Cinema Tickets Marketing Mix Report

GSB 516

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Introduction

Below are models based on eight months of sales history of different U.S. cinemas in 2018. These models will measure several variables' effect on total sales, including the price of the tickets, whether the movie was played in the first half of the year, and the number of times the movie was played in the cinema.

Spotlight Analysis - Dichotomous Moderator

The movie distributors questioned whether ticket prices would affect the total sales of the cinema. The model explained there is a significant relationship between ticket price and the total sales with a small p-value < 0.001 (Figure 1a). However, a follow-up analysis was needed to discover whether this relationship would be moderated if the movie was played in the first half of year. To create new models, two variables were initiated: *firstHalf*, one that indicates a 1 when the movie was released in the first half of the year, and *nonfirstHalf*, one that indicates a 1 when the movie was not released in the first half of the year. Each model was run similar to the original model having an additional interaction between the dichotomous moderator and ticket price, with the results shown in *Figure 2a and 2c*. With the significant p-values for both models, the estimates for ticket prices were inspected and concluded that the model that spotlights *nonfirstHalf* is higher. This confirms that when movies were released in the first half of the year, total sales increased by $303.92 for every additional dollar increased in ticket price. A graphical representation of this relationship is shown in *Figures 2e.*

Spotlight Analysis - Continuous Moderator

Regression on the relationship between total sales and ticket price, moderated by the number of shows played in a single day is displayed in *Figure 3a and Figure 3c*. The continuous moderator variable – *showTime* – was initiated. It was used to shift to different points to see if ticket price was only effective when the number of shows is either high or low, which led to new variables created: *showTimeLo* and *showTimeHi.*

The model showed that the price of the ticket was associated with total sales, especially in the higher range of shows. The lower range of shows would interact with the ticket price and decrease the total sales of the movie, yet the higher range of shows would result in the growth of total sales. These results implied that the ticket price of the movie was effective and profitable only when the number of shows was in the higher range. Based on the model, it's recommended to increase the number of shows for a movie for more lucrative total sales. To further analyze all possible ranges of the number of shows on the association with ticket prices and total sales, a floodlight analysis was investigated.

Floodlight Analysis - Continuous Moderator

With a floodlight analysis, the model revealed the impact of the number of shows on total sales for any ticket price. It indicated that the more times the movie was shown, the sales would increase, which was identical to the result of the spotlight analysis. This analysis also demonstrated that all levels of the number of shows were positively associated with ticket price and contained a small range of confidence intervals.

Conclusion

Based on the models, the movies released in the first half of the year with a higher range of shows would likely generate more sales. Thus, it is recommended to target released movies in the first half of the year and increase the number of shows since they had a positive significant effect on sales.

Appendix

Figure 1a: Output: Association between Ticket Price ($) and Ticket Sales ($)

Variables	Coefficient Estimate	P-value
Intercept	0.000000000007108	1
cPrice	254.19	< 0.0000000000000002***

*** indicates significance at the 0.01 level, ** indicates significance at the 0.05 level, * indicates significance at the 0.10 level.

Figure 1b: Graph for Association between Ticket Price ($) and Ticket Sales ($)

