THE EFFECT OF SPORTING EVENTS ON FIRM-LEVEL ECONOMIC ACTIVITY IN UPTOWN CHARLOTTE

by

Benjamin Luke Fore

A thesis submitted to the faculty of
The University of North Carolina at Charlotte
in partial fulfillment of the requirements
for the degree of Master of Science in
Economics

Charlotte

2015

Approved by:

_____
Dr. Craig A. Depken II

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Dr. Stephen Billings

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Dr. Lisa Schulkind

ABSTRACT

BENJAMIN LUKE FORE. The effect of sporting events on firm-level economic activity in Uptown Charlotte. (Under the direction of DR. CRAIG A. DEPKEN II)

This study investigates the impact of sporting events in Charlotte, North Carolina on local economic activity. A formal analysis of the effect these events have on local markets is useful in supporting or refuting the assumption of economic benefits. This study is unique in that the data are firm-level and occur at a high frequency. The methodology used in this research is ordinary least squares regression analysis. The variable of interest is a firm's sales; the business is a full-service restaurant located in the center city area of Charlotte, North Carolina. Charlotte is home to the NBA's Charlotte Bobcats recently renamed the Hornets, and the NFL's Carolina Panthers. The study investigates effects on revenues from Panthers and Bobcats games as well as sporting events located at local venues. The study finds mild support for the claim that restaurants and bars are positively impacted by sporting events. Panthers home games significantly impact sales. However, the outcome of the game may negatively influence the economic behavior of the crowd. Bobcats home games, Convention Center, and Memorial Stadium sporting events have no discernable impact on revenues. The results cannot necessarily be generalized to the entire local economy. However, the result may hold for other medium to high-end restaurants located in Uptown Charlotte.

ACKNOWLEDGMENTS

I wish to express my sincere gratitude to Dr. Craig A. Depken II for his continued investment and advice during the course of this research. I would also like to acknowledge the owners and managers of the business under study who gave me generous access to their internal reports. I should also like to thank Dr. Lisa Schulkind and Dr. Stephen Billings for serving as members of my thesis committee. I would like to thank the Belk College of Business at the University of North Carolina at Charlotte and specifically the Economics Department for creating a robust learning environment and financial support.

I would like to thank Tammy Sullivan for providing the mathematical foundation necessary to complete this thesis. In addition, a thank you to Jonathan Bricker for introducing me to economic theory and encouraging me to pursue higher education. To my colleagues, Mark Whitmeyer and Zekun Wu, thank you for your continued interest and suggestions throughout the development of this research. To my family and loved ones, thank you for your emotional support and constant encouragement throughout my academic career.

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INTRODUCTION

The literature focusing on the effect of sporting and cultural events on local economic activity is robust and generally consistent across the academic realm. The topic is of much interest to city planners and local politicians. Many promoters argue that professional sporting events and stadiums should be subsidized by the government (Coates & Humphreys, 2008). Their argument is generally based on the premise that local sporting events create jobs and increase economic activity and thus tax revenues. The majority of the prevailing literature attempts to measure the effect that large sporting and cultural events have on these economic variables.

The intent of this paper is to build on prior research and investigate the relationship between local sporting events and economic activity in a specific business. Previous studies focus on broad aggregates such as tax revenues and, in doing so, lose the signal in the noise. Recent studies have made great contributions by using specific daily data on tourist activity to successfully identify an event's impact. This study is unique in that the data are at the firm-level and are analyzed at both a weekly and daily frequency. The following analysis provides a look into the micro level impact local sporting events have on a specific firm.

The dependent variable in this study is a firm's sales for a given period. In respect to privacy, the particular business that was kind enough to lend their data to this project will remain unnamed. However, some general description of the private entity is important in order to move forward. The business is a full-service restaurant located in the center city area of Charlotte, North Carolina within walking distance of Time Warner Cable (TWC) Arena and Bank of America (BoA) Stadium. TWC Arena is home to the

NBA's Charlotte Hornets and BoA Stadium is home to the NFL's Carolina Panthers. Promoters of sport and stadium subsidies often claim that businesses within close proximity to the stadiums will enjoy increased business before and after games and events. Advocates also suggest that the nearby businesses that will most likely benefit are restaurants and bars (Coates & Humphreys, 2003). Therefore an investigation into this specific type of business may either support or refute these claims.

The basic approach is to begin by identifying typical economic indicators and environmental factors that impact sales revenue. After testing the significance of these theoretical relationships, the study will explore the extent to which local sporting events impact sales in a specific business entity. Along the way sporting events are differentiated by unexpected losses and surprise wins, thereby including uncertainty and market expectations in the model. Using expectations the study will examine the extent to which a "celebratory", or conversely "sore-loser", effect may impact spending decisions after an unexpected outcome.

LITERATURE REVIEW

It is necessary to define this paper's contributions and limitations before discussing past influences. First and foremost this paper is not intended to inform public policy decisions. The effects of sporting events on a single business cannot be extrapolated to indicate changes in economic activity in a city as a whole. The main contribution of this paper is the unique source of data and frequency of variables. The previous literature focuses mainly on variables such as tax revenue, employment, and (most recently) hotel occupancy levels. This paper uses an actual business's revenue as the dependent variable. The only studies to the author's knowledge that use more granular data is a forthcoming paper by Bettison, Depken and Stephenson (2015) and another by Baumann, Matheson and Muroi (2009).

In reviewing the literature there is an appropriate distinction to be made between sources. One side of the literature is largely provided by academic economists and the other side by consulting firms that employ analysts and economists (Coates & Humphreys, 2008). I will focus only on the academic side of the literature in an attempt to maintain a clear view of the objective goal, free of political bias. A proper critique of the consultant's side of the literature is available in Hudson (2001).

Contrary to the analysts with a vested interest, the majority of economists agree that sporting events have little to no discernable impact on the economy as a whole (Coates & Humphreys, 2008). The economists who have put forth empirical evidence to support these claims have focused on economic variables that are available on a quarterly frequency. Coates (2008) goes as far as to say "No matter what cities or geographical areas are examined, no matter what estimators are used, no matter what model

specifications are used, and no matter what variables are used, articles published in peer reviewed economics journals contain almost no evidence that professional sports franchises and facilities have a measurable economic impact on the economy." However, the one commonality amongst all of these studies is the use of aggregated variables. That is, the variables may be distinct in definition but they are common in frequency. It should come as no surprise that a single sporting event in the course of a 3-month span has no effect on total economic activity (Lavoie & Rodriguez, 2005).

More recent studies have turned to the use of monthly variables to try to hone in on the effects that sporting events may contribute to the economy. The results are still largely ambiguous. Researchers find limited results of sporting events' impact on economic activity. Coates and Depken (2011) made use of monthly tax revenues in several towns in Texas. Their study is unique in that it includes events that are relatively large to the host city such as college football games in a small town. Their findings are interesting, albeit mixed, college games generally correspond with increases in taxable activity, professional games correspond with decreases in activity and football mega-events, such as pro-bowls or the NFL's Super Bowl, are associated with large economic increases.

Another study performed by Baade, Baumann and Matheson (2008) looks at taxable income in four major metropolitan statistical areas (MSA's) in Florida from 1980 to 2005. Taxable income is recorded in monthly frequency for each county and the authors aggregate the data to the MSA level. The work combines a long time series with the state's robust sports history and sophisticated econometric techniques. The results of the investigation find limited significant positive impact stemming from the creation of

new stadiums, leagues, franchises, mega-events, strikes, or lock-outs. These results are in line with the general consensus of the literature.

The value-added in using high-frequency data is exhibited in Coates and Depken (2011). Events that previously promised no statistical significance because they were a "drop in the bucket" of economic activity show limited significance at a monthly frequency. The transition from quarterly to monthly variables generally requires a movement from broad to more specific data. Recent studies have transitioned into using inbound passengers from airlines or hotel occupancy rates as dependent variables to measure the influx of visitors for a particular event. Lavoie and Rodriguez (2005) find some weak evidence of sporting events' impact on occupancy rates in several cities in Canada. The authors looked at "lock-outs" of specific franchises or leagues and analyzed the negative effects of those shut-downs on occupancy rates in the corresponding cities. Their results found that some of the lock-outs had significant negative impacts while other lockouts did not, however the results are far from robust. In any case, a movement from sparsely-recorded aggregate data to more specific and frequent data seems to promise a closer inspection into an event's effect. However, there is a trade-off in this movement towards specificity. Even if a sporting event can be associated with higher occupancy rates it cannot be assumed that this leads to higher aggregate income and employment for an entire city or region. The same caveat holds for the data and analysis put forth in this paper.

The literature is trending away from infrequent, aggregated economic variables and into more recurrent industry-specific variables. In doing so, a trade-off occurs between isolating an event's effect and losing the ability to extrapolate the results to the

economy as a whole. This type of substitution is common in economic research: understanding the macro-world requires familiarity with the underpinnings of micro behavior.

In econometric research, one is hard-pressed to find more microscopic data frequency than daily observations; Baumann, Matheson and Muroi (2009) have done just that. Their 2009 study investigates the effect of sporting events in Hawaii on daily incoming airline passengers. Events range from a variety of professional and amateur events including the Honolulu and Maui Marathons, NFL Pro Bowl, PGA tournaments, surfing competitions and so on. The benefit to this analysis is the frequency of observations and the fact that most tourist traffic is geographically bound to arrive via aircraft. The daily frequency allows the authors to track the number of arrivals several days before and up to the day of the event. Their results show that the only sporting events that significantly impact arrivals are the Honolulu Marathon and the NFL Pro Bowl. However, the authors conclude that the millions of dollars spent by the Hawaiian Tourism Association (HTA) in acquiring the rights to the NFL Pro Bowl exceeds the actual value added to the economy. They reach this conclusion by comparing the influx of passengers from the Pro Bowl to that of the Honolulu Marathon, in which the HTA pays virtually zero dollars to attract and retain. Thus the authors have skirted the issue of generalizing their results to economic activity by comparing two separate events' ability to attract tourists.

A working paper by Bettison, Depken and Stephenson (2015) makes use of daily hotel occupancy rates in Charlotte, North Carolina to measure tourism traffic during sporting and cultural events. The work is similar to Baumann, Matheson and Muroi

(2009) in that the use of daily data allows the researcher to isolate the effect of a specific event. The study has a distinct advantage over previous research by measuring how long an event attracts and retains visitors before, during and afterwards. The results are quite robust; many events significantly increase occupancy rates the day before and the day of the event. However, some events have negative spillover effects that represent a crowding-out in the days following the event. Also, some events that visitors' authorities subsidize have no discernable effect on occupancy rates. The authors debunk the public policy myth that all sporting and cultural events attract and retain visitors days before and after an event.

The regression analysis in this study borrows from the collective literature by combining economic, environmental and industry-specific variables at high-frequency. Part I of this study is not as micro as the work put forward by Baumann et al. (2009) and Bettison et al. (2015) but certainly more specific than other literature. Part II investigates the data on a daily frequency to more effectively isolate an event's impacts. To the author's knowledge, this work is the first to use firm-level revenue data to estimate the impact of local sporting events.

MOTIVATION AND THEORY

This study hypothesizes that sporting events may significantly impact sales at this particular business. The establishment is a medium-to-high-end restaurant located within walking distance of several sports venues. Restaurant demand on a given night or day is a function of locals and visitors who are in Uptown Charlotte. Sporting events at the Charlotte Convention Center, Mecklenburg County Aquatic Center, Time Warner Cable (TWC) Arena, Bank of America (BoA) Stadium, and other venues are likely to increase the number of people in the center city. The events that increase foot traffic near this restaurant are expected to have a positive impact on revenues. Likewise, events that attract visitors to stay at hotels in Uptown Charlotte are expected to have a positive effect on sales. However, if an event is large enough it may generate a "crowding out" effect in which some visitors or Charlotteans stay away from the Uptown area.

Professional sporting events attract a large number of fans and are thus expected to have the greatest impact on revenues at this business. A sold-out game at BoA Stadium seats over 70,000 and a sold-out game at TWC Arena seats 20,000. A small portion of this crowd could significantly impact sales at this business. Additionally, an event may attract visitors to stay in Charlotte for several days, leading to positive impacts on revenues before and after the event. However, on game days traffic is congested, parking costs increase, and there are intoxicated fans throughout the city. These negative aspects of game days create externality costs that may incentivize Charlotteans or would-be visitors to stay away. Professional sporting events and other relatively large events may have a zero-sum or even negative sum effect on economic activity in the presence of a "crowding out" effect.

The professional sports venues offer a large selection of food and beverage opportunities. Fans may forgo dining out before or after the game with the expectation that they can eat at the stadium or arena. Thus, on games day there is increased competition in the food and beverage sector. When a stadium opens, along with many dining options, consumers are presented with more substitutes than normally available in the center city area. The "entrance" of the venue into the food and beverage market may decrease revenues for all other businesses in direct competition.

Professional sports fans are emotionally invested in the outcome of a game involving their favorite team. A satisfied crowd is more likely to spend money and celebrate than a crowd that is upset over a loss. A home team win is expected to generate celebratory spending behavior. Conversely, when the home team loses the fans are expected to spend less money. The outcome of a professional home game is likely to impact revenues at this business by different magnitudes, possibly in different directions. However, many game attendees are visitor fans and a home team loss is their preferred outcome. Thus a home team loss may generate celebratory spending by the rival fans. The effect of a home team win may be difficult to disentangle. The extent to which the home team winning matters is limited by how many visitor fans are in attendance.

