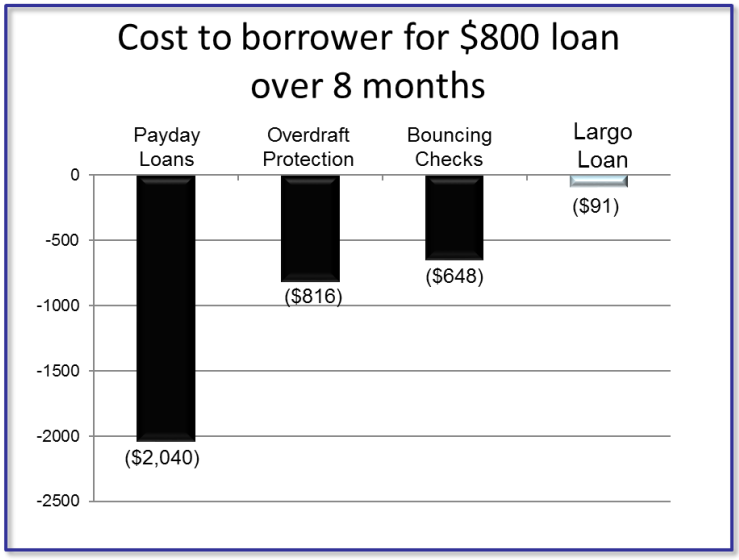

Chart Assumptions: Payday Loan term is biweekly with a fee of $15 per $100 loaned and a rollover of 17 times to reach an 8-month period. Overdraft protection and Bouncing Check fees from traditional lenders are $34 and $27 dollars respectively and occur three times a month during the 8-month period.

Simulating Loan Decisions and Performance.

1. Estimate the probability of loan performance (3 points)
Use the model coefficients given, to compute, in Colum P, the probability that a loan would perform versus default.

2. Assign Interest Rates (3 points)
Use an appropriate function to assign an interest rate to each loan application based on the probability that the loan would perform. The *Rates* worksheet provides interest rates by probability of performing.

3. Simulate perform versus default (3 points)
In Column S, simulate if a loan performs or defaults, as a binomially distributed random variable with a mean equal to the estimated probability that the loan would perform. Column R already contains random numbers you may utilize to simulate perform versus default. Check to be sure that if the predicted probability of a loan performing is high/low, that the frequency of 1 or 0 makes sense when you recalculate random numbers.

4. Simulate timing of default (3 points)
In Column U, use the GAMMA.INV function, to simulate values from a gamma distribution with parameters (alpha = 1, beta = 2). This is a way to simulate x-values from an exponential distribution with mean 0.5, for which there is no EXP.INV function in Excel. The exponential function is a common hazard function, providing time between or time to some event. Your experience using the NORM.INV function is sufficient to use the GAMM.INV function. You need a random value for the probability argument, and the parameters of the distribution.

5. Column V converts the x-values generated from the gamma distribution into integers that represent the number of payments received before default. I did this for you.

6. Calculate the estimated profit/loss (3 points)
In Column W, calculate the estimated profit/loss that would be realized by lending $800, and receiving the number of payments shown in Column V times the amount of the payments, which are shown in Column C on the *Rates* worksheet. Column W should show a profit/loss for every loan, because we did not model approval decisions yet.

7. Approve Loans (3 points)
In Column X, approve or deny loans based on a cutoff probability in cell AB2.

8. Calculate profit/loss on approved loans (3 points)
In Column Y, calculate the estimated profit/loss on approved loans, i.e. the difference between payments received and the principal loaned.

9. Calculate Total Profit (3 points)
Sum up Column Y profit/loss values in cell AB3.

10. Complete the Data Table (3 points)
Complete the Data Table, showing the Total Profit from AB3 as the output in Column AB. The cutoffs to evaluate are already included in Column AA.

11. Play F9 (3 points)
Recalculate the random numbers numerous times, i.e. hit F9 (or Fn+F9 on your Mac) to see how this model behaves. You might notice that the cutoff in AB2 and the same cutoff in the Data Table have different Total Profit estimates. Don't be alarmed – they represent recalculation of the random numbers. Each time a cutoff is used from the Data Table, the random numbers recalculate. Enter in AB2, the cutoff value that you think is the best policy for Largo to apply when it approves Double-8 Loans. Save your file with the best cutoff in AB2, and then upload it to the dropbox associated with this assignment.

Nice work; Thanks!