

Should you Advertise During the Super Bowl in 2021?

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1. Introduction

The first Super Bowl was played in 1967 between the winners of the American Football League and the National Football League [1] with two different networks airing the game and drawing in spectators of more than 61,000 fans in attendance at the Los Angeles Coliseum [1]. Over the years, the popularity of the event has turned into an American cultural phenomenon, which takes the form of a sporting event, music concert, and advertising extravaganza during “Super Bowl Week”.

Due to its ability to draw a global audience, companies see the Super Bowl as a huge advertising platform. Advertising has been a part of the Super Bowl from the very beginning [2]. Significant viewing of the male population resulted in advertising geared toward men. The first Super Bowl had an estimated viewership of 56 million people. As of 2017, the Super Bowl now sees 111.3 million people watching the game [1]. Viewership is now mostly split evenly between men and women [2]. With this many people tuning in, despite the cost of advertising it can be a great place to get your product noticed.

2. Research Task

Given the cost of advertising during the Super Bowl, which is estimated to be \$5.2 million per 30-second spot [3], it is important that money is spent wisely. We have been asked to let our client know the odds of a favorable outcome for money spent to ensure a significant return on investment. Our client has let us know that when an East Coast team plays, their ads return a

large increase in sales. When a Midwest team plays, they have a mediocre increase in sales. Then when a West Coast team plays, they have a decrease in sales.

3. Literature Review

According to the Nielsen data from the past 10 years, Super Bowls have consistently been ranked in the top 13-most watched TV programs of all time in the U.S. in total views [4]. Nielsen also reported that there were 43.9 million social media interactions concerning the game across Facebook, Instagram and Twitter [4]. Thus, it is natural that companies would seize this excellent advertising opportunity to reach a vast audience of prospective buyers. However, the cost of advertising during this high-profile event does not come cheap with an estimated of \$5.6 million per 30-second spot [3] during last year's Super Bowl. Thus, the next question that companies should ask, "Is this worth it? And what do I get out of it?"

Yelkur, Tomkovich and Traczyk, *Super Bowl Advertising Effectiveness: Hollywood Finds the Games Golden*, found that 68% of the surveyed respondents said that they paid attention to the Super Bowl ads and that 52% had discussed the ads the following day [5]. In Choong, Filbeck, Tompkins and Ashman, *An event study approach to evaluating the economic returns of advertising in the super bowl*, researchers found that there is a positive and significantly average abnormal returns recorded on the first day of trading after the airing of the advertisement on the Super Bowl. [6] Similar results were found in a study by Raithel, Taylor and Hock, *Are Super Bowl ads a super waste of money? Examining the intermediary roles of customer-based brand equity and customer equity effect*, examined how customer-based-brand equity mediates the impact of Super Bowl ads on firm value. They also concluded that the Super Bowl ads that successfully change the consumer mindset by building positive brand associations lead to improved cash flows and, consequently, an increase in stock prices [7].

One particular study done by Stephens-Davidowitz, Varian and Smith, *Super returns to super bowl ads?*, investigated the causal effect of advertising of movie demand. They stated that the identification rest on two points: 1) Super Bowl ads are purchased before advertisers know which teams play; 2) home cities of the teams that are playing will have proportionally more viewer than other cities. They concluded that there was a substantial increase in opening weekend revenue due to Super Bowl ads when comparing product purchase patterns for the advertised movies in cities whose teams were playing in the Super Bowl [8].

4. Methods

4.1. Preparation of the Data

To provide an analysis of the return on investment for the client to advertise during the super bowl, our group calculated the probabilities of the teams that could be predicted to play in the super bowl. There were several methods that could have been used to determine the probability of each team to go to the super bowl.

Using a time series analysis of the past seasons and the point spread of each game could have indicated the probability of each team's likelihood of playing in the super bowl. Because this method provides probabilities and will not provide an exact number to show if the probabilities are correct, this was not the method selected as it was not an economically efficient method. The betting markets use a forecasting technique that is specific for the type of sport. For football, they use the winning percentage, the margin of victory, and the quality of the opponent. The methods used to predict the winners in the betting markets were correct 65% of the time [9]. Because these probabilities are generated based on established forecasting technique, it was determined that a model would be generated using the probabilities of the teams to play in the Super Bowl.