Local sporting events are likely to have positive impacts on sales at this business. Amateur events, small tournaments, and regional matches occur at the Charlotte Convention Center, Parks and Recreation Facilities, Mecklenburg County Aquatic Center, and Memorial Stadium. These events attract visitors from other cities and states, some of whom may choose to stay at hotels in the Charlotte area. The venues that entice visitors and locals to either visit or stay in Uptown Charlotte increases the likelihood that

those individuals will dine in the center city. There is a potential link between these events occurring and increased revenue at this business. The events are generally small enough to avoid a "crowding out" effect. Also, their food and beverage options are either non-existent or very limited. Thus, the negative impacts from events at these locations are less prevalent.

In summation, sporting events are likely to impact revenue at this business. There are several venues that increase foot traffic, and possibly hotel stays, near the restaurant. The location of the firm makes it a prime candidate to investigate the economic impact of sporting events. There are likely to be positive and negative impacts caused by large professional sporting events. Positive impacts from the influx of fans; negative impacts from "crowding out" and decreased restaurant market share. Additionally, events at local venues may have a positive impact on revenues.

PART I: WEEKLY FREQUENCY

Data Description

The variable of focus in this study is sales revenue of a full-service restaurant in Charlotte, North Carolina. The data have been transformed into the natural log form to scale the data and increase the ease of coefficient interpretation. Sales are aggregated into weekly observations, a week being defined as Sunday through Saturday. The sample period is from February 2007 to October 2014. Revenue remains in nominal terms because the series encompasses only a 7 year period over a relatively low-inflation economy; the month-over-month percent change in the consumer price index averaged only 0.16% over the series (FRED, 2014). Restaurant sales are highly volatile in nature with peaks and troughs exceedingly sensitive to seasonality and week-to-week variation. See Figure A1 for a graph of sales revenue in nominal form. The values of the vertical axis in Figure A1 have been normalized by the first week of sales for discretion. That is, each week's sales are divided by the first week's sales such that sales in Figure A1 can be interpreted as deviations from week one. The data exhibits a downward trend during the Great Recession followed by a slight upward trend throughout the remainder of the series. The Augmented Dickey-Fuller (ADF) unit root test (Dickey & Fuller, 1979) indicates that the series is stationary at the one percent level of significance. The volatility and trends in the data suggest that business cycle effects as well as quarterly, monthly, and weekly fixed effects should be investigated.

To account for the business cycle and general economic impacts on the restaurant's revenues, data have been collected on North Carolina initial claims of unemployment. State employment offices collect initial claims for unemployment on a

weekly basis. Initial claims have proven a reliable leading indicator of the unemployment rate (Montgomery et al., 1998). Initial claims for North Carolina are chosen over the similar national statistic in order to capture the region's economy more effectively. The initial claims series has been converted to the natural log to scale the data and increase the ease of interpretation. The ADF unit root test indicates the series is stationary at the one percent level of significance.

In addition to general economic factors, the firm's revenue may be impacted by weather conditions. Weather information from the Charlotte Douglas International Airport Weather Station was obtained from the National Climatic Data Center (NOAA, 2014). Daily recordings of rain (in millimeters) were transformed into a categorical variable that takes a value of one if a week experienced three or more days of rain, and zero otherwise. Daily recordings of maximum temperature (in degrees Celsius) were transformed into weekly average highs. Naturally, weekly average temperature highs are cyclical throughout the year. The ADF test indicates the series is stationary at the one percent level. Including temperature may help capture the inherent seasonality of restaurant revenues. Furthermore, the categorical variable for rain should capture the impact of a particularly rainy week on foot traffic in the center city.

Restaurant-specific factors have also been taken into consideration such as promotions and management turnover. Over the sample period there was a regime change in the form of a new general manager being appointed in July 2012. That manager remained in charge of operations until January 2014. This regime change may impose a structural break within the data. A categorical variable "management change" takes a value of one during the interim manager's tenure and zero otherwise. Two weeks of

every winter and summer during the sample period hundreds of restaurants in Charlotte participate in Charlotte Restaurant Week. During this promotional event participating restaurants offer a heavily subsidized menu. These price cuts generally increase revenue by increasing demand amongst traditionally elastic consumers. The categorical variable "promotion" takes a value of one during the specific weeks in which these promotions were held and zero otherwise.

Professional sporting events data were collected for the NBA's Charlotte Bobcats (currently renamed "Hornets") and the NFL's Carolina Panthers. Event data include whether or not the team played at home, whether they won or lost, and the betting market's *ex ante* expectations for whether or not they would win or lose. In addition to this baseline basket of categorical variables, interactions between variables are included in certain specifications. At first glance, games may seem to have only two outcomes: the home team wins or loses. However, the combination of market expectations and actual outcomes suggests there are four possible outcomes for a game: expected win and an actual win, expected loss and an actual loss, expected loss and a surprise win, expected win and a surprise loss. These last two possibilities are of the most interest to the study.

Local sporting event data were obtained from the Charlotte Regional Visitor's Authority (CRVA) describing a variety of facilities and stadiums in and around the center city area of Charlotte, NC. These local sporting events occurred at the Charlotte Convention Center, Memorial Stadium, BoA Stadium, TWC Arena, the Aquatic Center, and various Parks and Recreation facilities surrounding the city. Charlotte has been the host of the Central Intercollegiate Athletic Association (CIAA) Basketball Tournament since 2006. The tournament draws attendees from all over the East coast into the city for

multiple days on end. Bettison, Depken and Stephenson (2015) find that the CIAA tournament significantly impacts hotel occupancy rates in the city of Charlotte, NC. Bank of America Stadium, in addition to Panthers games, has held international soccer matches, the Atlantic Coast Conference (ACC) College football championship and several other large college bowl games. The Aquatic Center, located in Uptown Charlotte, holds smaller but more frequent events and is home to four USA swimming teams. In addition to football, basketball and swimming, Charlotte is host to an eclectic range of sporting events such as soccer, hockey, baseball, marathons, bowling, gun shooting, lacrosse, cheering and fighting competitions. The vast majority of these events occur at the facilities listed above. Attendance data were collected for all the events that occurred at these locations during the sample period.

Table B1 , Appendix B, provides summary statistics of the data used in the study. Summary reports for sales revenue have been intentionally omitted for discretion. The upper panel of Table B1 summarizes the control variables. The weekly average of North Carolina initial unemployment claims was 13,659 during the sample period; the maximum was 56,647 and the minimum was 4,378. There were 149 weeks with at least three days of rain in the 400 weeks of the sample period. The interim manager oversaw operations for 77 of the 400 weeks in the sample period; these 77 observations fall within the middle 80% of the data.

The middle panel of Table B1 summarizes the data describing professional sports events. The Carolina Panther's played a total of 112 games in the 2007-08 season through the 2013-14 season. Of these 112 games, 58 were at home, the Panthers won 54 games in total and won 32 of those games at home. There were three occurrences in which the

Panthers played twice in one week. Of the 54 wins throughout this period, 18 were surprise wins to the extent that the Panthers were considered an underdog in the betting markets. Of the 58 losses during the sample period, there were 18 unexpected losses to the extent that the Panthers were favorites in the betting markets. During the sample period the Charlotte Bobcats played a total of 558 games in the 2007-08 season through the 2013-14 season. Of these 558 games, 291 were at home, the Bobcats won 227 games in total and 147 of those wins were at home. Of the 227 wins throughout this period, 58 were surprise wins to the extent that the Bobcats were considered an underdog in the betting markets. Of the 331 losses during the sample period, there were 45 unexpected losses to the extent that the Bobcats were favorites in the betting markets.

The final panel of Table B1 summarizes the local sports variables. Each location has a discrete variable that counts how many events took place in a given week. The attendance level of any given event was also recorded. There were 36 sporting events held at the Charlotte Convention Center between 2007 and 2014. The average attendance at those events was 12,774 with a minimum of 500 and a maximum of 40,000 (CIAA Basketball tournaments). The Bank of America Stadium hosted 14 sporting events (other than NFL games) with an average attendance of 50,932 and a maximum attendance of the stadium's capacity of 74,000. The CRVA only recorded six sporting events at TWC arena and five events at Memorial Stadium over the seven year period in sample. These numbers seem unrealistically low and are likely the result of a collection or measurement error. The Aquatic Center held 36 events over the period, averaging 1,081 in attendance with a minimum of 100 and maximum of 3,000. Note that the Aquatic Center is open year-round for members, not just for competitions and special events. There were a total

of 406 sporting events at the Parks and Recreation facilities in Mecklenburg County during the period in sample, roughly one a week on average. Several of the facilities are located just outside of the center-city area of Charlotte. However, many of the parks and recreational facilities are located in the outer suburbs of Charlotte. Unfortunately all events are aggregated into one category by the CRVA. Therefore the data are not geographically specific. The variation in attendance is quite large; the maximum attendance was 35,100 and the minimum was 100. The average attendance was 2,600 over the sample. Of the 400 weeks in the sample period, 310 of those weeks were associated with a sporting event at a Parks and Recreation facility in Mecklenburg County.

Methodology and Models

The study employs the use of regression analysis to isolate the impact of local and professional sporting events on the sales revenue of the restaurant in focus. Before investigating individual events and conditions a model must be specified that controls for business and economic fluctuations and environmental factors that affect sales. In addition to the typical theoretical indicators, restaurant-specific control variables will be included in the model. Given that the data are time-series, an autoregressive model that includes a lag of the dependent variable, as an independent variable, has been implemented to account for autocorrelation. Equation 1 is the base-line control model with the following specification:

$$SALES_t = \beta_0 + \beta_1\, SALES_{t-1} + \beta_2\, UNEMPLOYMENT_t + \beta_3\, RAIN_t + \beta_4\, TEMPERATURE_t + \beta_5\, TIME_t + \beta_6\, WEEK_t + \beta_7\, MANAGER_t + \beta_8\, PROMOTION_t + \varepsilon_t\,, \quad (1)$$

where *SALES* is the total revenue in log form; *UNEMPLOYMENT* is the initial claims for unemployment insurance in North Carolina, in log form; *RAIN* is a dummy variable equal to one if the week experienced at least three days of rain; *TEMPERATURE* is the average high temperature during a given week; *TIME* is an index ranging from 1 to 400 throughout the period in sample; *WEEK* is an index identifying a specific week of the year ranging from 1 to 52 throughout each year; *MANAGER* is a categorical variable that identifies the interim manager's tenure over the sample period; *PROMOTION* is a categorical variable that identifies weeks in which the restaurant is running a very popular promotion. The β coefficients are parameters to be estimated using a least squared error minimization process, and ε is a white-noise disturbance term. Lastly, the subscript t denotes a given week in the sample, beginning on February 25th 2007 and ending October 19th 2014. Note: The presence of lagged sales on the right-hand-side of equation (1) introduces bias but the estimated parameters are still consistent.

The estimation results of this specification are included in column (1) of Table B2 of Appendix B. The variables that capture the previous week's sales, unemployment claims, time index, temperature average, and the promotion indicator are all statistically significant beyond the 1% level. The categorical variable indicating a particularly rainy week is significant at the 5% level. Finally, the weekly index is not significant in this base model but is included to help capture the intuition that restaurant sales are generally highly related to the same week's previous year sales. The adjusted r-squared for this model is 0.268. Given the high volatility of revenue that is apparent in Figure A1, this model explains a reasonable amount of variation in the data. Furthermore, the coefficients are of reasonable magnitude and have the expected signs. For instance, the coefficient for

unemployment claims can be interpreted as a one percent increase in unemployment insurance claims in the state of North Carolina is associated with a 0.2% decrease in revenue at this particular business. That is, if the unemployment in the region is going up, the economy is likely contracting and the business experiences a decrease in revenue streams. It is expected that the business's revenues are negatively impacted by several days of rain because of its location in the center city; the coefficient on the categorical variable for a particularly rainy week can be interpreted as in a week that experiences three or more days of rain the business will experience a 5.8% decrease in revenue, compared to a week with fewer rainy days. This result is in line with intuition and expectations. Indeed, these control variables capture economic, environmental and business-specific factors that influence revenue. Moving forward these variables will be used to control for a reasonable portion of the variation in sales and thus allow identification of other events that may impact revenues.

Local Sports

I first consider the effect local events may have on revenue. These events are non-professional sports held at a variety of venues located near the business under consideration. The venues are included as categorical variables in the following model:

$$SALES_t = \beta_0 + \Sigma\beta i\ CONTROL_{it} + \beta_9 CONVENTION_t + \beta_{10} AQUATIC_t + \beta_{11} MEMORIAL_t + \beta_{12}\ BOASTADIUM_t + \beta_{13}\ PARK_t + \varepsilon_t\ . \quad (2)$$

For brevity, let the vector *CONTROL* contain all of the variables included in model (1). Where subscript i is an index equal to 1 up to 8 for each of the control variables. Again, the subscript t is an index that references a particular week within the sample. The event indicator variables equal one if there was an event at the corresponding location in a

given week t, and zero otherwise. For example, *CONVENTION* is equal to the number of separate sporting events held at the Charlotte Convention Center during a particular week. The same result holds for the variables corresponding to the Aquatic Center, Memorial Stadium, Bank of America Stadium, and a Parks and Recreation facility.[1]

Table 1: Model (2) estimation results

EVENTS	*IMPACT*
Convention	0.035
	(0.041)
Aquatic Center	0.104***
	(0.040)
Memorial Stadium	0.040**
	(0.019)
BoA Stadium	-0.032
	(0.063)
Park & Recreation	0.028
	(0.019)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimation results for the variables of interest in model (2) are presented above in Table 1. The full estimation results for this model are reported in column (2) of Table B2 in Appendix B. The Aquatic Center and Memorial Stadium are the only venues in which events directly impact revenues in this particular business. The coefficient

[1] An inquiry was made into the attendance level of each venue during a given week. A model similar to model 2 was specified that included attendance level (instead of number of events) at a particular location throughout the week. The logic is that perhaps some events are relatively small and larger events will have a greater chance of being significant. The results are similar to model 2. That is, the only location that impacts sales at this particular business is the Aquatic Center, regardless of event attendance. Given the large disparity between event sizes this result is anecdotally quite interesting (see Table B1).

estimate for the Aquatic Center is significant at the 1% level. An event at the Aquatic Center is associated with a 10% increase in revenue for the week. An event at Memorial Stadium is associated with a 4% increase in revenue, significant at the 10% level. The impact of all other events are not significantly different than zero.

