Analyzing the Economic Viability of the Florida Panthers in a Non-traditional Hockey Marke*

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*Code and data are available at: https://github.com/UofT-DailinLi/NHL-Florida-Panthers-Team-Analysis.git

1 Introduction

The Florida Panthers were chosen for analysis because it was a unique opportunity to explore the dynamics of an ice hockey team in a southern city. Typically, ice hockey is played in cold areas, such as Canada and the United States' northern cities. Ice culture has popularized the sport. However, the Panthers hockey team's location in the Miami metropolitan area is known for its warm climate. This is where we can look at a particular case to see how franchises have evolved and dealt with the challenges in a non-traditional field hockey market.

2 Part 1: Florida Panthers

Although the Panthers are located in a southern city, the Miami metropolitan area actually has a significant population of 62 million, which is seventh in the U.S. Metropolitan Statistical Area (MSA) rankings("Ice Hockey Wiki: NHL Cities by Population" 2023). But hockey isn't as popular as traditional sports like football and basketball in southern cities, and even with a large market size, market penetration and fan engagement can be significantly reduced. Income levels in South Florida vary widely; as we can see from point2home's online data, the average household income is $79,886. However, by region, the highest average household income is $161,979, and the lowest is $35,837("Miami, FL Demographics" 2023). Higher incomes in certain areas set the stage for revenue from pricey season tickets and front-row tickets. Also, the South Florida area is home to many corporate headquarters, including as many as five Fortune 500 companies. This lays a strong foundation for corporate sponsorships and partnerships, such as Ford being a major sponsor of the Panthers, which is a significant part of the team's revenue("Forbes: The Business of Hockey" 2023).

Regarding team revenue, ticket revenue is the most intuitive revenue, and the Panthers have $49 million in ticket revenue based on 2023 numbers, compared to his total revenue of $160 million, or about 30 percent. And the top teams in the rankings can all have ticket revenue of about 50% of their total revenue. This revenue is affected by the team's record, publicity, and whether or not a recognizable player is competing, and the Panthers have a lot of room for improvement. The remaining 70% of revenue is from television broadcasts, corporate sponsorships, and franchise merchandise sales("Forbes: The Business of Hockey" 2023). National telecast deals are shared among NHL teams, but local broadcast deals are based on market size and team popularity. Meanwhile, the Panthers have established strong relationships with many major corporations headquartered in Miami, including arena naming rights, advertising, and sponsorships that are a significant part of the team's revenue. Team-branded merchandise and arena food sales are additional major sources of revenue.

In terms of expenses, player salaries are the most significant cost, with player expenses up to 90 million in 2023, which is 56% of total revenue, a percentage with expenses higher than many of the top few big teams. This could be related to the team's popularity and location, where the team has to pay high prices to retain talent. Again, most of the expenses are game operations,

arena maintenance, and employee expenses. In 2023, the Panthers had a net income of 6 million, a vast improvement from the opposing net income before the epidemic("Forbes: The Business of Hockey" 2023). The team's dynamic and diverse revenue streams have allowed the Panthers to turn around their profit and loss, again adapting to the unique market conditions of South Florida.

3 Part 2: League analysis

3.1 Data

To run further league analysis and investigate why the Florida Panthers, a southern city-based hockey team, can survive in a complex sports environment, I gathered data from various sources, including Professor Rodney Fort's website(Rod 2023), Forbes(Forbes 2023), Statistics Canada(Statistics Canada 2023), and the United States Census Bureau. I collected NHL team data from 2014 to 2019 for enough observations to run a regression analysis. It includes 182 observations and nine original variables: "Year," "Team," "Revenue," "Expense," "Payroll," "Operating Income," "NHL Points," "NHL Win Per," and "Population." To account for the inflation, I will adjust four variables, "Revenue," "Expense," "Payroll," and "Operating Income," by inflation rate to ensure they reflect constant dollars with the base year 2014, providing more accurate analysis and financial trends(Federal Reserve Bank of Minneapolis 2023). Data was cleaned and analyzed using the open-source statistical programming language R (R Core Team 2022), and additional packages from `tidyverse` (Wickham et al. 2019), `stargazer` (Hlavac 2018), `kableExtra` (Zhu 2019), `here`(Müller 2017), and `dplyr` (Wickham et al. 2020). The cleaned dataset contains 182 observations, and nine cleaned variables will be shown below.

Table 1: First Ten Rows of Cleaned Sports Data

Year	Team	NHL_Points	Winning_Percent	Population	Adjusted_Rev	Adjusted_Exp	Adjusted_Payroll	Adjusted_Payroll_million	Adjusted_Income
2014	Anaheim Ducks	116	0.66	13.166609	107	110.7	59697500	59.70	-3.7
2014	Boston Bruins	117	0.66	4.746931	164	129.5	73705000	73.71	34.5
2014	Buffalo Sabres	52	0.26	1.135060	103	98.6	56677500	56.68	4.4
2014	Calgary Flames	77	0.43	1.386828	122	99.7	52416000	52.42	22.3
2014	Carolina Hurricanes	83	0.44	1.241189	91	105.0	58815000	58.82	-14.0
2014	Chicago Blackhawks	107	0.56	9.560430	172	121.8	73122500	73.12	50.2
2014	Colorado Avalanche	112	0.63	2.753973	104	95.6	54175000	54.18	8.4
2014	Columbus Blue Jackets	93	0.52	2.001635	86	101.6	52789275	52.79	-15.6
2014	Dallas Stars	91	0.49	6.889769	113	109.5	56950000	56.95	3.5
2014	Detroit Red Wings	93	0.48	4.311194	134	118.8	73232500	73.23	15.2