Another variable that was considered is the teams' revenues. According to Jakob Eckstein's article, "How the NFL Make Money," the NFL earns the majority of its money with TV deals [10]. It stated that Statista Research and Analysis, which is a well know market research and analysis service provider, estimated that more than 50% of the league's revenue came TV deals. Other revenue streams include ticket sales, merchandising, licensing rights and corporate sponsorships.

Logically, it made sense to utilize the yearly revenues of each team to help determine a possible percentage earning for our company. Data for each team was obtained from Statista.com [11] and Forbes.com [12] for periods 2001 – 2018. Teams were grouped in relation to their fanbase locations, not necessarily where the headquarters of the team was located, Figures 1-3 demonstrate each team's region and revenue.

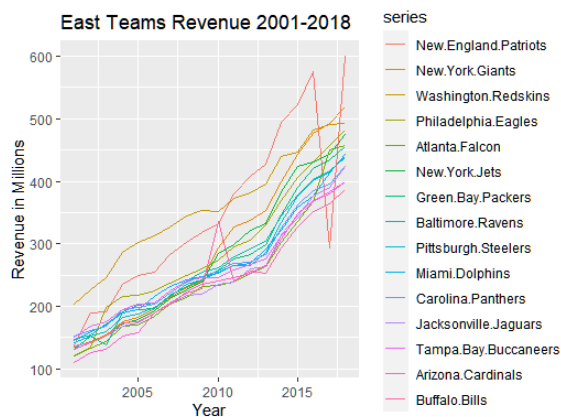


Figure 1

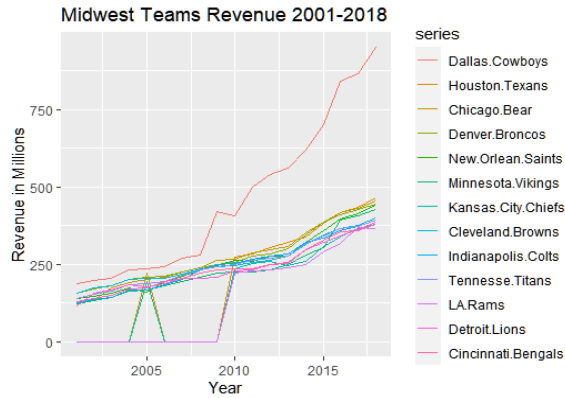


Figure 2

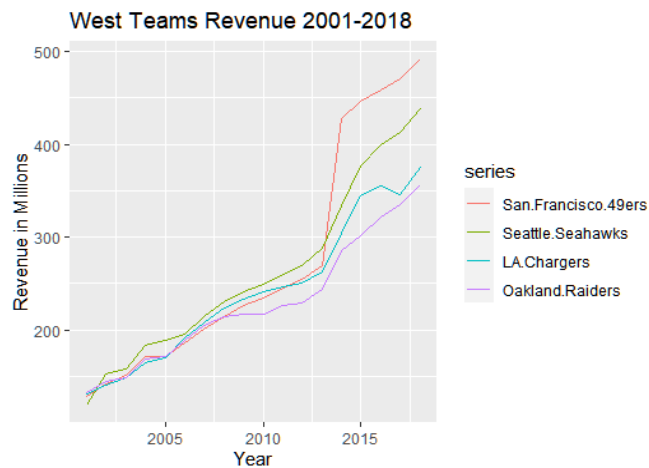


Figure 3

4.2. Analysis Methods

The algorithm used for deciding the teams that go to the Super Bowl operated on the betting odds for each team to win the conference championship in their respective conferences, the AFC or NFC. The betting odds, obtained from VegasInsider, were then converted into percentages that indicated the team's probability of winning their respective championship. For example, the Kansas City Chiefs carry 3/1 odds of winning the AFC championship, which converts into a 25% chance of winning. Our model split the NFL teams into their respective conferences and paired each team with its respective odds for winning their conference championship. Once separated into data frames consisting of AFC and NFC teams, the sample function is used. The sample

function picks an entry from the data frame(s) based on the probability, or betting odds, that were assigned to its 'prob' option and continues this process for 1,000 iterations inside of a for loop. Once the for loop completes its iterations, the data frames are displayed, giving the number of predicted outcomes for each team to win their respective conference championship. The AFC and NFC teams that have the highest number of entries will become the contenders for the upcoming Super Bowl.