Although these results cannot be extrapolated to entities other than this particular business they are in line with findings in the previous literature. That is, non-professional sporting events have little to no net impact on economic activity. However, it may be the case that these local events do have an impact on other businesses. Perhaps ice cream shops and hot dog restaurants are more likely beneficiaries than a full-service restaurant. Perhaps businesses located along a major freeway, such as fast food restaurants, are more convenient when traveling to and away from particular events. The purpose of this research is not intended to answer these questions. However, a statement can be made that the Aquatic Center is the only local, non-professional sporting venue that impacts sales at this particular business.

Professional Sports

Charlotte is home to two professional sports teams: the Carolina Panthers and the Charlotte Bobcats (renamed Hornets beginning 2014-15 season). The managers of the business believe, based on their experience, Panthers home games increase sales and Bobcats games have no effect. Furthermore, the managers have noted that when the Panthers win there is a noticeable increase in revenue, more so than just playing at home. An investigation is made into the conditions under which the games of these teams may have an impact on revenue by specifying the following model:

$$SALES_t = \beta_0 + \Sigma\beta i\ CONTROL_{it} + \gamma_1 PANTHERSHOME_t + \gamma_2 PANTHERSWIN_t + \gamma_3 PANTHERSHOMEWIN_t + \theta_1 BOBCATSHOME_t + \theta_2 BOBCATSWIN_t + \theta_3 BOBCATSHOMEWIN_t + \varepsilon_t \ . \quad (3)$$

As before, let the vector *CONTROL* contain all of the variables included in model (1). The variables of interest are coded such that each variable's prefix is the team name and the suffix is the condition. The variables reflect the number of times the event occurred for a given week t. For example, *PANTHERSWIN* equals the total number of Carolina Panthers wins in a given week. Another example, *BOBCATSHOMEWIN* equals the total number of Charlotte Bobcats wins, while playing at home, in a given week. These variables are used to test whether winning, playing at home, and winning while playing at home have disparate impacts on revenue.

Table 2: Model (3) estimation results

EVENTS	*IMPACT*	
	Panthers	Bobcats
Home Game	0.066	-0.002
	(0.044)	(0.017)
Win	0.127**	-0.007
	(0.050)	(0.024)
Win at Home	-0.093	-0.023
	(0.073)	(0.036)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimation results for the variables of interest in model (3) are presented above in Table 2. The full estimation results for this model are available in Column (3) of Table B2. These results are somewhat in line with the manager's expectations. Indeed,

the Bobcats variables have no statistically significant impact on sales revenues at this particular business. There is no condition (winning, winning at home, or playing at home) in which the Bobcats have a discernable impact on revenue. The Panthers variables are somewhat more interesting. The variable *PANTHERSWIN* is statistically significant at the 5% level. The coefficient has the expected positive sign and can be interpreted as when the Panthers win, regardless of where the game is played, there is a 12.7% increase in sales, on average. However, the variables for the home game and winning at home conditions are not statistically significant at a conventional level. This result may raise a red flag to the attentive reader. It would seem likely that if *PANTHERSWIN* is significant that *PANTHERSHOMEWIN* would also be significant. One possible explanation for this result could be the lower number of wins at home when compared to winning regardless of location. Over the sample period the Panthers won 54 games total, of which only 32 were played at home. Therefore, *PANTHERSHOMEWIN* is a vector of 32 ones and 367 zeros. There may not be enough variation in this vector to find a statistically significant relationship with revenues, or there may be no relationship despite managers' predispositions.

In summation, the analysis reveals that certain Panthers games have a positive and significant impact on revenue. Surprisingly, Panthers playing at home is not statistically significant. However if the Panthers win, regardless of where the game is played, there is a meaningful increase in sales revenue. Contrary to expectation, Panthers home games and winning home games are not statistically significant. As expected, the Bobcats games have no effect on this particular business.

The Expectations Game

The evidence suggests that a Panthers win, regardless of where the win takes place, is associated with an increase in sales. This result raises the question: why does winning matter and under which circumstances could it be that winning matters more? The model put forth in this section attempts to answer those questions.

Over the past seven years the Carolina Panthers and Charlotte Bobcats have not had the best track record. Both teams lose often, generally don't make it to the playoffs, and are therefore usually expected to lose. The expectations for a particular game can be tracked through the betting market. While betting houses offer many types of bets, this study will use what is known as the "money line" to discover whether or not a particular team was expected to win or lose. Money lines represent a ratio of money bet versus return if the bettor is correct. If the money line is positive for a team then they are considered underdogs and expected to lose. Conversely, if a team's money line is negative the team is expected to win. Historical money line data are thus a record of the betting markets' expectations on game outcomes. For the study's purposes the divergence between expectations and actual outcomes will be exploited. For example, over the sample period the Panthers were favorites in 50 games. Of those 50 expected wins they actually lost 18. These 18 losses are thus categorized as unexpected losses. Similar calculations are made to find instances where the Panthers won when they were underdogs, i.e. a surprise win. Figure 1 is a visual representation of the differentiation of game outcomes and expectations.

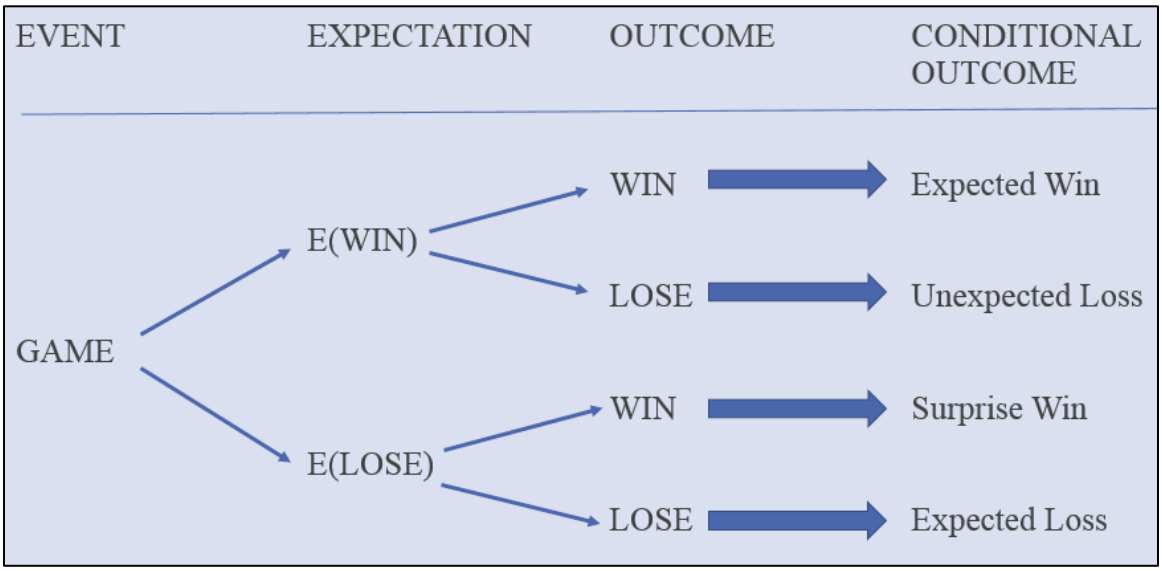

Figure 1: Conditional Outcome Model

Under the assumption that fan expectations are the same as the betting market's expectations, game outcomes can be divided into four categories using the money lines and the actual results data. Therefore, a set of variables is created that represent the following conditions: Panther/Bobcat win and they were expected to win; Panther/Bobcat lose and they were expected to lose; Panther/Bobcat win and they were expected to lose (surprise win); Panther/Bobcat lose and they were expected to win (unexpected loss). The most interesting cases are naturally the latter two. These variables isolate how fan behavior differs in the case of elations or dissatisfaction over the outcome of a game.

The empirical strategy starts with a fully-specified model that contains all possible game outcomes. A more parsimonious model that only includes surprise wins and unexpected losses is then estimated. The following model investigates the full set of conditional outcomes:

$$SALES_t = \beta_0 + \Sigma\beta_i\, CONTROL_{it} + \gamma_0 PANTHERSHOME_t + \Sigma\gamma_j\, PANTHERSCONDITIONS_{jt} + \theta_0 BOBCATSHOME_t + \Sigma\theta_j\, BOBCATSCONDITIONS_{jt} + \varepsilon_t \,. \quad (4)$$

The vector *CONTROL* contains all of the control variables included in model (1). *PANTHERSHOME* is an indicator variable equal to the number of home games the Panthers played in week t. *PANTHERSCONDITIONS* is a vector of four game outcome variables that capture the four distinct possibilities between expectations and outcomes. The vector includes variables for expected wins, expected losses, surprise wins and unexpected losses. Each of these variables is equal to the number of times a particular condition occurred in a given week t. Subscript j is an index equal to 1 up to 4 for each of the conditional variables. The exact same variable setup and explanation holds for *BOBCATSHOME* and *BOBCATSCONDITIONS*.

Table 3: Model (4) estimation results

EVENTS	*IMPACT*	
	Panthers	Bobcats
Home Game	0.082*	0.002
	(0.049)	(0.016)
Expected Win	-0.005	-0.031
	(0.063)	(0.023)
Expected Loss	0.012	-0.002
	(0.052)	(0.013)
Surprise Win	0.100*	-0.007
	(0.055)	(0.027)
Unexpected Loss	-0.111	-0.069*
	(0.085)	(0.040)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimation results for the variables of interest in model (4) are presented above in Table 3. The full estimation results for this model are available in Column (4) of Table B2. Interestingly the variable for Panthers home games is positive and statistically significant at the 10% level. This result is in line with our expectations based on discussion with the restaurant's managers. When expectations on game outcomes are controlled for the variable for Panthers home games becomes significant. The variables for unexpected losses are negative as expected. When the Bobcats are expected to win and they actually lose (unexpected loss) there is a negative impact on revenue, significant at the 10% level. The variable for an unexpected Panthers loss is negative and almost statistically significant at the 10% level. Even though the variable is insignificant at conventional levels the coefficient is interesting. The variable for a surprise win by the Panthers is statistically significant at the 10% level. The coefficient is positive, suggesting that a surprise win leads to a 10% increase in revenue. Figure 2 below presents the coefficients from Table 3 graphically.

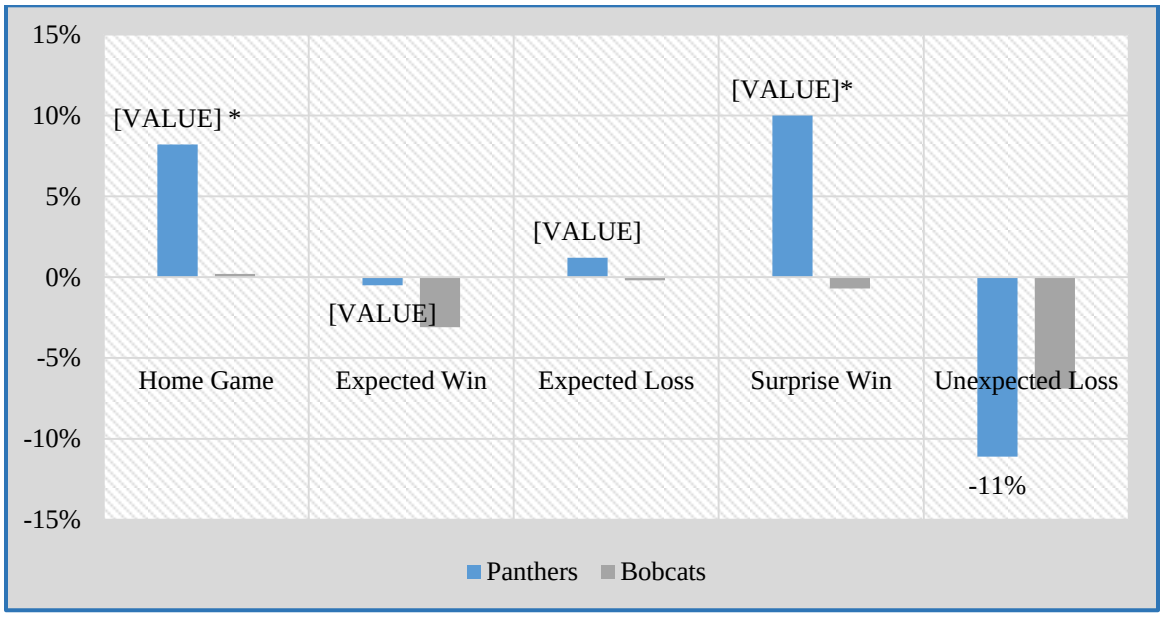

Figure 2: Professional sports impact on weekly revenue

These results make intuitive sense when compared to model (3). In model (3), a Panthers win has a positive and statistically significant impact on revenue. By splitting game outcomes conditional on expectations, the model splits the effect between variables. Naturally, conditional outcomes are less significant than general outcomes. The variables that capture expected wins and expected losses are insignificant. This suggests that when expectations are in line with outcomes there is no significant change in behavior. The variable for Bobcats home games is insignificant as in model (3). This result is in line with managers' expectations that Bobcats home games have no impact on the business.

