

## Plato Renovation Inc. Questions

### Part I. Data Analyses

Please see the Jupyter Notebook for the procedures of data analyses. All the necessary codes are provided in the Notebook but you have to figure out the process and answer the questions there. Once you understand and execute the codes, you will be able to find the required numbers for the questions in the second part.

### Part II. Questions

#### *Background information on accuracy*

The accuracy of a forecast is determined by comparing the forecast value against the actual/realized value. One common measure of forecast accuracy is to calculate the absolute difference between the actual value and the forecast value (i.e., absolute forecast error). The higher the absolute forecast error is, the less accurate the forecast is. In this case, the estimate of AFDA can be considered a forecast and the realized value is the actual value.

1. The traditional way of forecasting AFDA is to use the aging method, where the expected collection rates depend on the number of days the account is outstanding (i.e., the age). What are the average collection rates across different account ages (fill the numbers in the blanks below)? Does account age ‘help explain’ the collection rates? Explain. (Hint: Do the collection rates vary by account age?)

Table 1	
Age	Average of payment_received
(0, 30)	0.942
(30, 60)	0.881
(60, 90)	0.671

Your answer: **Yes, the collection rates vary by account age, the older an account is, the lower % chance it will receive payment.**

2. What are the average collection rates for different (a) customer locations, (b) years (whether it's a bridge year), and (c) quarters (fill the numbers in the blanks below)? Which factor is more important in explaining the collection rates? Explain.

Table 2	
District	Average of payment_received
Tourism	0.880

Business	0.913
Residence	0.890

Year	Average of payment received
Non-Bridge Year	0.912
Bridge Year	0.833

Quarter	Average of payment received
Qtr1	0.895
Qtr2	0.901
Qtr3	0.892
Qtr4	0.891

Your answer: **I would say that the non-bridge year vs. bridge year is the most important in explaining payment received. The difference between these two is about 8% where the rest of them are between 1-3%.**

- Assume the first fiscal quarter of 2020 (a bridge year) is completed and all the transaction are recorded in the dataset *Plato\_Dataset\_2020Q1.csv*. What are the total receivables by customer location? What is the total actual amount of non-paid accounts receivable (fill the numbers in the blanks below)?

**Table 3**

District	Total accounts receivables
Tourism	771197
Business	394350
Residence	630954
Sum	1,796,501
Actual non-paid accounts	383527

- For each of the three factors (*district*, *bridge\_year*, *quarter*), apply the collection rates from Table 2 to the accounts receivables in Table 3 to develop a forecast of AFDA. Then for each factor calculate the absolute forecast error. Which factor reduces the absolute forecast errors by the greatest degree? Show your calculations for all three factors. Do the results support your answer in Question 2?

Hint: The estimated AFDA conditional on the customer location (i.e., *district*) is \$196,257 and the absolute forecast error for this factor is \$187,270

Your answer: **The bridge year reduces the absolute error the most which is consistent with question 2 as we also said bridge year was the best prediction. It has the lowest absolute error at 83511.333.**

5. Up until now, we have separately examined each factor. Now we consider combining the effect of factors by providing more granular data. What are the average collection rates by bridge year, account age, and customer location (fill the numbers in the blanks below)? For example, during a bridge year for customers in the tourism district, with an account age of 0 to 30 days, the collection rate is 82.6%. What do you learn, if anything, from Table 4 that you don't know from Tables 1 and 2?

**Table 4**

Bridge year	District			
Age	Tourism	Business	Residence	Total Average
(0, 30)	82.6%	95.7%	91.2%	89.6%
(30, 60)	71.2%	89.9%	87.6%	81.8%
(60, 90)	49.3%	79.4%	73.5%	62.5%
Total Average	72.8%	92.1%	88.0%	83.3%

Not Bridge year	Tourism	Business	Residence	Total Average
Age				
(0, 30)	96.2%	95.3%	94.5%	95.3%
(30, 60)	93.1%	89.5%	88.0%	90.1%
(60, 90)	74.2%	71.6%	95.7%	68.9%
Total Average	93.4%	91.1%	89.2%	91.2%

Your answer: Table 4 reveals that the collection rates within the Atlantis Island tourism industry are more affected by aging during bridge years as opposed to non-bridge years. We already knew that bridge year had an effect, but we were unaware that aging has a larger effect during bridge years.

6. What are the total accounts receivables by accounts age and customer location in Q1 2020 (fill the numbers in the blanks below)?

**Table 5**

District				
Age	Tourism	Business	Residence	Total
(0, 30)	488122	203729	361637	
(30, 60)	134814	144569	226102	
(60, 90)	148261	46052	43215	
Total				1,796,501

7. Applying the collection rates in Table 4 to the total accounts receivables in Table 5, what could be your best estimate of Plato's allowance for doubtful accounts (AFDA) for Q1 2020. What is the absolute forecast error? How does this absolute forecast error compare with the absolute forecast error of a forecast of AFDA using collection rates that condition only on account ages (from Table 1)? How much does absolute forecast error decrease?

Your answer: Our best estimate for the allowance of doubtful accounts for Q1 in 2020 is 188632.605 with an absolute forecast error of 194894.395. This absolute forecast error is smaller than the absolute forecast of AFDA using collection rates that condition only on account ages.

8. Why do you think your approach using a more detailed model can help reduce the forecast error? Can you think of any scenarios where using a more detailed model does not produce any improvements?

Your answer: Our approach using a more detailed model reduces the forecast error because it provides a specific trend of the data; to reiterate, by using a more detailed model, we can determine specific changes in the data. One way where a more detailed model does not produce any improvements would be if there was an over-abundance of random detail or data and it would be unclear to find certain trends in the data.

9. Can you think of any other factors that could affect customers' repayment rates? What can you do to collect data to incorporate these additional factors?

Your answer: Aside from using credit scores and credit history, two other factors could be identifying loan size and the length of time to make a payment. We can collect data on the factors by tracking the different loan sizes from various customers and seeing how long it takes for them to make the payments for loan. By compiling this data, we can identify a mathematical correlation between both factors and estimate how long it takes for a customer to pay a certain loan size.

10. If you are a CFO of the company, how do you determine whether your accounting team should rely on a more detailed model to estimate AFDA instead of using only account ages? What are the benefits and costs?

Your answer: As the CFO of the company, I would first use basic computation for one year to see how adequately the company can estimate AFDA. For next year, I would recommend using the more detailed model and comparing which model is more proficient in estimating AFDA. If there is no substantial difference, I would just use the first model to mitigate from the company spending too much on the detailed model.