Once our teams are selected from their respective conference, the percentage of revenue each team generates is calculated. Referencing data from [13] top team revenues, our teams were first weighted by region: East, Midwest and West. For example, New England is the top revenue earner in the East and received an 8% weight overall, Dallas Cowboys are top earners in the Midwest and received a weight of 16%. In order to offset these weights based on the ad profits, an additional weight was applied per region. A random weight was assigned for each region: East received a value between 0.5 to 1, Midwest received a value of 0.1 to 0.5 and West received a value between -0.01 to -0.1 and the respective weight was multiplied by the calculated region percentage to get an overall weight based on ad profit. Once our team's ad profit percentages are calculated, the sum of these becomes our total ad revenue for our NFC and AFC teams going to the Super Bowl. A variation of the bootstrap method was applied and a data frame of 1000 percentages was created to give each variable AFC, NFC and percent profit the same number of predictions.

5. Results

5.1. Team Selection

Using the R code for predicting Super Bowl contenders, we found that the Kansas City Chiefs and the San Francisco 49ers will compete in the Super Bowl. The process for choosing these

teams gave us 158 entries for the San Francisco 49ers and 201 entries for the Kansas City Chiefs.

It should also be noted that the San Francisco 49ers lead the second highest prediction for the NFC champion, the Tampa Bay Buccaneers, by 36 entries. On the other hand, the runner up in the AFC is the Baltimore Ravens with 14 fewer entries than the Kansas City Chiefs.

5.2. Revenue and Return on Investment Forecasts

Using the previously mentioned weight system, the Kansas City Chiefs were assigned a random value between 0.1 and 0.5, due to their geographical position in the Midwest. 1,000 values are generated and stored. On the other hand, the San Francisco 49ers were assigned a random value between -.1 and -.01. The San Francisco 49ers were also assigned 1,000 random values. Corresponding entries of random values for each team were added together to create the final weight used to determine the return on investment for the advertisers. Using an ARIMA model to forecast these values, we generated an average return on investment as well as a model with one step ahead forecasts for return on investment. Overall, the average return on investment was 0.3%, as seen in figure 4 below.

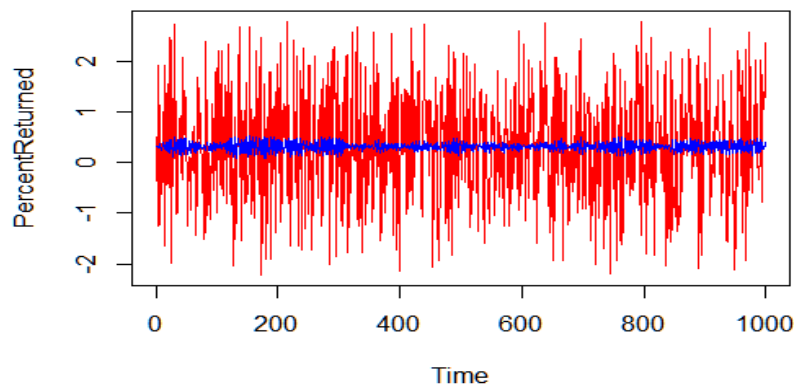


Figure 4

6. Discussion

When we look at our results and see that the average return on investment is only 0.3%, we have to question the usefulness for this company to purchase Super Bowl advertising when not knowing who will play in the game. This is a decision that the company would need to make. But, given the cost of \$5.2 million per ad and the expected return only being \$15,600, the company may find that their money is better spent on other advertising endeavors.