Consider a more parsimonious expectations model. That is, an expectations model that only includes the conditional outcomes of the greatest interest: unexpected losses and surprise wins. This specification is deemed appropriate because model (4) showed that

expected wins and expected losses are insignificant. The next specification is simply model (4) without the variables for expected wins and expected losses:

$$SALES_t = \beta_0 + \Sigma\beta_i\, CONTROL_{it} + \gamma_0 PANTHERSHOME_t + \Sigma\gamma_j\, PANTHERSCONDITIONS_{jt} + \theta_0 BOBCATSHOME_t + \Sigma\theta_j\, BOBCATSCONDITIONS_{jt} + \varepsilon_t \quad (5)$$

The vector *CONTROL* contains all of the control variables included in model (1). *PANTHERSHOME* is an indicator variable equal to the number of home games the Panthers played in week t. *PANTHERSCONDITIONS* is a vector of variables that capture the two conditional outcomes of interest: surprise wins and unexpected losses. Each of these variables is equal to the number of times a particular condition occurred in a given week t. The exact same variable setup and explanation holds for *BOBCATSHOME* and *BOBCATSCONDITIONS*.

Table 4: Model (5) estimation results

EVENTS	*IMPACT*	
	Panthers	Bobcats
Home Game	0.080*	-0.007
	(0.043)	(0.015)
Surprise Win	0.099*	-0.003
	(0.050)	(0.027)
Unexpected Loss	-0.111	-0.062
	(0.079)	(0.040)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimation results for the variables of interest in model (5) are presented above in Table 4. The full estimation results for this model are available in Column (5) of

Table B2. As is the case in model (4), several of the variables are statistically significant. The similarity of point estimates and standard errors between model (4) and (5) suggests that the results are not highly sensitive to specification bias. The variable for Panthers home games is positive and statistically significant at the 10% level. A Panthers surprise win is positive and statistically significant at the 10% level. This result may capture the excited behavior of fans who just experienced an unexpected victory. In any case, a surprise win is likely to be good for the business and the result is in line with the management's expectations. The parameter on a Panthers unexpected loss is negative but not statistically significant at conventional levels. The result is in line with expectation: an unexpected loss is associated with lower revenue potentially due to a "sore-loser" effect. In addition to the Panthers variables, an unexpected loss by the Bobcats has a negative impact on revenues. The variable for Bobcats unexpected losses is negative and nearly statistically significant at the 10% level. Bobcats home games and surprise wins remain insignificant in the movement between model (4) and (5).

The results of the expectations models are highly intuitive and in line with the expectations of the business' management. The study finds that when the Panthers play at home there is a significant increase in sales revenues. However, the increase is conditional on the actual outcome of the game versus expectations. If the Panthers suffer an unexpected loss the negative impact from the "sore-loser" effect outweighs the positive impact from the home game. On the other extreme, if the Panthers win unexpectedly there is an additional positive effect; potentially from the celebratory spending behavior of fans.

These results may provide some insight into why economists have struggled to find empirical support for the impact of sporting events on economic activity. If economic activity is related to the outcome of the game relative to the expectations of the fans then there may be a zero-sum effect. Sports outcomes are naturally divided into winners and losers. Thus sports fans' response to outcomes are divided into winners and losers and transitively into celebratory behavior and disappointed behavior. In addition to the crowd being divided, expectations play a role in the magnitude of any response to the actual outcome. The behavioral effects are difficult to disentangle. There is no surprise that previous literature that only matched economic activity with the occurrence of a sporting event was unable to find an impact different from zero. It is likely that every sporting event has negative and positive effects on economic activity, in part due to the different post-game behavior of attendees. The ratio of home fans to visitor fans in attendance coupled with expectations are likely to play a key role in the net impact of a particular event.

Final Specification

The study has taken an organized approach in identifying specific events and conditions that impact sales in a particular firm. The effort began by specifying a base-line model that separates economic, environmental, and business-specific factors thought to influence sales. For clarity, inquiries into the effects of local sporting events, professional sporting events, and expectations on game outcomes were conducted in three separate sections. Moving forward the study will combine the discoveries of each inquiry into a final model. The statistically insignificant findings from previous sections are not included in the final model for brevity. The final specification is as follows:

$$SALES_t = \beta_0 + \Sigma\beta_i\, CONTROL_{it} + \varphi_0\, AQUATIC_t + \gamma_0 PANTHERSHOME_t + \gamma_1\, PANTHERSURPRISEWIN_t + \gamma_2\, PANTHERSUNEXPECTEDLOSS_t + \theta_0\, BOBCATSUNEXPECTEDLOSS_t + \varepsilon_t\,. \quad (6)$$

The vector *CONTROL* contains all of the control variables included in model (1). The variable *AQUATIC* is the only significant local sports venue variable from model (2) and represents the number of events at the Aquatic Center in a given week. The variable *PANTHERSHOME* is described in the "Professional Sports" section and represents the number of Panthers home games in a given week. The *SURPRISEWIN* and *UNEXPECTEDLOSS* variables are described in great detail in "The Expectations Game" section. These are the same variables that were contained in the vectors *PANTHERSCONDITIONS* and *BOBCATSCONDITIONS* in models (5) and (6).

The final specification includes all of the statistically significant discoveries from this study. The estimates for model (6) can be found in column (6) of Table B2. In this specification the Aquatic Center variable is highly statistically significant at the 1% level. The final interpretation is during a week in which the Aquatic Center holds an event there is a 10% increase in sales revenue, on average. The Promotion variable which captures the effect of Charlotte Restaurant Week is highly significant at the 1% level. During Restaurant Week sales are 16% higher on average, despite the reduced menu prices. The variable for Panthers home games is positive and significant at the 5% level. When the Panthers play at home there is a 9% increase in revenues, on average. However, expectations play an important role in sales as well. A surprise win by the Panthers is associated with an additional 9% increase in revenue; the variable for this condition is statistically significant at the 10% level. An unexpected loss by the Panthers is associated

with a 12% decrease in revenue, albeit not significant at conventional levels. Finally, an unexpected loss by the Bobcats is associated with a 6% decrease in revenue; the variable is statistically significant at the 10% level.

The results of the weekly model specifications warrant a closer inspection into the data. The main variables of interest, the professional sporting events, occur on just one day in a given week. It may be of greater value to analyze sales on a daily frequency, thus isolating an event's impact on a more granular level. The study progresses by utilizing the information in daily frequency and applying the same organized approach used for the data in weekly form.

PART II: DAILY FREQUENCY

Data Description

The next phase of the analysis is to use more frequent data. Here the dependent variable is the daily sales of the restaurant between March 26th 2007 and December 31st 2013 for a total of 2,247 observations. The business was closed for 45 days during this period because of various holidays and renovations; these observations are omitted from the sample because they have zero revenue. Figure A2 in Appendix A presents a time-series graph of daily revenue. The values of the vertical axis in Figure A2 have been normalized by the first day of sales for discretion; Figure A2 can be interpreted as deviations from day one. Similar to Figure A1, although not quite as clear, a slight downturn can be seen during the 2008-09 recession, followed by a period of stable revenues with respect to an overall time trend. From this graph the range of observations on a day-to-day basis is clearly quite volatile. Figure A3 in Appendix A plots sales by the day of week where Monday is represented by the number 1 through Sunday (number 7). There is clearly a consistent variation in sales over the days of the week. Mondays and Sundays have the lowest revenues and Fridays and Saturdays have the highest. This visual inspection suggests that controls for daily, weekly, and yearly fixed effects are appropriate.

Many of the same variables from the weekly analysis have been converted to daily format. Additionally some new variables and econometric techniques will be introduced to better utilize the data in this frequency. Table B3 in Appendix B reports summary statistics for this sample.

The high temperature for each day is recorded in tenths of degrees Celsius. The average high temperature is 22.68 degrees Celsius (72.8 degrees Fahrenheit). Additional environmental data is recorded for snow days using a categorical variable equal to one if snow fell. During the six years in the sample there were eight days of snow fall in the Charlotte area. Rain information is recorded using a categorical variable equal to one if at least ten millimeters of rain fell on a given day. There were 205 days of at least mild rainfall, roughly 8% of the sample. These variables are intended to capture any adverse effect weather may have on foot traffic in the Uptown area of Charlotte.

Initial claims for unemployment insurance in the state of North Carolina are included in the daily sample. Due to the reporting frequency of once a week, for a given week the reported number of unemployment claims is attributed to each day of the week. The variable is reported in Table B3 in log form. This variable is included to control for any effect negative labor market outcomes may have on overall business activity.

The restaurant-specific factors from the weekly models have also been incorporated at the daily frequency. These variables capture the effects of promotions and management turnover. The interim manager presided over the business for 521 days in total, or 21% of the sample period. A categorical variable for management change is equal to one during this interim manager's tenure and zero otherwise. Restaurants in Charlotte participate in Charlotte Restaurant Week for two weeks of every winter and summer. A categorical variable that identifies the specific days of these promotions has been created to control for the increase in demand.

The middle panel of Table B3 contains information on the professional sporting events. Event data include whether or not the team played at home, whether they won or

lost, and the conditional outcome of the game (expected win, surprise win, unexpected loss, and expected loss). In addition to this basket of categorical variables, interactions between variables will be tested for significance. These variables will be used to generate a host of more informative interaction variables than the ones used in the weekly model. Because of the increased number of observations and granularity of the data, games are separated into multiple possible scenarios. These scenarios include expected wins at home, unexpected wins at home, expected losses away, and every other combination of game outcome and location for each of the professional teams. The summary statistics for the various interactions are included in Table B3. These variables will be introduced as necessary within "The Expectations Game" portion of Part II.

The bottom panel of Table B3 contains summary statistics for the local sporting venues. The locations are the same as the ones included in the weekly model. The Charlotte Convention Center held events on 164 days over the sample period; the Aquatic Center held events on 122 days; and Bank of America Stadium held sporting events, other than Panthers games, on 92 days between 2007 and the end of 2013. Finally, only four sporting events were recorded at Memorial Stadium during the period in sample. This small number of events likely reflects a measurement error on the part of the data provider.

An understanding of the data in daily frequency can be derived from Table B3. For more information on the variables and their origins please see the preceding description of control variables, professional, and local sports variables in the Data Description in Part I. The following section will discuss econometric methods and

propose a baseline control and several extended models to evaluate the effect of sporting events on revenues.

Methodology and Models

Ordinary least squares (OLS) regression is used to identify the relationship between sporting events and revenue. Newey and West (1987) suggest a method that corrects standard errors for bias resulting from autocorrelation which violates the assumptions of OLS. Given that the data are time-series, the models used in Part II of this study will implement the Newey-West (1987) correction for autocorrelation and heteroskedasticity. The method requires the user to determine the number of lags to incorporate in order to successfully correct for the bias; referred to as the truncation parameter. The truncation parameter (m) was chosen by specifying an autoregressive distributed lag (ADL) model and identifying the statistically significant lags. The ADL model included controls for daily, weekly, and yearly fixed effects and include up to 12 lags of revenue. Sales in log form follows an autoregressive process up to the 7^{th} order; lags beyond 7 were not statistically significant. This result is in line with expectations given that the data are in daily frequency. That is, on any given day, the sales are likely to be related to the previous seven days of sales. The truncation parameter for the Newey-West correction method is set to seven for every model reported in the following analysis. The study begins by identifying equation 7, the base-line control model under the following specification:

$$SALES_t = \beta_0 + \beta_1 DAY_t + \beta_2 WEEK_t + \beta_3 YEAR_t + \beta_4 TEMP_t + \beta_5 SNOW_t + \beta_6 RAIN_t + \beta_7 UNEMP_{t-14} + \beta_8 UNEMP_{t-28} + \beta_9 PROMOTION_t + \beta_7 MANAGER_t + \varepsilon_t , \quad (7)$$

where *SALES* is total daily revenue in log form, ε is a white-noise disturbance term and the subscript t denotes a given day in the sample, beginning on March 26th 2007 and ending December 31st 2013. The *DAY*, *WEEK*, and *YEAR* variables describe daily, weekly, and yearly fixed effects; *TEMP* is the high temperature for a given day t in tenths of degrees Celsius; *SNOW* and *RAIN* are categorical variables equal to one if there was snow or at least 10 millimeters of rain on a given day; *MANAGER* is a categorical variable that identifies the interim manager's tenure over the sample period; *PROMOTION* is a categorical variable that identifies weeks in which the restaurant is running a very popular promotion.

