

# M3: Lac Lemman Festival Case Study Report

- Introduction

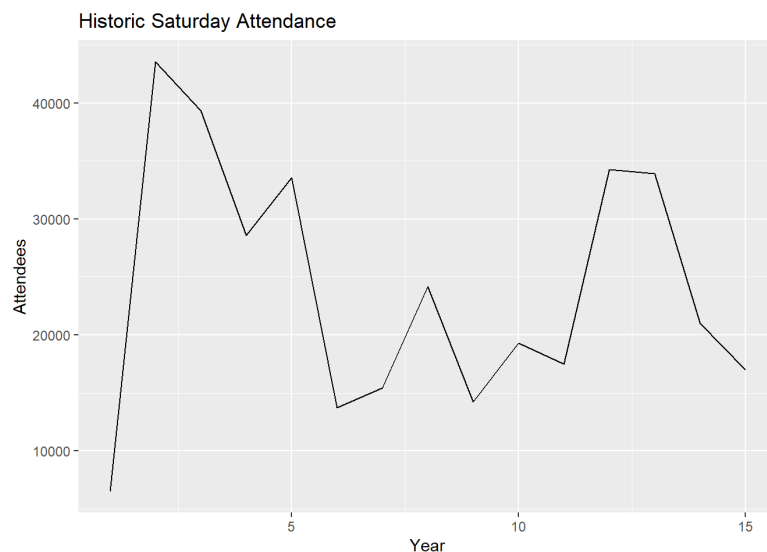
The director of a festival must decide whether or not they should make nonrefundable deposits on services in order to make DVDs of the previous night's show to sell to festival goers the next day. This is the first time they will sell this kind of DVD at the festival so they do not know what demand will look like. If they do go forward with the deposits, they must then decide how many DVDs to produce since they have to be made ahead of time. The main business problem here is to forecast what demand will look like for the DVDs given attendance numbers, weather, and survey results that shows what percentage of attendees would be interested in buying the DVD.

- Background

- Friday/Saturday admission price: CHF30
- Video crew nonrefundable fee: CHF11,740
- Editing fee: CHF3,000
- Production company setup fee: CHF1,250
- DVD cost per unit (up to 5,300): CHF0.86
- DVD extra cost per unit (after 5,300): CHF0.20
- DVD royalty fee per unit: CHF1.02
- DVD price per unit: CHF18
- Mean probability of an individual attendee's choice to buy the DVD: 0.1892
- Standard deviation of an individual's choice: 0.3917
- Friday attendance: 18,394
- Chance of rain on Saturday: 80%

- Data Analysis

First, we need to take a look at the data given for historic attendance to see if there are any seasonality, trends, or outliers that we can immediately spot.



From a cursory look at the data given, there does not seem to be any seasonality or cyclic trends in Saturday attendance in the past. Attendance seems to be pretty sporadic and fluctuates wildly from year to year with spikes and falls happening regularly.

Next, we need to select the best simple forecasting model. Since we did not see any seasonality in the data, we can ignore the seasonal naïve model and just focus on the mean, naïve, and drift models. To compare the models, we will 20% of the data (3 years) as our test set and the rest (12 years) as our training set. In this case, the mean model performed the best as it had the smallest RMSE and intuitively we would also want to use the mean method since attendance can change significantly from year to year which makes the naïve and drift methods not viable choices anymore.

Simple Forecasting Method	RMSE
Mean	7,220.42338709365
Naïve	12,563.2493143029
Drift	17,879.4098684822

Finally, we want to use a regression model to use all of the available information about the weather and Friday attendance to try and create a more accurate forecast.

```
Call:
tslm(formula = Saturday_Attendance ~ Friday_Attendance + Friday_Rain +
      Saturday_Rain, data = exhibit1b)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-5301.3 -2091.9  -622.6   2172.0   5986.1
```

```
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    4777.8422   2784.7288    1.716  0.11420
Friday_Attendance    1.2526     0.1366    9.173 1.74e-06 ***
Friday_Rain     3492.2497   2013.1775    1.735  0.11069
Saturday_Rain   -9206.7009   2104.2228   -4.375  0.00111 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 3466 on 11 degrees of freedom
Multiple R-squared:  0.9194, Adjusted R-squared:  0.8974
F-statistic:  41.8 on 3 and 11 DF,  p-value: 2.638e-06
```

The results are relatively straight forward and show a negative correlation between Saturday attendance and if it rains that day along with a positive correlation with Friday attendance and Saturday attendance. Interestingly, however, there is also a positive correlation between if it rains Friday and Saturday attendance perhaps due to the reason that people that were interested in going on Friday decided to wait until Saturday in hopes that there will be better weather then.

