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Are NFL teams getting the most out of their wins?
The Efficiency of Year End Revenues of Ten NFL
Teams

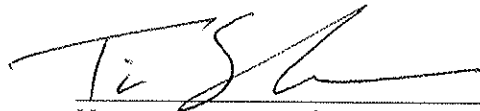
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RUNNING HEAD: Efficiency of Year End Revenues

Are NFL teams getting the most out of their wins?

The Efficiency of Year End Revenues of Ten NFL Teams

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Introduction

Major sports have taken over television, radio, toys, clothing and many other prominent industries. In today's world, many of the biggest celebrities and most common household names are professional athletes. With the economic impact of athletics comes its necessary evolution from a popular spectator event into a business. Each team in the major leagues is now not only pressured to produce wins (especially by their fans), but as a business, they must also bring in ticket sales, merchandise sales, and television viewers, and do so on a finite budget. This means that efficiency of funds is a vital goal for team managers and financial specialists. Efficiency in this sense can then be described as how well a team can transform its resources, such as key players, fan loyalty, and stadium location, into successful year end revenue.

This research project seeks to examine the effects of various factors on year-end revenues for the top ten most valuable teams in the National Football League. By analyzing such aspects as income, team record and stand out players, we will be able to determine how efficiently each team is performing in their respective revenues. This study provides insights that can be of great value to the sports marketing industry. By determining the efficiency of the studied teams' revenues, the NFL can reduce their unnecessary expenses that yield little to no return in revenue. Additionally, teams that are not seeing successful revenue reports will be able to identify their areas of weakness in comparison to other, better performing teams, and can make changes to accommodate where they are lacking. Ultimately, the goal of this research is to identify factors to improve revenue efficiency across the league as a whole by looking at the top performing teams (or best practices).

The DEA Model

There are several methods to approaching efficiency. For example, a simple ratio of output to input would be one such efficiency measure. However, this ratio does not allow for multiple inputs. Likewise, improvements in efficiency can come from minimizing the amount of inputs to produce a given level of output (i.e., input-oriented) or maximizing output for a given amount of inputs (i.e., output-oriented). Since this paper is interested in understanding the factors that might explain the final year-end sales, an input-oriented model was employed. The impacts of each input are generally based on previous research with the output goal in mind, but since there was little previous information, the inputs for this study were chosen to cover a broad range of topics that all had the potential for impact. The effect of each input is subject to the inputs of the teams included in this study. That is, the inputs included in this study provide evidence of best practices among the teams including based on these factors.

Data envelopment analysis (DEA) model is a common method of benchmarking productive efficiency (Zhu 2003). For this study, productive efficiency is defined as how effectively an entity is using its resources to achieve an end product. The DEA model allows for analysis of the relationship between inputs and outputs, in other words, what is being used to produce an end result and the end result itself, respectively.

Data and Methodology

All data for each team's history, MSA statistics and revenues was collected using reputable online sources such as *Forbes*, *Census Reporter* and *ESPN*. The data was collected, organized into a spreadsheet and then estimations were performed using an add-in for Microsoft Excel, DEA frontier. Since this was an input-oriented analysis, each team's efficiency was based

on what inputs they should have according to their year's reported revenue. The completed analysis provided efficiency scores for each team, between 0 and 1, where a score of 1.0 represents a team that is on the efficiency frontier. Teams that score less than 1 represent inefficiencies, meaning they used more inputs than needed to yield their respective merchandising revenues.