The estimation results for equation 7 are included in column 1 of Table B4 of Appendix B. The parameter estimates for the daily, weekly, and yearly fixed effects are included at the top of the table. The yearly and daily fixed effects are significant at the 1% level. The majority of weekly fixed effects are significant at the 1% level, and all but two weeks are significant at the 10% level or better. The *TEMP* and *RAIN* variables are not statistically significant at conventional levels, yet the *SNOW* variable is significant at the 5% level and the parameter is negative as expected. The significance and coefficient estimates for *PROMOTION* and *MANAGER* are similar to those from the weekly model reported in Table B2. The *UNEMP* variable is included as a two week (14-day) lag and four week (28-day) lag. Both lags of *UNEMP* are statistically significant at the 10% level and the coefficients are negative as expected.

The control model's adjusted R-squared is 54.2%. Given the volatility demonstrated in the graph of daily sales over time (see Figure A2) this model is explaining a significant portion of variation within the sample. Moving forward the study

will rely on the variables included in equation (7) as a basket of variables named *CONTROL*. Each additional model will include these variables while an investigation into sporting events' effects is performed.

Local Sports

In an effort to remain consistent the study will progress by the same organizational structure outlined in Part I. Local sporting venues are included as categorical variables equal to one if the venue hosted an event. An inquiry into the impact of local sporting events is specified in the following model:

$$SALES_t = \beta_0 + \Sigma\beta_i \, CONTROL_{it} + \beta_{11} \, AQUATIC_t + \beta_{12} \, CONVENTION_t + \beta_{13} \, MEMORIAL_t + \beta_{14} \, BOASTADIUM_t + \varepsilon_t \, . \quad (8)$$

Let the vector *CONTROL* contain all of the variables included in model (7), where subscript i is an index equal to 1 to 10 for each of the control variables. The event variables are equal to one if there was an event at the corresponding location on a given day t. For example, *CONVENTION* is equal to one each day in which the Charlotte Convention Center held a sporting event.

Table 5: Model (8) estimation results

EVENTS	*IMPACTS*
Aquatic Center	0.085**
	(0.040)
Convention Center	-0.013
	(0.038)
Memorial Stadium	0.338
	(0.219)
BoA Stadium	-0.131**
	(0.057)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimation results for the variables of interest in model (8) are presented above in Table 5. The full estimation results for equation (8) are available in column 2 of Table B4 in Appendix B. The results are almost identical to the results obtained from the weekly specification model in Part I. Events held at the Aquatic Center have a statistically significant positive impact on revenue at the 5% level of significance. Events at Bank of America Stadium, other than Panthers games, have a statistically significant negative impact on revenue in this particular business. These events include college bowl games and the ACC football championships. Sporting events held at the Charlotte Convention Center and Memorial Stadium do not have a significant impact on sales revenue in this particular business. The only notable difference between these results and the results from Part I is that events at Bank of America Stadium are statistically significant.

The attendance level for each of these events is recorded as the total amount of attendance for the entire event. Unlike the weekly model, it would be inappropriate to investigate the attendance level effects on daily data. For many events that span multiple days it is likely that the attendance is not even across the entire event. For instance, the ACC championship may occur over a series of days, but the final, big game and thus the largest attendance only occurs on one of those days. The data gathered from the Charlotte Regional Visitor's Authority only includes the total attendance level, and not the daily attendance for each event. The investigation into attendance levels in the weekly model showed that including attendance provided no additional information or significance to a venue's effect.

Professional Sports

The study will now set out to identify any effect that a professional sporting event may have on daily revenues in this specific business. An immediate benefit to the daily specification is the ability to look at the effect a professional sporting event may have the day before and after the game in addition to the day of the game. The weekly specification did not allow this granular examination. The following model is specified to analyze the effect of professional sporting events:

$$SALES_t = \beta_0 + \Sigma\beta_i\, CONTROL_{it} + \gamma_1 PANTHERSHOME_{t-1} + \gamma_2 PANTHERSHOME_t + \gamma_3 PANTHERSHOME_{t+1} + \gamma_4 PANTHERSWIN_t + \gamma_5 PANTHERSHOMEWIN_t + \theta_1 BOBCATSHOME_{t-1} + \theta_2 BOBCATSHOME_t + \theta_3 BOBCATSHOME_{t+1} + \theta_4 BOBCATSWIN_t + \theta_5 BOBCATSHOMEWIN_t + \varepsilon_t\,, \quad (9)$$

where the β's, γ's, θ's are parameters to be estimated and the ε is a white noise error term. The vector *CONTROL* contains all of the variables outlined in model (7). Each variable is coded such that the team name is the prefix and the scenario is the suffix. For instance, *PANTHERSHOME* is equal to one if there was a Carolina Panthers home game on a given day t. *PANTHERSWIN* is equal to one if the Panthers won a game, regardless of location. Finally, *PANTHERSHOMEWIN* is equal to one if the Panthers won a home game on a given day t. The same pattern follows for the *BOBCATS*- prefix. Leads and lags of *PANTHERSHOME* and *BOBCATSHOME* are included to capture the effect of the event the day before and after the game.

Table 6: Model (9) estimation results

EVENTS	*IMPACTS*	
	Panthers	Bobcats
Day Before Home	0.184***	-0.049*
	(0.030)	(0.028)
Day of Home Game	0.586***	-0.045
	(0.081)	(0.034)
Day after Home	0.086	-0.023
	(0.053)	(0.030)
Win (Home / Away)	-0.053	0.060*
	(0.073)	(0.035)
Win at Home	-0.070	-0.048
	(0.124)	(0.056)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimation results for the variables of interest in model (9) are presented above in Table 6. The full estimation results for equation (9) are included in Column 3 of Table B4. Panthers home games have a significant effect on revenues at this business. The day before a Panthers home game there is an average increase in revenues of 18.4% relevant to similar days without a Panthers home game. The day of a Panthers home game there is an average 58.6% increase in revenues relative to a comparable day without a game. Both of these results are statistically significant at the 1% level. The day after a Panthers home game has no statistically significant effect. However, the point estimate is positive; suggesting no evidence of a "crowding out" effect the day after the game. A Panthers win does not have an effect that is statistically discernable from zero. Likewise, a Panthers win at home does not have a significant effect different from zero. At first pass this result may seem counter-intuitive. All other things equal, intuition would suggest that winning at home is positive and would lead to celebratory spending behavior by Panthers fans. However, the opponent's fans also attend games in Charlotte. These fans may react

negatively to a Panthers win and spend less than they would have otherwise. The dichotomous nature of a crowd's reaction to a game's outcome may explain this net zero effect. A further inquiry into winning versus expectations will be made in the next section.

The *BOBCAT* variables have similar results to the weekly specification model. Most of the variables are either statistically insignificant or are weakly significant. The day before a Bobcats home game there is a small, negative impact on sales, significant at the 10% level. A Bobcats win has a positive impact on revenue, regardless of home or away, and is significant at the 10% level. The weekly model found no significance amongst any scenarios in which the Bobcats played. The daily model is in line with those results, finding only weak significance amongst a few scenarios. It appears as though the management's observation that Bobcats games had little-to-no impact on revenue is mostly correct.

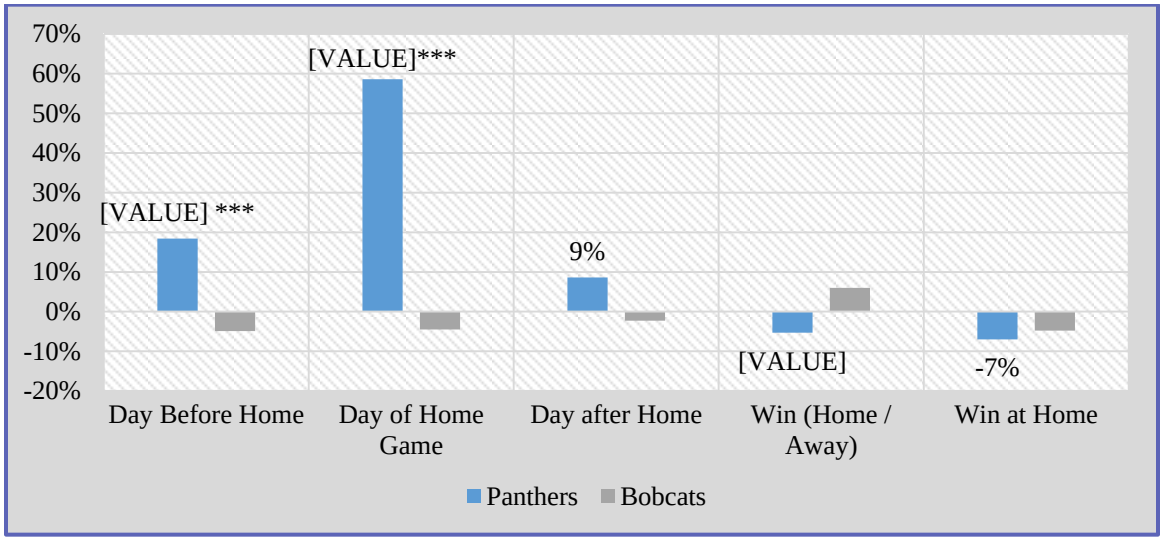

Figure 3: Professional sports impact on daily revenue

Figure 3 presents the coefficients from Table 6. The graphical representation of the analysis shows that Panthers home games have a positive and substantial impact on sales. The day before and the day of a Panthers home game are statistically significant at the 1% level. These results are independent of whether the Panthers win. Finally, the Bobcats games have almost no effect on sales at this business.

The Expectations Game

In Part I of the study, the investigation into professional sporting events found that a Panther's win had a positive and statistically significant impact on sales. In Part II, a Panthers win is not statistically significant. The daily data have greater statistical power and are more focused on a particular event and result. However, up until this inconsistency the models in daily and weekly frequency mostly behaved similarly. The discrepancy between the two outcomes motivates a closer investigation. As in Part I, the study will incorporate expectations and uncertainty to closer identify behavior patterns amongst professional sports fans.

A full discussion of how expectations were defined using the betting market can be found in "The Expectations Game" in Part I. The professional sports variables listed in the middle panel of Table B3 are combinations of game location and conditional outcomes for Panthers and Bobcats games. The study will differentiate professional sports games into eight possible scenarios conditional on expectations, outcome, and location. The weekly frequency models only included four separate scenarios: surprise win, unexpected loss, expected win and expected loss. The increased precision of the daily data facilitates the identification of conditional outcomes by location. That is, in addition to the four possible game outcomes, the location (home or away) will also be

acknowledged. For example, Panthers games have been divided into home games that resulted in a surprise win, unexpected loss, expected win, or expected loss and also away games that resulted in a surprise win, unexpected loss, expected win, or expected loss. Dissecting the data in this fashion creates eight possible categories for each Panthers game that occurred during the sample period. The same partitions have been created for Bobcats games.

The empirical strategy is to begin by specifying a full expectations model that incorporates each of these eight possible outcomes for the Panthers and the Bobcats. The following model includes the full set of conditional outcomes by game location:

$$SALES_t = \beta_0 + \Sigma\beta_i\, CONTROL_{it} + \gamma_0 PANTHERSHOME_{t-1} + \gamma_1 PANTHERSHOME_{t+1}$$
$$\Sigma\gamma_j\, PANTHERSHOMECONDITIONS_{jt} + \Sigma\gamma_j\, PANTHERSAWAYCONDITIONS_{jt} +$$
$$\theta_0\, BOBCATSHOME_{t-1} + \theta_1\, BOBCATSHOME_{t+1} +$$
$$\Sigma\theta_j\, BOBCATSHOMECONDITIONS_{jt} + \Sigma\theta_j\, BOBCATSAWAYCONDITIONS_{jt} + \varepsilon_t, \quad (10)$$

where the β's, γ's, θ's are parameters to be estimated and the ε is a white noise error term. The vector *CONTROL* contains all of the control variables included in model (7). *PANTHERSHOMECONDITIONS* is a vector of four Panthers *home game* outcome variables that capture the four distinct possibilities between expectations and outcomes. The vector includes variables for expected wins, expected losses, surprise wins, and unexpected losses. Subscript j is an index for each of the conditional outcomes/variables. *PANTHERSAWAYCONDITIONS* is a vector of four Panthers *away game* outcome variables with an identical explanation as the home conditions. The exact same variable setup and explanation holds for *BOBCATSHOMECONDITIONS* and *BOBCATSAWAYCONDITIONS*. Once again, leads and lags of *PANTHERSHOME* and

BOBCATSHOME are included to capture the effect of the event the day before and after the game.

Table 7: Model (10) estimation results

EVENTS	*IMPACTS*			
Home	Panthers at Home	Bobcats at Home	Panthers Away	Bobcats Away
Expected Win	0.415***	-0.066	-0.131	0.026
	(0.079)	(0.060)	(0.095)	(0.102)
Unexpected Loss	0.515***	-0.226**	-0.448***	0.154*
	(0.091)	(0.105)	(0.099)	(0.084)
Surprise Win	0.521***	-0.014	-0.038	0.078*
	(0.159)	(0.066)	(0.102)	(0.046)
Expected Loss	0.606***	-0.135*	-0.175*	-0.029
	(0.126)	(0.081)	(0.010)	(0.028)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The estimation results for the variables of interest in model (10) are presented above in Table 7. The full estimation results for model (10) are located in column 4 of Table B4. The variable for professional sports home games has been split into four possible outcomes conditional on expectations. Additionally, professional sports away games are included and split into four possible outcomes conditional on expectations. The results for the Panthers variables are statistically robust. The results for the Bobcats variables are weakly significant in some cases. In general the impacts are in line with the basic expectations of management: Panthers games can impact sales significantly, Bobcats games have less impact.