- Proposed Solutions and Recommendations

1. Ignoring the uncertainty, assume that Saturday attendance is 24,139, that 18.92% of Saturday attendees will buy the DVD, and that 4,500 DVDs are produced. How much profit will be made on the DVD project if this scenario occurs? Make a recommendation about whether Monte should have the check delivered today to the video crew for their fees.

Assuming that 18.92% of 24,139 attendees will buy a DVD, the festival will sell out of the 4,500 they produced before reaching that demand ( $24,139 \times 18.92\% = 4,567$ ). Selling all 4,500 DVDs will produce CHF81,000 in revenue ( $4,500 \times 18 = 81,000$ ) at a cost of CHF24,450 ( $11,740 + 3,000 + 1250 + (4500 \times 0.86) + (4500 \times 1.02)$ ) making a profit of CHF56,550 ( $81,000 - 24,450$ ).

2. Provide a complete forecast for attendance at Saturday night's performance using case Exhibit 1 only.

Since exhibit 1 only provides historic Saturday attendance, we will use the mean method that we previously determined was the best simple forecasting method to create this forecast:

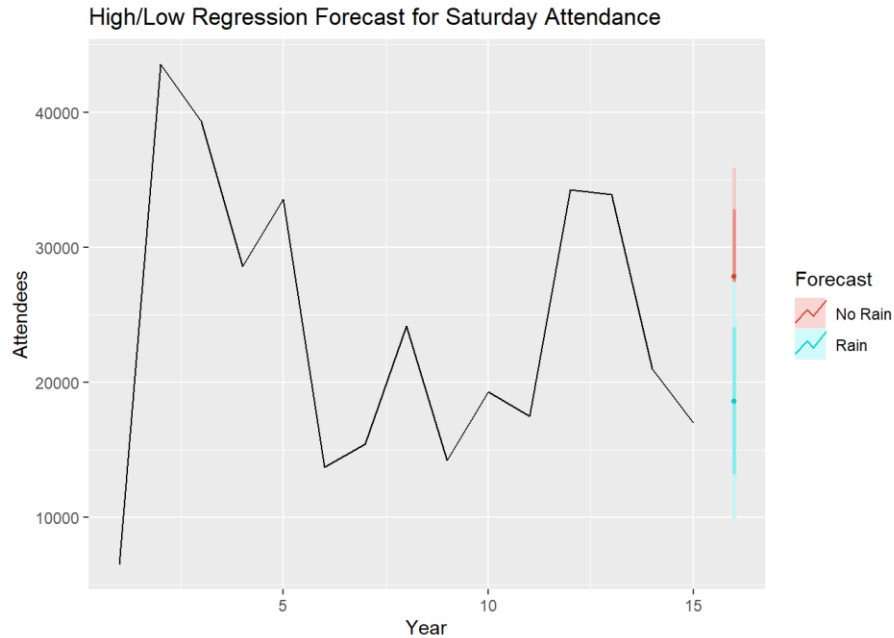
Year	Forecast	Low 80%	High 80%	Low 95%	High 95%
16	24,138.67	9,111.37	39,165.96	176.1248	48,101.21

3. Fyno has stated (case Exhibit 2) that he estimates the mean proportion of attendees who will buy the DVD to be 0.1892. He also believes that there is uncertainty in this number which is based on a sample of 37 individuals. If an individual's outcome has a standard deviation of 0.3917, what is the standard deviation of the average proportion of 37 people? Use this standard deviation along with the mean of 0.1892 in your analysis of later questions.

$$\text{Sample } SD = \sqrt{\frac{SD}{n}} = \sqrt{\frac{0.3917}{37}} = 0.1028907$$

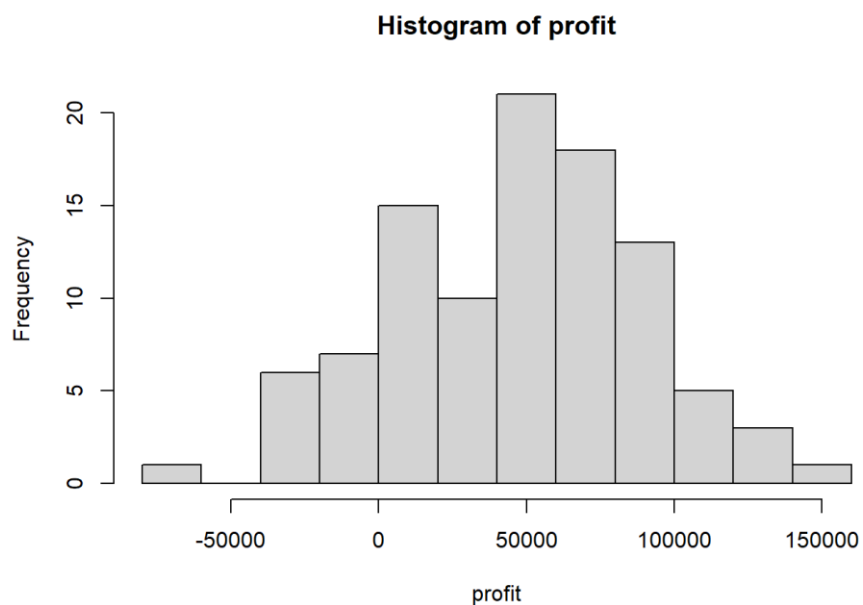
4. The weather forecast seemed important to Fyno, along with the number of people in attendance at Friday's concert. Make your best use of that information to provide an updated complete forecast of attendance at Saturday's concert.