7. Limitations

To start we don't know exactly what the client is referring to as the East, Midwest, and West. We can make our best guess but without more guidance we may miss—categorize a team. The number of teams in each region will also impact the probabilities. The East Region tends to have more teams than both the Midwest and West, which affects the probabilities generated.

The Las Vegas odds that we use change over time. This could affect our results as time moves forward. Players get hurt causing backups to enter the game. This could have a positive or negative affect on if a team is likely to make the Super Bowl. We also must look at the current pandemic circling the world. This may drastically change the season. It may start later or end earlier, there may not be crowds of cheering fans, one team may be infected and have to drop out. There is currently a lot of uncertainty in the world of sports.

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Additional References

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Appendices

Code was written in R:

```
#Predicts teams going to Superbowl
TeamOdds=read.csv("OddsToSuperBowl.csv", header=TRUE )
NFCWinner=NULL
AFCWinner=NULL
NFCFINAL=NULL
AFCFINAL=NULL
for(j in 1:1000) {
  NFCWinner=sample(TeamOdds$NFC,size=1,replace = FALSE,prob =
TeamOdds$NFCODDS)
  AFCWinner=sample(TeamOdds$AFC,size=1,replace = FALSE,prob =
TeamOdds$AFCODDS)
  NFCFINAL=rbind(NFCFINAL,data.frame(NFCWinner))
  AFCFINAL=rbind(AFCFINAL,data.frame(AFCWinner))
}
summary(NFCFINAL)
summary(AFCFINAL)

#Parses out the winning team's string
winner1=summary(NFCFINAL)
winner2=summary(AFCFINAL)

team1=trimws(gsub( ".*", "",winner1[1]))
team2=trimws(gsub(".*", "",winner2[1]))

Revenue=read.csv("Stats.csv")
Percent=NULL

#Loop to run the random percent earning calculations (modified bootstrap)
for(j in 1:1000)
{
  #Random weights to multiply to the weight of teams
  eastweight=runif(1,min=0.5,max=1)
  midweight=runif(1,min=0.1,max=0.5)
  westweight=-(runif(1,min=0.01,max=0.1))

  for(i in 1:length(Revenue$Team))
  {
    if(Revenue$Team[i]==team1)
    {
      Revenue$region[i]
```

```

    if(Revenue$region[i]=="east")
      team1weight=Revenue$regionweight[i]*eastweight
    if(Revenue$region[i]=="mid")
      team1weight=Revenue$regionweight[i]*midweight
    else
      team1weight=Revenue$regionweight[i]*westweight
  }
  if(Revenue$Team[i]==team2)
  {
    if(Revenue$region[i]=="east")
      team2weight=Revenue$regionweight[i]*eastweight
    if(Revenue$region[i]=="mid")
      team2weight=Revenue$regionweight[i]*midweight
    else
      team2weight=Revenue$regionweight[i]*westweight
  }
}
PercentReturned=(team1weight+team2weight)*100
Percent=rbind(Percent,data.frame(PercentReturned))
}

```

```

#Exports to excel file and create arima model
data=data.frame(team1,team2,Percent)
write.csv(data,"Results.csv",row.names=TRUE)
fit=ts(Percent)
model=auto.arima(fit)
summary(model)
plot(model$x,col="red")
lines(fitted(model),col="blue")

```

```

#Creates timeplots of regions
Timeplot=read.csv("Timeplot.csv")

```

```

EastTS= ts(data=Timeplot[,2:16], start=c(2001),frequency = 1)
MidTS= ts(data=Timeplot[,17:29], start=c(2001),frequency = 1)
WestTS= ts(data=Timeplot[,30:33], start=c(2001),frequency = 1)
autoplot(EastTS)+ggtitle("East Teams Revenue 2001-2018")+ylab("Revenue in
Millions")+xlab("Year")
autoplot(MidTS)+ggtitle("Midwest Teams Revenue 2001-2018")+ylab("Revenue in
Millions")+xlab("Year")
autoplot(WestTS)+ggtitle("West Teams Revenue 2001-2018")+ylab("Revenue in
Millions")+xlab("Year")

```