The variables for before and after Panthers home games are nearly identical to the results from equation (9). There is a 17.4% increase in sales the day before a Panthers

home game relative to a comparable day without a Panthers home game. The day after a Panthers home game does not have a significant effect. The day of a Panthers home game is divided into several possible results. Regardless of game outcome versus expectations there is a highly significant positive impact on sales. Panthers home games generate positive, statistically significant increases in revenues on game day. These increases from Panthers home games occur independent of whether the game resulted in a surprise win, unexpected loss, expected win, or unexpected loss. These findings are statistically significant at the 1% level. There is some minor variation in the point estimates for each of these conditional outcomes. However, there is significant overlap in each estimated coefficient's 95% confidence interval. That is, the point estimates are slightly different in magnitude, but are not determined to be statistically different than one another. Regardless of game outcome or expectations, the model finds an average 40-60% increase in revenues on Panthers home game days, relative to similar days without Panthers home games.

Unlike Panthers home games, the results for away games are not consistent across the range of outcomes and expectations. When the Panthers win an away game, regardless of expectations, there is no statistically significant impact on revenues. That is, neither a surprise win nor an expected win away has an impact on revenues in this business. When the Panthers play away games and experience an unexpected loss there is a negative impact on revenues at the 1% level of statistical significance. The model finds an average 44.8% decrease in revenues when the Panthers unexpectedly lose an away game. Lastly, there is a weakly significant negative impact when the Panthers lose an away game they were expected to lose. At the 10% level of significance the model finds

an average 17.5% decrease in revenue associated with an expected loss away. The results are in line with the "sore-loser" effect found in the weekly frequency models. No further evidence is found to support the "celebratory" effect on spending behavior found in Part I.

The Bobcats variables present some interesting results. Overall, model (10) finds that Bobcats home games tend to draw business away from this particular restaurant. At the 5% level of significance, the model estimates a 5.6% decrease in revenue the day before a Bobcats home game relative to another comparable day without a Bobcats home game. The model finds a negative impact on revenues the day of Bobcats home games regardless of expectations and outcomes. All the point estimates for each of the conditional outcomes are negative, yet only two are statistically significant at conventional levels. When the Bobcats experience an unexpected loss at home the model finds an average 22.6% decrease in revenue, significant at the 5% level. When the Bobcats have an expected loss at home the model finds an average 13.5% decrease in revenue, significant at the 10% level. The results are consistent with the "sore-loser" effect on spending behavior. The point estimates for winning at home are not significant at conventional levels, signifying no support for the celebratory spending hypothesis.

Bobcats away games show some significance across conditional outcomes. The point estimates are mostly positive, suggesting that the business has higher revenue when the Bobcats are not in town. Regardless of expectations and outcomes the business enjoys increased revenue (or at least no decrease) when the Bobcats are out of town. The model finds that revenues increase by an average 15.4% when the Bobcats suffer an unexpected loss at an away game, significant at the 10% level. When the Bobcats experience a

surprise win at an away game revenues increase by an average 7.8%, significant at the 10% level. Contrary to the results of the Panthers, the business is better off when the Bobcats are not in town.

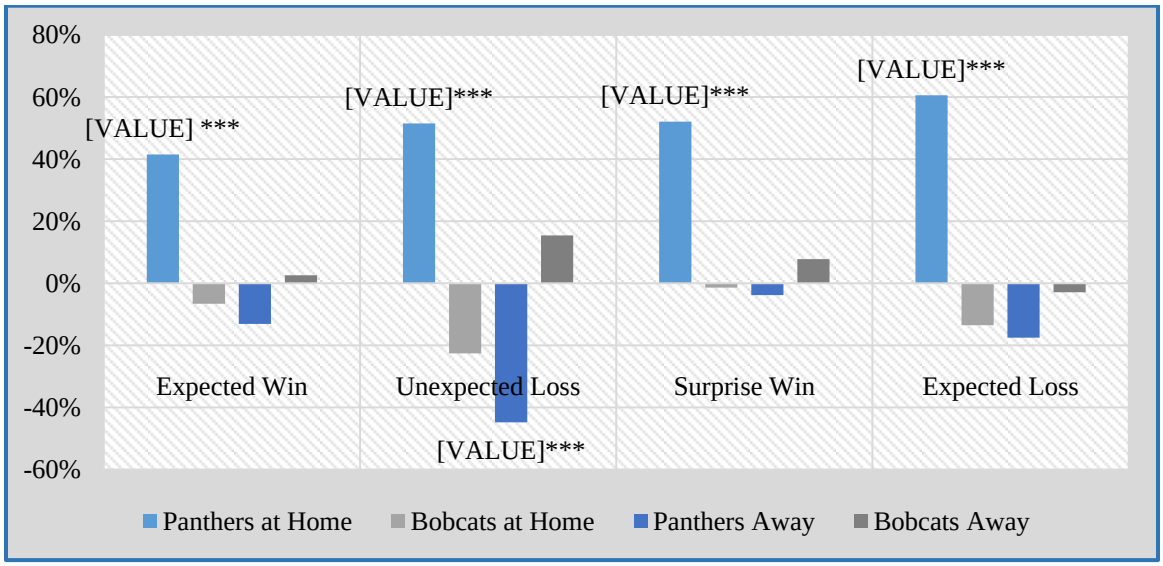

Figure 4: Conditional outcome impact on revenue

Figure 4 presents the estimates from Table 7. The restaurant under study is impacted differently by the presence of the professional sporting teams and venues within walking distance. Regardless of a game's expectations or outcome, a Panthers home game positively impacts revenues in this business. When the Panthers play an away game, revenues are negatively influenced or not affected depending on the game's outcome relative to expectations. On the contrary, Bobcats home games either have a negative impact or no impact depending on the outcome and expectations of the game. Likewise, when the Bobcats are playing out of town the business is either better off or no worse off depending on expectations and outcomes. In the simplest language, this

restaurant benefits from the presence of the Panthers in Charlotte and is not affected or perhaps even negatively impacted by the presence of the Bobcats.

Final Specification

Part II of this study has focused on applying the organized approach from Part I to the data in daily frequency. Amateur and professional sporting events have been investigated rigorously. The results from the preceding sections will now be compiled into a final specification that incorporates the most relevant findings of this study. The reader should note an overall consistency between the weekly and daily final specification. Although there are some minor discrepancies in regards to interpreting conditional outcomes versus expectations. The final model is specified below:

$$SALES_t = \beta_0 + \Sigma\beta_i\, CONTROL_{it} + \beta_{11} AQUATIC_t + \beta_{12}\, BOASTADIUM_t +$$
$$\gamma_0 PANTHERSHOME_{t-1} + \gamma_1 PANTHERSHOME_{t+1} +$$
$$\Sigma\gamma_j\, PANTHERSHOMECONDITIONS_{jt} +$$
$$\theta_0\, BOBCATSHOME_{t-1} + \theta_1\, BOBCATSHOME_{t+1} +$$
$$\Sigma\theta_j\, BOBCATSHOMECONDITIONS_{jt} + \varepsilon_t\,, \qquad (11)$$

where the β's, γ's, θ's are parameters to be estimated and the ε is a white noise error term. The vector *CONTROL* contains all of the control variables from model (7). Local sporting variables *AQUATIC* and *BOASTADIUM* from Model (8) are included. Leads and lags of Panthers and Bobcats home games are included from Model (9). Lastly, home game conditional outcomes are included for the Panthers and the Bobcats from Model (10). Away game conditional outcomes from Model (10) are omitted for conciseness.

The estimation results for Model (11) are available in column 5 of Table B4 in Appendix B. The resulting coefficients and levels of significance for each of the variables

are highly similar to their counterparts from their respective models (7, 8, 9, and 10). A visual inspection across the columns of Table B4 confirms that there are no large changes in coefficient magnitude, signs, or statistical significance between the models. The study will focus on the similarities and differences between the weekly final model (in Table B2) and the daily final model (in Table B4).

The final specification models from daily and weekly datasets are mostly consistent with each other. Both models find that increases in unemployment claims are associated with decreases in revenue at statistically significant levels. The restaurant specific controls for promotions and management turnover are highly statistically significant in both models. Additionally, environmental factors such as temperature, rain, and snow have some mixed levels of significance and their coefficients have expected directional effects. The models concur that events at the Aquatic Center positively impact sales, significant at the 5% level. For professional sporting events the general conclusion from both models is that Panthers home games significantly and positively affect revenues at this restaurant, but that Bobcats home games either negatively impact or do not impact this restaurant's sales.

The final models from Part I and II contain some discrepancies. The daily model identified sporting events at Bank of America Stadium (other than Panthers games) as negative impacts on revenues, significant at the 5% level. The weekly model also estimated a negative effect, albeit statistically insignificant. The weekly model found more compelling support for "celebratory" and "sore-loser" spending behavior. While the daily model found some mixed results: the positive impact attributed to Panthers home games overwhelmed any reactionary spending behavior related to positive game

outcomes and expectations. The daily model weakly supported the “sore-loser” hypothesis amongst a few conditional outcomes for Bobcats games. Overall the models are mostly concordant, especially with respect to the key variables of interest.

CONCLUSION

The purpose of this paper is to explore the relationship between sporting events in Charlotte, North Carolina, and economic activity at a particular firm. The motivation to explore this topic is that city governments are generally proponents of subsidizing sporting events and venues. City policymakers advocate these subsidies because of the belief that the events generate a net increase in economic activity. A formal inquiry into the effect these events have on economic activity is necessary to evaluate the claimed benefits. An investigation may either support or debunk the claims that restaurants and bars within close proximity to stadiums will enjoy increased business before and after games and events. This study is unique in that the data is firm-level and occurs at a high frequency. The preceding analysis provided a look into the micro level impact local sporting events have on a single firm.

The methodology used in this research is ordinary least squares regression analysis. The dependent variable is a full-service restaurant's sales. Several econometric models are specified at the daily and weekly frequency to investigate the impact of sporting events. The method began by identifying typical economic indicators and environmental factors that impact sales revenue at a weekly frequency. After testing the significance of these theoretical relationships, the study explored the extent to which local sporting events impact sales in a specific business entity. Along the way sporting event outcomes were dissected into unexpected losses and surprise wins, thereby including uncertainty and market expectations in the model. A separate econometric model is then estimated using revenue in a daily format while controlling for yearly,

weekly, and daily fixed effects. This daily model serves as a robustness check to supplement the results of the weekly model.

The results from the regression model that incorporates sales at the weekly frequency finds statistically significant positive impacts associated with Panthers home games and events at the Mecklenburg County Aquatic Center; Bobcats games and events at other venues in center city and surrounding Charlotte do not have a significant effect on sales. Additionally, when expectations and actual outcomes are out of line the weekly model finds a "celebration" effect and a "sore-loser" effect. That is, a surprise win by the Panthers is associated with an increase in revenue and an unexpected loss by the Panthers is associated with a decrease in revenue. The variables for these outcomes and events are statistically significant.

The results from the regression model that incorporates revenue at the daily frequency finds similar results as the weekly model. Significant increases in sales are realized the day before and the day of Panthers home games. These increases occur regardless of game outcomes and expectations on game outcomes. The results do not consistently support the "celebration" effect on spending behavior found in the weekly model. However, some support for the "sore-loser" hypothesis is found. In accordance with the first model, events held at the Aquatic Center have a positive impact on revenue. Lastly, Bobcats home games may have a negative impact on sales or no impact at all depending on outcomes and expectations. The overall results of the daily model are particularly robust given the large number of observations and the high statistical significance of yearly, weekly and daily fixed effect control variables.

The study finds mild support for the claim that restaurants are positively impacted by local sporting events. For this particular business, Panthers home games and events held at the Mecklenburg County Aquatic Center significantly increase sales. While an undesirable outcome of some games may negatively influence the economic behavior of the crowd, this result does not hold for Panthers home games, which have positive impacts on revenue at this business regardless of expectations and outcomes. Bobcats home games may have a negative impact on sales at this particular business. Convention Center, Memorial Stadium, and Parks and Recreation events have no discernable impact on revenues. This result implies that these events do not impact this specific firm; the outcome cannot necessarily be generalized to the entire local economy. However, the result may hold for other medium to high-end restaurants located in Uptown Charlotte. Future studies would benefit by attempting to aggregate food and beverage spending across the entire region under study. By doing so the researcher may be able to identify which types of restaurants benefit more from particular venues and outcomes.