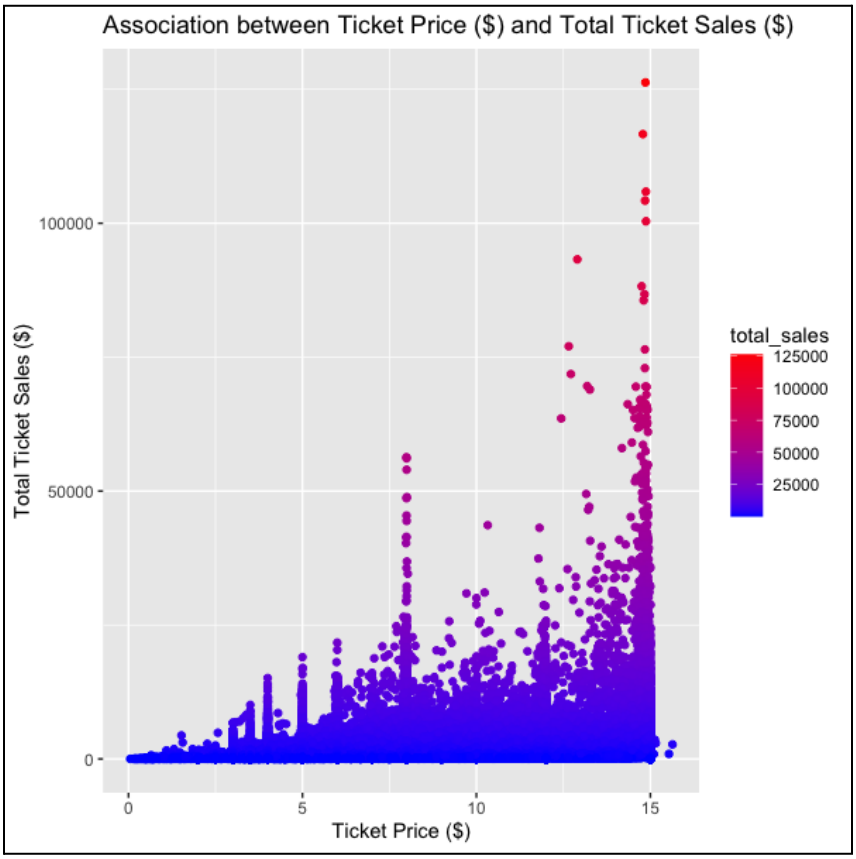

Figure 1c: Code for Association between Ticket Price ($) and Ticket Sales ($)

```
reg <- lm(cSale~cPrice, data=cin)
```

```
summary(reg)
```

Figure 2a: Output for Association between Ticket Price ($) and Ticket Sales ($), with First Half

Variables	Coefficient Estimate	P-value
Intercept	-140.84	<0.0000000000000002***
cPrice	221.99	<0.0000000000000002***
cfirstHalf	325.51	<0.0000000000000002***
cPrice:cfirstHalf	81.94	<0.0000000000000002***

Figure 2b: Code for Association between Ticket Price ($) and Ticket Sales ($), with First Half

```
cin <- cin %>% mutate(firstHalf= ifelse(month < 7, yes=1, no=0))
reg <- lm(cSale~cPrice*firstHalf, data=cin)
summary(reg)
```

Figure 2c: Output for Association between Ticket Price ($) and Ticket Sales ($), with Non-First Half

Variables	Coefficient Estimate	P-value
Intercept	184.67	<0.0000000000000002***
cPrice	303.92	<0.0000000000000002***
cnonfirstHalf	-325.51	<0.0000000000000002***
cPrice:cnonfirstHalf	-81.94	<0.0000000000000002***

Figure 2d: Code for Association between Ticket Price ($) and Ticket Sales ($), with Non First Half

```
cin <- cin %>% mutate(nonFirstHalf = 1 - firstHalf)
reg <- lm(cSale~cPrice*nonFirstHalf, data=cin)
summary(reg)
```

Figure 2e: Graph for Association between Ticket Price ($) and Ticket Sales ($), with First Half