The teams researched for this study are the top 10 most valuable teams in the NFL based on their year-end revenue as of the end of 2016. For this study of NFL teams, the inputs are regular season wins for the year 2017, Pro-Bowl players for 2017, per capita income of the metropolitan statistical area (MSA) associated with each team's stadium, and Super bowl wins since 2007. While there could be many contributing factors to a team's year end revenue, these inputs were chosen because they cover a broad variety of said factors and provide areas upon which teams can be reasonably improved, or represent some outside factors that may be impactful and cannot be changed by the organization. The data on these inputs is also readily available to the public. Regular season and Super bowl wins were chosen to highlight the potential impact of team performance on revenue while Pro Bowl players were researched under the assumption that they would be fan favorites and generate merchandise revenue. Finally, per capita income was included as a factor that was outside of each team's controllable scope, but that could be useful in determining how the team should be marketed, how prices should be determined and what motivates fans to support the team in their area. The output will be the team's year end revenues from ticket sales, merchandise, endorsements and any other income-generating performance done by the team during the year 2016.

These teams, in order of value, are: the Dallas Cowboys, New England Patriots, New York Giants, San Francisco 49ers, Washington Redskins, Los Angeles Rams, New York Jets,

Chicago Bears, Houston Texans, and the Philadelphia Eagles. These teams vary in success, geographical location, fan demographics and past championships, to name a few. Some of these teams, such as the Dallas Cowboys, have loyal fan bases while others, such as the Patriots, are seeing recent success and are currently building a similar following. The varying locations of these teams are also impactful on their success in their respective markets. Such factors as climate, per capita income, major professional teams in the same area, etc., may play a crucial role in determining how well a team performs in bringing in revenue.

The results of the DEA revealed important conclusions as to best practices among the set of teams. The first are the critical success factors (wins, Super Bowls, salaries) for teams to be able to improve their efficiency, and in this case, team revenue. The second, and possibly more important, is how inefficient a team may be as compared to best practices, or most efficient teams in the study.

Results- Efficient Teams

The Dallas Cowboys are the most valuable team in the NFL according to a 2017 team valuation done by *Forbes*. This fact was reinforced by the results of this study as they were also found to be the most efficient team in terms of how much output they receive based on their level of input. They have an appropriate amount of regular season wins, Super Bowl wins, pro-bowl players, and per-capita income based on their total revenue. The Cowboys have had a strong fan base for many years and are often referred as “America’s team”. This long standing loyal fan base is a likely contributing factor to their consistently high team value as well as revenue despite varying team performance. This finding also highlights that as an organization the Dallas Cowboy efficiently utilizes their resources to reach their end revenue of \$700,000,000.

In addition to the Cowboys, the New York Giants, the San Francisco 49ers, the New York Jets, and the Chicago Bears are all also on the efficient frontier (efficiency score=1.0) based on their regular season wins, Super Bowl wins, pro-bowl players and per capita income which yielded the reported yearly revenue. Even though there are clear differences among these teams in both their inputs and outputs, notably, in per capita income and regular season wins, they share the commonality of performing as expected based on their resources. In conclusion, each team is efficiently aligning their resources to reach their given revenue.

Results- Inefficient Teams

Though the Patriots are the second most valuable team, they are not necessarily efficient and could be more valuable according to our results. In recent years, the Patriots have had very successful seasons that have not resulted in major increases in revenue. From the data, they are winning approximately 5 more regular season games than needed for their recorded \$523,000,000 in revenue. They also appear to not be capitalizing on the additional 4 pro-bowl players, \$25,000 excess of per-capita income and 2 Super Bowl wins. That is, the Patriots are not efficiently converting those successes into additional revenue relative to other teams. It is important to note that the Patriots have had their successes within the last 10 years, so it is relatively new. This lag in strong performance's effect on buyer behavior could explain the slack in revenue. Additionally, the Patriots are combatting other major New England sports teams with historically loyal fan bases. These teams include the Boston Red Sox, Boston Celtics, and Boston Bruins among others. This competition among these major teams in other sports could account for the seemingly low revenue held by the Patriots.