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APPENDIX A: FIGURES

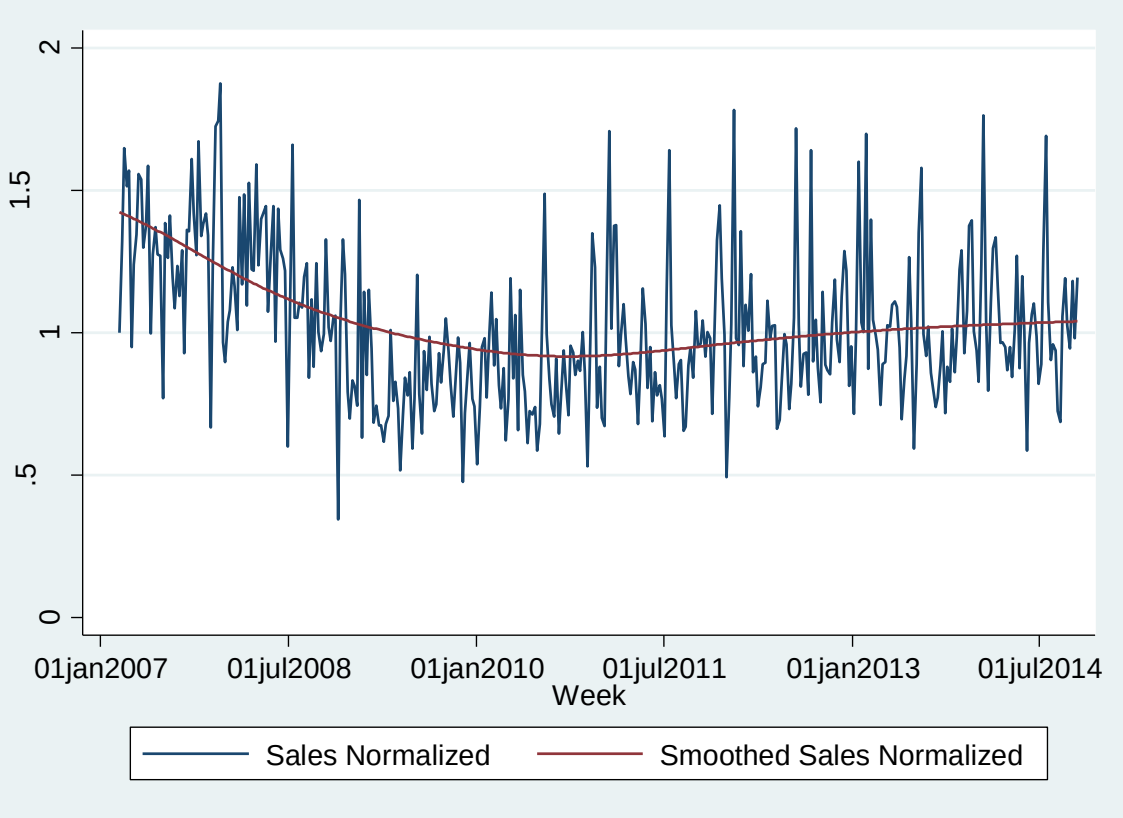

Figure A1: Sales by week

APPENDIX A: (Continued)

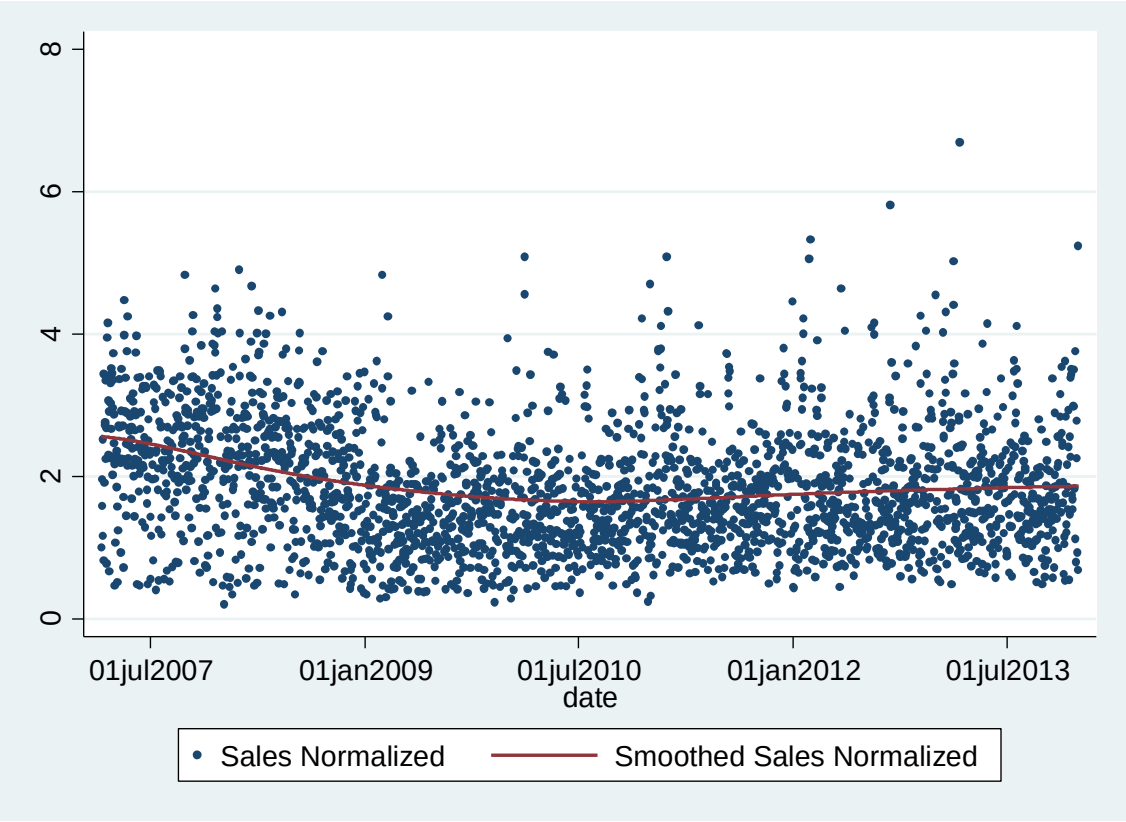

Figure A2: Sales by day

APPENDIX A: (Continued)

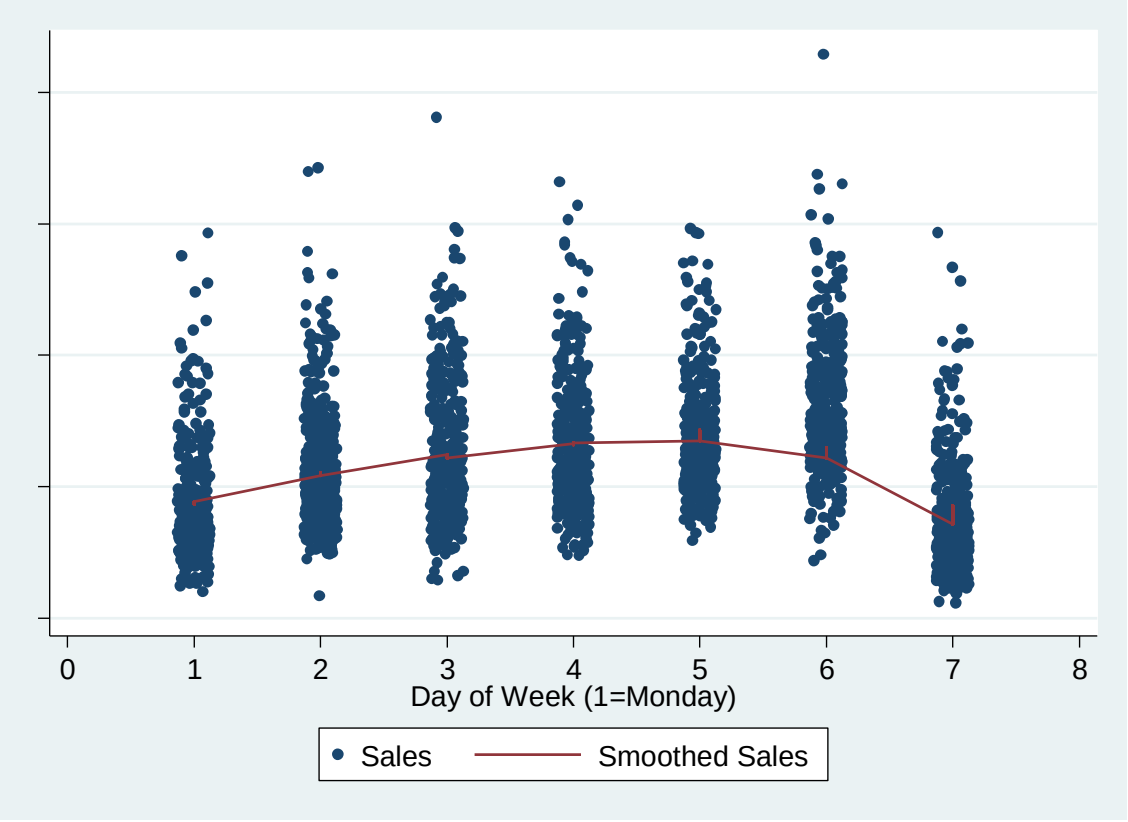

Figure A3: Sales by day of the week

APPENDIX B: TABLES

Table B1: Weekly data description

Control Variables	Obs ≥ 1	Mean	Std. Dev.	Min	Max
Unemployment Claims	400	13,659	6,940	4,378	56,647
High Temperature (Celsius)	400	22.657	8.069	3.257	37.771
Rain at least 3 days (1=YES)	149	0.373	0.484	0	1
Management Change (1=YES)	77	0.193	0.395	0	1
Professional Sports Variables	**Obs ≥ 1**	**Mean**	**Std. Dev.**	**Min**	**Max**
Panthers					
Home Game	58	0.153	0.380	0	2
Win	54	0.143	0.371	0	2
Win at Home	32	0.080	0.272	0	1
Surprise Win	18	0.045	0.208	0	1
Unexpected Loss	18	0.045	0.208	0	1
Bobcats					
Home Game	153	0.728	1.044	0	4
Win	132	0.568	0.937	0	5
Win at Home	108	0.368	0.673	0	3
Surprise Win	58	0.263	0.583	0	1
Unexpected Loss	45	0.128	0.356	0	1
Local Sports Variables	**Obs ≥ 1**	**Mean**	**Std. Dev.**	**Min**	**Max**
Convention Center	36	0.090	0.287	0	1
Attendance	36	12,774	13,616	500	40,000
Bank of America Stadium	14	0.035	0.184	0	1
Attendance	14	50,932	21,576	50	74,000
Time Warner Cable Arena	6	0.015	0.122	0	1
Attendance	6	8,850	8,799	100	20,000
Memorial Stadium	5	0.013	0.111	0	1
Attendance	5	7,520	7,839	1000	20,000
Aquatic Center	36	0.090	0.287	0	1
Attendance	36	1,081	725	100	3,000
Park and Recreation	310	1.015	0.736	0	3
Attendance	310	2,600	2,903	100	35,100

Table B2: Weekly regression output

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations	(5) ProSports Reduced Expectations	(6) Final Model
CONTROLS						
Lagged Sales	0.190***	0.204***	0.175***	0.175***	0.183***	0.186***
(Log form)	(0.055)	(0.056)	(0.054)	(0.054)	(0.053)	(0.052)
Unemployment	-0.214***	-0.211***	-0.221***	-0.206***	-0.208***	-0.213***
	(0.040)	(0.040)	(0.039)	(0.040)	(0.039)	(0.039)
Time Index	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Week Index	-0.000	0.000	-0.002*	-0.002	-0.002	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Rainy Week	-0.058**	-0.058**	-0.059**	-0.066**	-0.067**	-0.068***
	(0.024)	(0.024)	(0.024)	(0.026)	(0.026)	(0.025)
Temperature	-0.006***	-0.006***	-0.005**	-0.006***	-0.006***	-0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Management Change	0.087***	0.103***	0.079**	0.087**	0.088**	0.101***
	(0.033)	(0.033)	(0.033)	(0.035)	(0.035)	(0.035)
Promotion	0.157***	0.163***	0.162***	0.157***	0.156***	0.161***
	(0.055)	(0.055)	(0.056)	(0.055)	(0.055)	(0.054)

Table B2: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations	(5) ProSports Reduced Expectations	(6) Final Model
LOCAL EVENTS						
Convention		0.035				
		(0.041)				
Aquatic Center		0.104***				0.104***
		(0.040)				(0.038)
Memorial Stadium		0.040**				
		(0.019)				
BoA Stadium		-0.032				
		(0.063)				
Park & Recreation		0.028				
		(0.019)				
PANTHERS						
Home Game			0.066	0.082*	0.080*	0.086**
			(0.044)	(0.049)	(0.043)	(0.043)
Win			0.127**			
			(0.050)			
Win at Home			-0.093			
			(0.073)			
BOBCATS						
Home Game			-0.002	0.002	-0.007	
			(0.017)	(0.016)	(0.015)	
Win			-0.007			
			(0.024)			
Win at Home			-0.023			
			(0.036)			

Table B2: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations	(5) ProSports Reduced Expectations	(6) Final Model
PANTHERS						
Expected Win				-0.005		
				(0.063)		
Expected Loss				0.012		
				(0.052)		
Surprise Win				0.100*	0.099*	0.094*
				(0.055)	(0.050)	(0.049)
Unexpected Loss				-0.111	-0.111	-0.120
				(0.085)	(0.079)	(0.081)
BOBCATS						
Expected Win				-0.031		
				(0.023)		
Expected Loss				-0.002		
				(0.013)		
Surprise Win				-0.007	-0.003	
				(0.027)	(0.027)	
Unexpected Loss				-0.069*	-0.062	-0.064*
				(0.040)	(0.040)	(0.038)
Constant	11.464***	11.263***	11.751***	11.623***	11.545***	11.514***
	(0.920)	(0.928)	(0.892)	(0.892)	(0.884)	(0.877)
Observations	399	399	399	399	399	399
Adjusted R-squared	0.268	0.278	0.280	0.280	0.285	0.298