0 = First Half = A Period from January to June

1 = Non-First Half = A Period from July to December

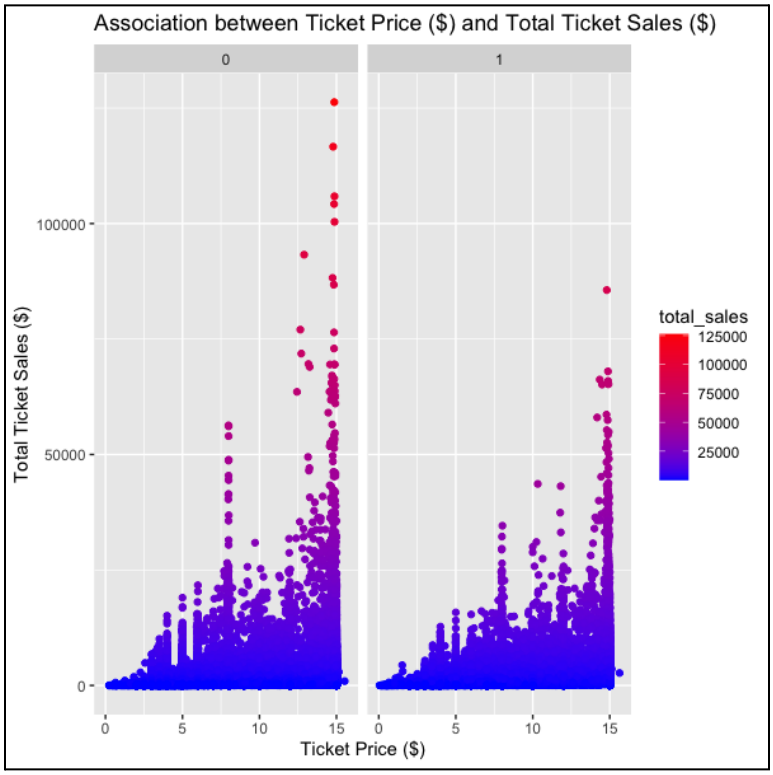

Figure 3a: Output for Association between Ticket Price ($) and Ticket Sales ($), with Lower ShowTime

Variables	Coefficient Estimate	P-value
Intercept	-1338.27	<0.0000000000000002***
cPrice	-130.51	<0.0000000000000002***
cshowTimeLo	378.93	<0.0000000000000002***
cPrice:cshowTimeLo	100.08	<0.0000000000000002***

Figure 3b: Code for Association between Ticket Price ($) and Ticket Sales ($), moderated by Lower Show Time

```
cin$showTimeLo <- cin$cShowTime + sd(cin$cShowTime)
reg <- lm(cSale~cPrice*showTimeLo, data=cin)
summary(reg)
```

Figure 3c: Output for Association between Ticket Price ($) and Ticket Sales ($), with Higher ShowTime

Variables	Coefficient Estimate	P-value
Intercept	978.60	<0.0000000000000002***
cPrice	481.38	<0.0000000000000002***
cshowTimeHi	378.93	<0.0000000000000002***
cPrice:cshowTimeHi	100.08	<0.0000000000000002***

Figure 3d: Code for Association between Ticket Price ($) and Ticket Sales ($), moderated by High ShowTIme

```
cin$showTimeHi <- cin$cShowTime - sd(cin$cShowTime)
reg <- lm(cSale~cPrice*showTimeHi, data=cin)
summary(reg)
```

Figure 4a: Graph for Floodlight Analysis

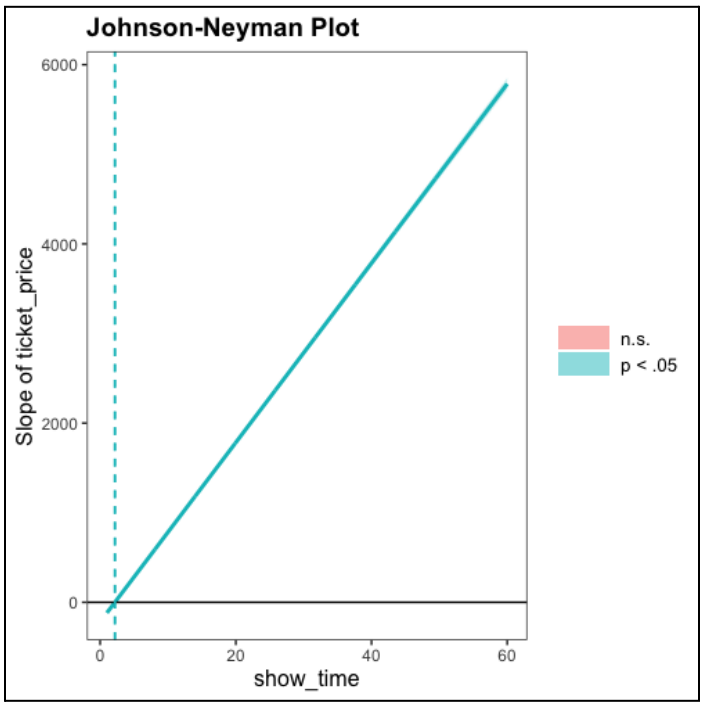

Figure 4b: Code for Floodlight Analysis

```
fl <- lm(total_sales ~ ticket_price*show_time , data = cin)
johnson_neyman(fl, pred = show_time, modx = ticket_price,
mod.range=c(1, 60), alpha = 0.05,  title = "Johnson-Neyman Plot")
```