The Washington Redskins were also found to be inefficient. The Redskins overproduced in the regular season by approximately 3 wins and had an excess of nearly \$26,000 in per capita

income. Based on the team's high performance and fan base's speculative buying power, the Redskins' revenue is surprisingly low. The Redskins' low revenue could be a result of success lag similar to the Patriots since they have no recent Super Bowl wins. Another misleading factor is the high per capita income around the Redskin's MSA; however, high purchasing power doesn't result in fans spending money on Redskins' tickets, gear and memorabilia. There could be other factors that draw the MSA residents' buying decisions elsewhere, such as high costs of living.

The Los Angeles Rams also have inefficiencies, though they are the closest of the inefficient teams to being efficient. Based on their current revenues, they had one too many wins and approximately \$1,000 extra per capita income. Meanwhile, the Houston Texans had \$416,000,000 in revenues which, based on their levels of analyzed inputs, is not an efficient performance. The Texans had 5 too many regular season wins, 1 extra Pro-Bowl player and \$8,000 of surplus per capita income. Considering their team success, impact players and fan spending power, the Texans under produced in their year's revenues. Lastly, the final inefficient team is the Philadelphia Eagles. They had 3 extra regular season wins, 1 extra Pro Bowl player and about \$15,000 in excess per capita income. Based on their \$410,000,000 revenue performance, the Eagles over performed. With the Eagle's inputs, they should expect higher revenues.

Conclusions (Implications)

Of the ten teams analyzed in this study, 5 were on the efficiency frontier while 5 were deemed inefficient. This means that for half of the top ten highest valued teams, the

organizations were efficient in regular season wins, Pro-Bowl players, Super bowl wins in the last 10 years, and per capita income of the MSA, necessary to achieve their output. These five teams could be examined for “best practices” in terms of the inputs that were used. For the other half, the levels of input were not yielding the expected value of year-end revenues, meaning for what was being put in, not enough revenue was generated relative to the efficient teams. It was common among these inefficient teams to have successful seasons in terms of wins, key players and recent Super bowls, that didn’t seem to have a positive impact on revenue. While one would not advise a team to not win, these teams were not able to capture as much revenue as other similar teams. Therefore, recommendations include looking at the qualities of these other efficient teams and implement their best practices. For example, one strategy may be to increase the fan experience, such as loyalty programs, game entertainment and new purchasable gear. Essentially, the goal is to promote the experience, not just the contest. This same principle applies to Super bowl wins. While a major championship win can be incredibly effective in developing loyal fans who are more likely to purchase gear and season tickets, for teams who have the expectation of being successful, there might be a more cost effective, timely or convenient method to achieving similar results. This could mean starting new home game traditions, a rebranding of purchasable team memorabilia and gear, or even making the players more approachable via meet and greets. On the subject of individual players, one of the analyzed inputs was the teams’ number of Pro-bowl players. When a team is over performing in this category, it means they could reallocate overspent funds from a single player salary to 2 or 3 solid players that could result in better team performance. If they are underperforming in Pro-bowl players, then it is recommended that the team spends a little extra to bring in a key player that could attract more viewers, publicity or possibly wins. This study shows that there are many

factors to consider when attempting to either improve revenue or decrease costs while maintaining revenues, but this also means that there are multiple available options teams can take to make sure they are performing as efficiently as possible.

Future Studies and Recommendations

This research was of the top 10 most valuable teams in the NFL. There are 32 total teams in the league which means there are many teams to analyze outside of this study. That is, characteristics among these top 10 teams may be different for the rest of the NFL. For future research, the DEA analysis would be applied to all 32 teams, which provides a larger window for comparison and possibly greater insight towards the factors affecting team revenue efficiency. This same type of analysis also has relevancy outside of the sport of football. Many other revenue-generating, professional sports such as baseball, basketball and hockey in the United States and soccer and volleyball abroad could be analyzed for their own respective team efficiencies since similar factors affect these sports' revenue success.

