Are sports teams playing fans?
An application of the Fan Cost Index across the Big Four sport leagues

Trey Foulks, Anaya Patel, Manny Portugal, and Taylor Thomas (University of North Carolina at Chapel Hill)

INTRODUCTION

Across the NBA, MLB, NHL, and NFL, research has shown a wide range of ticket prices set for fans as they desire to see their favorite teams play in person. The Fan Cost Index (FCI) analyzes the price for a family of four to attend, pay for concessions, and park a single vehicle for a game; combining all costs associated with a sporting event. This study researches whether certain leagues and athletic organizations are overcharging or undercharging fans with the FCI and what factors are greatly influencing the cost of being a fan.

Research Question: *Which teams in the Big Four leagues are overcharging or undercharging fans? What factors, particularly team performance, influence the cost of being a fan?*

METHODS

Our independent variable was FCI sourced from Rodney Fort Sports Business Data. We collected a pooled sample of data from the 2019 seasons across the Big Four Leagues to account for the 2020 seasons affected by COVID. The variables we looked at were as follows:

Total Duration: average time for one regular game in minutes
Number of Games: total number of games in a season
TV Market Size: population of media market in team's geographic area
Team Value: value of team in billions
% Stadium Capacity: average number of seats filled in the stadium
Age of Arena: how old is the stadium that the team plays in
Won Title?: did the team win a title in the previous year?
Winning Percentage: number of games won out of total games in a season

Using a hierarchical regression analysis, we grouped variables based on duration variables (average duration of one game, and number of games), market variables (TV market size and team value), stadium variables (percent capacity and age of arena) and performance variables (title win and winning percentage).

Hierarchical Regression Analysis Results

Predictor Variables	Model 1	Model 2	Model 3	Model 4
Duration-Related				
Total Duration	-.03 (-.51)	-.21 (-3.3)**	-.07 (-1.0)	-.05 (-8.0)
Number of Games	-.76 (-12.5)**	-.68 (-12.7)**	-.52 (-7.4)**	-.58 (-8.0)**
Market-Related				
TV Market Size		.15 (2.8)**	.15 (2.9)**	.19 (3.6)**
Team Value (in billions)		.35 (5.0)**	.27 (3.8)**	.19 (2.6)**
Stadium-Related				
% of Stadium Capacity			.25 (3.4)**	.20 (2.6)**
Age of Arena			.04 (.98)	.03 (.61)
Performance-Related				
WonTitle?				.07 (1.5)
Winning Percentage				.12 (2.3)*
F-statistics	80.265	73.321	56.193	45.034
R^2	.572	.713	.744	.760
ΔR^2	.572**	.141**	.031**	.016**

Note: Standardized coefficients reported (β); t-values in parentheses; * $p < .05$; ** $p < .01$

RESULTS

As the models advanced and steps were added, the model described more of the variance in the Fan Cost Index. Our final model explained 76% of the variance in Fan Cost Index. When broken down into steps, we discovered how much variance was added for each block. The initial model with the duration block described 57.2% of the variance. The market block added 14.1% of the variance explanation to the model. The stadium block added 3.1% of variance explanation to the model. And lastly, the final block of performance added 1.6% of the variance explanation to our model. All of these values were statistically significant at the $p < .01$ level.

Final Predictive Model

Variable	Coefficient	Coefficient *t*-statistics	Significance
(Constant)	139.007	.985	.327
Winning Percentage	4.446	2.339	.021[b]
Won Title?	61.689	1.524	.130
TV Market Size	14.859	3.611	.001[a]
Team Value (in Billions)	27.599	2.675	.009[a]
Age of Arena	.240	.619	.537
% Stadium Capacity	1.707	2.630	.010[b]
Total Duration (in mins)	-0.377	-0.807	.422
Number of Games	-1.657	-8.089	.000[a]
		F- Statistic	34.139
		Significance	.000[a]
		R^2	.760
		Adjusted R^2	.743

[a]Significant at the .01 level
[b]Significant at the .05 level

IMPLICATIONS

This model is cross-sectional due to limitations on the scope of the class and time. Future research should look at how these variables would affect FCI over a longer period of time. All data is from pre-COVID, so further research should be done in the future to analyze whether the pandemic has had any effect. Teams can use similar models to analyze whether they are overcharging or undercharging fans.

Using the coefficients from the final predictive model, we created an equation to find a Predicted FCI for each team across the four leagues. Upon further analysis of these values, we found that NBA teams were far more likely to provide a higher value to fans while MLB teams were far more likely to overcharge fans on a per-game basis. The reasoning for MLB teams having a worse value is likely due to a combination of more total games in their schedule and a much lower average attendance.

Within the NFL, the two teams with the worst values were the Raiders and Chargers who had just relocated, indicating that they may have overestimated the value of their own relocation. The NHL had the least variance in values across the four leagues, indicating that teams are doing a better job of adjusting their own prices.

Based on the summary of all of our results, we believe teams should do a better job of adjusting ticket prices based on team performance to match their relative value to fans.

Best and Worst Fan Cost Index Values

Team	Actual FCI	Predicted FCI	Difference
Best Values			
Toronto Raptors	$359.90	$478.57	$118.67
Utah Jazz	$307.95	$426.51	$118.56
Washington Wizards	$273.07	$384.95	$111.88
Charlotte Hornets	$242.56	$352.32	$109.76
New Orleans Pelicans	$253.84	$363.33	$109.49
Worst Values			
New York Knicks	$856.00	$563.37	-$292.63
Las Vegas Raiders	$784.01	$531.46	-$252.55
Los Angeles Chargers	$820.56	$621.52	-$199.04
Houston Astros	$313.38	$117.05	-$196.32
Washington Nationals	$296.48	$111.38	-$185.09