To make best use of all of the information, we will use the regression model we made earlier to update our forecast. Since there is an 80% chance of rain on Saturday, we will run the regression twice, once assuming that it does rain on Saturday and one assuming that it does not rain, and take the weighted average of the two forecasts to create our updated forecast. The other two inputs that we will use for our regression are a Friday attendance of 18,394 and that it did not rain on Friday.



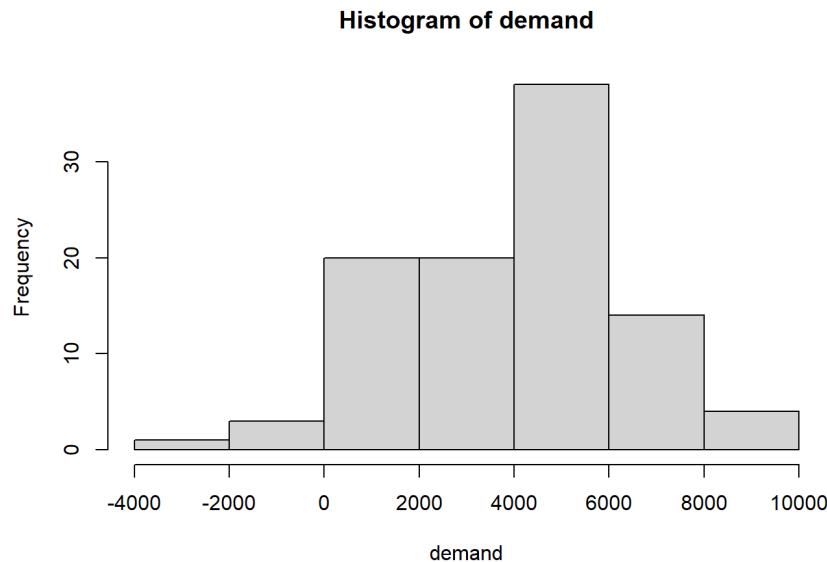
5. If 4,500 DVDs are produced on Saturday for the concert later Saturday evening, what is the risk profile (distribution) of profit (including all costs related to the DVD project)?

We can use the mean and standard deviation estimates for the proportion of attendees that will buy a DVD to create a normal distribution of demand. Using these demand numbers along with the rest of the formulation for profit that we derived in the first question, we arrive at the following risk profile of profit:



6. Please make a recommendation for how many DVDs to order from the production company.

Looking at the distribution for demand that we just created in the previous question, we can see that the most likely demand for DVDs is around 4,000. Since there is an added cost of producing more than 5,300 DVDs, I would strongly not recommend going over that limit but any amount up to that number is feasible.



7. In what ways can Carla Monte add value and reduce risk in the DVD project? Use insights you can glean both from your model and creative managerial thinking to produce ideas. Provide a rough rank order of the potential gains these ideas may provide.
- Purchase and setup rain coverings for the most frequented areas of the festival to reduce the impact rain has on festival attendance. The regression model shows that rain causes a decrease of around 8.5k people so reducing the number of people that do not show up due to rain is a big opportunity. Logically, if attendees know that the festival has adequate protection from the rain, they will be less likely to stay at home instead of coming to the festival on a rainy day.
  - Create pre-sales for the next year's DVDs ahead of time to get an idea of what demand looks like every year. This will reduce the risk of losing money on the deposits and setup fees since we will already know how demand is shaping up.
  - Speak with the production companies involved in the DVD making process to try and come up with a revenue sharing deal in order to reduce the amount of fixed setup costs involved in the venture. If each company is responsible for their own setup costs, this will reduce the sunk costs to make DVDs for the festival. This lowers overall risk for the venture while still ensuring that the festival can benefit, albeit to a lesser degree, from DVD sales.