Table 1 shows the first ten rows of cleaned sports data, "years" means the data was estimated in which year, "Team" means the sports team, "NHL Points" refers to a scoring system used in the NHL league, 2 points for a win, 1 point for an overtime or shootout loss, 0 points for a loss in regulation time. "Winning Percent" means the win rate of a team, and "population" means the Combined Statistical Area (CSA) population. The "Adjusted Revenue," "Adjusted Exp," "Adjusted Payroll (Million)," and "Adjusted Income" are four adjusted income-related variables.

3.2 Regression Model

Comparison of Linear Regression Models

	Dependent variable:		
	Adjusted_Rev		
	OLS		
	(1)	(2)	(3)
Constant	130.326***	94.038***	-3.287
	(4.025)	(15.949)	(28.502)
Population	1.743***	1.697***	1.672***
	(0.490)	(0.478)	(0.456)
Adjusted_Payroll_million			2.001***
			(0.495)
Winning_Percent		42.790	-7.720
		(28.740)	(30.149)
Year2015		8.647	1.746
		(9.168)	(8.916)
Year2016		11.101	0.698
		(9.167)	(9.122)
Year2017		19.345**	7.581
		(9.167)	(9.222)
Year2018		24.159***	13.334
		(9.169)	(9.153)
Year2019		28.753***	13.461
		(9.441)	(9.775)
Observations	165	165	165
R2	0.072	0.153	0.233
Adjusted R2	0.066	0.115	0.194
Residual Std. Error	35.233 (df = 163)	34.299 (df = 157)	32.740 (df = 156)

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F Statistic              12.657*** (df = 1; 163) 4.050*** (df = 7; 157) 5.929*** (df = 8; 15
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Note:                                                                  *p<0.1; **p<0.05; ***p<0.
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From the first regression, we can see if we only care about the relationship between population and revenue, the constant is 130 million, and the coefficient for population is 1.743. It indicates that for one more million people in the combined statistic area, the team tends to earn 1.743 million dollars on average. However, this regression does not consider other variables like years and winning percentage. Thus, we run the second regression. We include years as dummy variables and winning percentages to eliminate the effect by years and investigate whether the win rate will affect the overall revenue. The table shows that the coefficient of the winning percent is positive. The win rate affects the overall revenue since the winning percentage in data is on a from 0 to 1 scale. By controlling the dummy variable years, we can see the coefficient on years keeps increasing from 2015 to 2019. These coefficients indicate holding other variable fixes; 2015 tends to have 8.647 million dollars more revenue than the base year 2014, and 2016 tends to have 11.101 million dollars more than 2014. The increasing coefficient reveals the overall revenue for the NHL league has kept increasing from 2014 to 2019. For the third regression, we want to see if the payroll to the player, which is the most significant expense, affects the teams' revenue. This regression shows that parole has a positive coefficient, but the constant becomes negative, indicating the payroll expense. But, this time, the winning percent coefficient becomes negative.

4 Part 3: Team in the context of the league

After analyzing the league situation, we choose the second model to examine the Florida Panthers' financial health. The regression model is here:

$$\begin{aligned}\text{Adjusted\_Rev} = \beta_0 + \beta_1 \times \text{Population} + \beta_2 \times \text{Winning\_Percent} + \\ \beta_3 \times \text{Year2015} + \beta_4 \times \text{Year2016} + \beta_5 \times \text{Year2017} + \\ \beta_6 \times \text{Year2018} + \beta_7 \times \text{Year2019} + \epsilon\end{aligned}$$

In this equation $\beta_0 = 94.038$, $\beta_1 = 1.697$, $\beta_2 = 42.790$, $\beta_3 = 8.647$, $\beta_4 = 11.101$, $\beta_5 = 19.345$, $\beta_6 = 24.159$, $\beta_7 = 28.753$.

After we put all of Panther's information into this equation, we got six revenue estimations from 2014-2019.2014 is 119.28, 2015 is 132.77, 2016 is 140.08, 2017 is 142.44, 2018 is 151.99, and 2019 is 152.36 million dollar. After we compare it to the real data, we can find the actual revenue is all below 100 million dollars. Actual revenues were well below estimates compared to expectations, meaning the Panthers' financial performance was well below the

league environment and their situation. Several factors could have contributed to the lower-than-expected revenues, as the study period, 2014 through 2019, was pre-epidemic, so the epidemic's impact was excluded. This could be related to the team's winning percentage, which was lower, plus being located in the tropics of Florida, which led to a decline in the popularity of hockey as well as revenues from title and advertising. At the same time, the Panthers only made 30% of their gate receipts, which is a far lower figure than other teams. Net income has also invariably been in the red over the years. According to the analysis, the Floridian Panthers need to meet expectations, raising concerns about the team's financial situation. Whether or not the situation can be turned around in the future depends on whether the Panthers can capitalize on the dynamic market.

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