Another expansion upon this study is the inclusion of more inputs. While the inputs in this research revealed insightful information about what affects revenue, there are many other inputs that could be considered. Average player salary, stadium capacity, team sponsors, the fan experience and even team success, specifically, major championship wins, from farther back than 10 years are all possible examples of the endless list of inputs to include in future work. Team history would likely impact a fan's support at a deeper level than one current season would, so this could be crucial to conclusions in future work. It is also valuable to note that certain inputs may have greater impacts than others, but this is only known after the study is complete, so each future study would allow further elaboration and therefore insight to what results in the greatest change in the desired output.

The most contentious input in this study was the per capita income of the MSA. While this factor is certainly important and influential to revenues, its primary purpose was to represent cost differences across the different geographical areas among the ten teams studied. For example, a dollar of revenue in the South (i.e. Cowboys) might not equate to a dollar of revenue in the Northeast (i.e. Patriots). While per capita income cannot be directly influenced by each organization, it is a factor worth noting in developing marketing strategies geared toward each level of income recognized among fans.

This work uses the top ten valued teams to highlight the value of this type of analysis in providing insights into the factors that impact team value. Along with examining other types of inputs, this research could focus on different measures of output based on individual team goals (e.g. winning a Super Bowl, generating revenue, developing a fan base). For example, rather than team value, the organization could look at what factors (inputs) impact ticket sales. A clearer focus would yield more accurate and possibly more insightful results. As such, DEA is just one such tool that organizations can use to gain a better understanding of the factors that are not being used efficiently.

Appendix

Table 1: Data Table

This table contains all the data collected on each team including both inputs and outputs.

Team	Wins (Regular Season)	Pro-Bowl Players	Per Capita Income of Metro Area	Superbowl Wins (since 2007)	Total Revenue (Millions)
Dallas Cowboys	13	4	51099	0	700
New England Patriots	14	7	68292	2	523
New York Giants	11	1	38894	2	444
San Francisco 49ers	2	2	64882	0	446
Washington Redskins	8	1	79206	0	447
Los Angeles Rams	4	0	54526	0	317
New York Jets	5	3	38894	0	423
Chicago Bears	3	0	53886	0	385
Houston Texans	9	2	54346	0	416
Philadelphia Eagles	7	3	57173	0	407

Table 2: Efficiency Scores

This table contains the teams with their efficiency score on the right, where 1 is perfectly efficient and any value less than 1 is inefficient.

<i>DMU No.</i>	<i>DMU Name</i>	<i>Input-Oriented VRS Efficiency</i>
1	Dallas Cowboys	1.00000
2	New England Patriots	0.63165
3	New York Giants	1.00000
4	San Francisco 49ers	1.00000
5	Washington Redskins	0.78730
6	Los Angeles Rams	0.98826
7	New York Jets	1.00000
8	Chicago Bears	1.00000
9	Houston Texans	0.84716
10	Philadelphia Eagles	0.74671

Table 3: Target Values

This table depicts each teams target inputs based on the given output which was the reported year-end revenue for 2016.

DMU No.	DMU Name	Efficient Input Target				Efficient Output Target Total Revenue (Millions)
		Wins (Regular Season)	Pro-Bowl Players	Per Capita Income of Metro Area	Superbowl Wins (since 2007)	
1	Dallas Cowboys	13.00000	4.00000	51099.00000	0.00000	700.00000
2	New England Patriots	8.84303	2.99348	43136.31035	0.35411	523.00000
3	New York Giants	11.00000	1.00000	38894.00000	2.00000	444.00000
4	San Francisco 49ers	2.00000	2.00000	64882.00000	0.00000	446.00000
5	Washington Redskins	4.96825	0.78730	53337.44762	0.00000	447.00000
6	Los Angeles Rams	3.00000	0.00000	53886.00000	0.00000	385.00000
7	New York Jets	5.00000	3.00000	38894.00000	0.00000	423.00000
8	Chicago Bears	3.00000	0.00000	53886.00000	0.00000	385.00000
9	Houston Texans	4.39417	1.69432	46039.68856	0.00000	416.00000
10	Philadelphia Eagles	4.49341	2.24012	42691.39164	0.00000	413.37481

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