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B3: Daily data description

Control Variables	Obs = 1	Mean	Std. Dev.	Min	Max
High Temperature	2427	226.760	87.149	-28.000	400.000
Snow Day (1=YES)	8	0.003	0.057	0	1
Rainy (1=YES)	205	0.083	0.276	0	1
Unemployment Claims	2427	9.516	0.387	8.451	10.945
Promotion (1=YES)	104	0.043	0.203	0	1
Management Change (1=YES)	521	0.215	0.411	0	1
Professional Sports Variables	Obs = 1	Mean	Std. Dev.	Min	Max
Panthers					
Home Game	57	0.023	0.151	0	1
Win	53	0.022	0.146	0	1
Win at Home	30	0.012	0.111	0	1
Expected Win	35	0.014	0.119	0	1
Surprise Win	18	0.007	0.086	0	1
Unexpected Loss	18	0.007	0.086	0	1
Expected Loss	41	0.017	0.129	0	1
Expected Win at Home	24	0.010	0.099	0	1
Surprise Win at Home	6	0.002	0.050	0	1
Unexpected Loss at Home	13	0.005	0.073	0	1
Expected Loss at Home	14	0.006	0.076	0	1
Expected Win Away	11	0.005	0.067	0	1
Surprise Win Away	12	0.005	0.070	0	1
Unexpected Loss Away	5	0.002	0.045	0	1
Expected Loss Away	27	0.011	0.105	0	1
Bobcats					
Home Game	256	0.105	0.307	0	1
Win	186	0.077	0.266	0	1
Win at Home	53	0.022	0.146	0	1
Expected Win	92	0.038	0.191	0	1
Surprise Win	94	0.039	0.193	0	1
Unexpected Loss	51	0.021	0.143	0	1
Expected Loss	272	0.112	0.316	0	1
Expected Win at Home	80	0.033	0.178	0	1
Surprise Win at Home	43	0.018	0.132	0	1

Table B3: (Continued)

Professional Sports Variables	Obs = 1	Mean	Std. Dev.	Min	Max
Bobcats					
Unexpected Loss at Home	41	0.017	0.129	0	1
Expected Loss at Home	92	0.038	0.191	0	1
Expected Win Away	12	0.005	0.070	0	1
Surprise Win Away	51	0.021	0.143	0	1
Unexpected Loss Away	10	0.004	0.064	0	1
Expected Loss Away	180	0.074	0.262	0	1
Local Sports Variables	Obs = 1	Mean	Std. Dev.	Min	Max
Charlotte Convention Center	164	0.064	0.245	0	1
Bank of America Stadium	92	0.038	0.191	0	1
Memorial Stadium	4	0.002	0.041	0	1
Aquatic Center	122	0.050	0.219	0	1

Table B4: Daily regression output

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
Day of Week					
Tuesday	0.334***	0.334***	0.350***	0.348***	0.338***
	(0.022)	(0.022)	(0.023)	(0.023)	(0.022)
Wednesday	0.404***	0.401***	0.413***	0.412***	0.399***
	(0.025)	(0.025)	(0.026)	(0.026)	(0.025)
Thursday	0.454***	0.448***	0.466***	0.464***	0.447***
	(0.025)	(0.025)	(0.026)	(0.026)	(0.024)
Friday	0.537***	0.533***	0.551***	0.551***	0.538***
	(0.025)	(0.025)	(0.026)	(0.026)	(0.025)
Saturday	0.691***	0.685***	0.676***	0.680***	0.659***
	(0.026)	(0.026)	(0.028)	(0.028)	(0.027)
Sunday	-0.237***	-0.241***	-0.293***	-0.273***	-0.315***
	(0.034)	(0.034)	(0.037)	(0.038)	(0.036)
Week of Year (WOY)					
2.WOY	0.266*	0.251	0.272*	0.243*	0.236*
	(0.158)	(0.156)	(0.147)	(0.137)	(0.142)
3.WOY	0.480***	0.472***	0.522***	0.493***	0.478***
	(0.135)	(0.132)	(0.126)	(0.114)	(0.117)
4.WOY	0.509***	0.500***	0.540***	0.523***	0.508***
	(0.133)	(0.130)	(0.125)	(0.114)	(0.118)
5.WOY	0.585***	0.565***	0.577***	0.553***	0.542***
	(0.137)	(0.133)	(0.130)	(0.119)	(0.122)

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
6.WOY	0.495***	0.474***	0.521***	0.499***	0.479***
	(0.131)	(0.127)	(0.122)	(0.110)	(0.114)
7.WOY	0.938***	0.923***	0.967***	0.937***	0.924***
	(0.152)	(0.150)	(0.144)	(0.134)	(0.138)
8.WOY	0.577***	0.551***	0.606***	0.576***	0.551***
	(0.136)	(0.133)	(0.126)	(0.115)	(0.119)
9.WOY	0.681***	0.675***	0.692***	0.658***	0.656***
	(0.142)	(0.144)	(0.133)	(0.123)	(0.127)
10.WOY	0.636***	0.613***	0.663***	0.631***	0.615***
	(0.136)	(0.132)	(0.128)	(0.118)	(0.120)
11.WOY	0.558***	0.511***	0.581***	0.550***	0.510***
	(0.129)	(0.126)	(0.120)	(0.108)	(0.111)
12.WOY	0.553***	0.537***	0.573***	0.543***	0.538***
	(0.136)	(0.133)	(0.126)	(0.116)	(0.119)
13.WOY	0.468***	0.439***	0.483***	0.446***	0.430***
	(0.128)	(0.126)	(0.119)	(0.108)	(0.111)
14.WOY	0.413***	0.353***	0.445***	0.418***	0.355***
	(0.137)	(0.135)	(0.132)	(0.123)	(0.125)
15.WOY	0.440***	0.420***	0.458***	0.417***	0.412***
	(0.127)	(0.125)	(0.119)	(0.106)	(0.110)
16.WOY	0.517***	0.499***	0.533***	0.498***	0.488***
	(0.139)	(0.137)	(0.131)	(0.121)	(0.124)
17.WOY	0.530***	0.513***	0.544***	0.503***	0.496***
	(0.135)	(0.133)	(0.127)	(0.115)	(0.118)
18.WOY	0.583***	0.564***	0.589***	0.551***	0.544***
	(0.133)	(0.131)	(0.125)	(0.114)	(0.117)
19.WOY	0.632***	0.606***	0.634***	0.595***	0.585***
	(0.140)	(0.138)	(0.133)	(0.123)	(0.127)

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
20.WOY	0.560***	0.505***	0.563***	0.524***	0.482***
	(0.136)	(0.134)	(0.128)	(0.118)	(0.121)
21.WOY	0.443***	0.418***	0.444***	0.406***	0.397***
	(0.132)	(0.130)	(0.124)	(0.113)	(0.116)
22.WOY	0.338**	0.319**	0.337***	0.299**	0.296**
	(0.137)	(0.136)	(0.129)	(0.119)	(0.122)
23.WOY	0.409***	0.389***	0.407***	0.367***	0.365***
	(0.139)	(0.136)	(0.131)	(0.121)	(0.122)
24.WOY	0.467***	0.459***	0.466***	0.427***	0.435***
	(0.142)	(0.138)	(0.134)	(0.124)	(0.125)
25.WOY	0.479***	0.458***	0.478***	0.439***	0.435***
	(0.136)	(0.134)	(0.128)	(0.118)	(0.121)
26.WOY	0.431***	0.409***	0.429***	0.389***	0.385***
	(0.137)	(0.136)	(0.129)	(0.119)	(0.121)
27.WOY	0.233	0.211	0.230*	0.191	0.186
	(0.147)	(0.145)	(0.138)	(0.129)	(0.133)
28.WOY	0.285**	0.255*	0.281**	0.242**	0.237**
	(0.134)	(0.133)	(0.126)	(0.116)	(0.119)
29.WOY	0.412***	0.367***	0.405***	0.369***	0.338***
	(0.137)	(0.137)	(0.128)	(0.119)	(0.123)
30.WOY	0.438***	0.418***	0.429***	0.395***	0.389***
	(0.135)	(0.133)	(0.127)	(0.116)	(0.119)
31.WOY	0.430***	0.408***	0.427***	0.389***	0.384***
	(0.137)	(0.136)	(0.130)	(0.119)	(0.122)
32.WOY	0.415***	0.390***	0.414***	0.373***	0.367***
	(0.134)	(0.132)	(0.125)	(0.115)	(0.118)
33.WOY	0.402***	0.378***	0.402***	0.362***	0.355***
	(0.132)	(0.130)	(0.123)	(0.113)	(0.116)

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
34.WOY	0.405***	0.382***	0.405***	0.366***	0.360***
	(0.136)	(0.135)	(0.128)	(0.117)	(0.120)
35.WOY	0.446***	0.416***	0.446***	0.407***	0.401***
	(0.135)	(0.133)	(0.126)	(0.116)	(0.119)
36.WOY	0.263*	0.240*	0.249**	0.209*	0.201*
	(0.136)	(0.134)	(0.126)	(0.116)	(0.120)
37.WOY	0.448***	0.418***	0.399***	0.390***	0.350**
	(0.153)	(0.151)	(0.145)	(0.137)	(0.139)
38.WOY	0.450***	0.429***	0.390***	0.361***	0.347***
	(0.137)	(0.136)	(0.125)	(0.113)	(0.118)
39.WOY	0.499***	0.478***	0.419***	0.387***	0.386***
	(0.134)	(0.132)	(0.125)	(0.114)	(0.117)
40.WOY	0.377***	0.355***	0.360***	0.347***	0.322***
	(0.135)	(0.134)	(0.128)	(0.117)	(0.121)
41.WOY	0.534***	0.513***	0.479***	0.448***	0.436***
	(0.143)	(0.142)	(0.129)	(0.119)	(0.122)
42.WOY	0.484***	0.465***	0.457***	0.428***	0.420***
	(0.135)	(0.133)	(0.128)	(0.118)	(0.122)
43.WOY	0.549***	0.532***	0.465***	0.433***	0.425***
	(0.132)	(0.131)	(0.121)	(0.110)	(0.114)
44.WOY	0.367***	0.347***	0.345***	0.328***	0.312***
	(0.134)	(0.132)	(0.121)	(0.109)	(0.114)
45.WOY	0.500***	0.477***	0.495***	0.474***	0.456***
	(0.135)	(0.133)	(0.122)	(0.110)	(0.115)
46.WOY	0.623***	0.594***	0.590***	0.570***	0.545***
	(0.132)	(0.130)	(0.119)	(0.106)	(0.111)
47.WOY	0.471***	0.454***	0.420***	0.425***	0.401***
	(0.142)	(0.140)	(0.132)	(0.121)	(0.126)

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
48.WOY	0.147	0.128	0.144	0.132	0.110
	(0.159)	(0.156)	(0.144)	(0.134)	(0.138)
49.WOY	0.540***	0.577***	0.554***	0.551***	0.563***
	(0.129)	(0.123)	(0.120)	(0.110)	(0.112)
50.WOY	0.799***	0.794***	0.736***	0.721***	0.707***
	(0.133)	(0.130)	(0.122)	(0.112)	(0.116)
51.WOY	0.841***	0.838***	0.808***	0.789***	0.791***
	(0.134)	(0.130)	(0.125)	(0.113)	(0.115)
52.WOY	0.527***	0.608***	0.528***	0.526***	0.593***
	(0.141)	(0.133)	(0.124)	(0.113)	(0.115)
53.WOY	0.629***	0.692***	0.664***	0.638***	0.693***
	(0.152)	(0.148)	(0.143)	(0.133)	(0.136)
Year					
2008	-0.127***	-0.126***	-0.123***	-0.117***	-0.118***
	(0.037)	(0.037)	(0.035)	(0.035)	(0.035)
2009	-0.405***	-0.403***	-0.404***	-0.404***	-0.401***
	(0.050)	(0.050)	(0.046)	(0.046)	(0.046)
2010	-0.427***	-0.429***	-0.429***	-0.432***	-0.433***
	(0.034)	(0.034)	(0.033)	(0.033)	(0.032)
2011	-0.334***	-0.332***	-0.337***	-0.343***	-0.339***
	(0.032)	(0.031)	(0.031)	(0.031)	(0.030)
2012	-0.394***	-0.400***	-0.386***	-0.390***	-0.400***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.040)
2013	-0.458***	-0.463***	-0.445***	-0.443***	-0.455***
	(0.066)	(0.064)	(0.063)	(0.062)	(0.062)

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
Controls					
High Temperature	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Snow Day	-0.364**	-0.352**	-0.363**	-0.362**	-0.342**
	(0.158)	(0.154)	(0.150)	(0.158)	(0.141)
Rainy Day	-0.026	-0.030	-0.017	-0.022	-0.023
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Unemployment Lag 14	-0.085*	-0.092*	-0.084*	-0.087*	-0.093**
	(0.049)	(0.048)	(0.046)	(0.047)	(0.046)
Unemployment Lag 28	-0.097*	-0.094*	-0.098*	-0.095*	-0.094*
	(0.054)	(0.053)	(0.050)	(0.050)	(0.049)
Promotion	0.650***	0.650***	0.662***	0.653***	0.660***
	(0.039)	(0.038)	(0.039)	(0.038)	(0.039)
Management Change	0.108**	0.115**	0.099*	0.098**	0.109**
	(0.053)	(0.052)	(0.050)	(0.050)	(0.050)
Local Sports					
Aquatic Center		0.085**			0.090**
		(0.040)			(0.043)
Convention Center		-0.013			
		(0.038)			
Memorial Stadium		0.338			
		(0.219)			
BoA Stadium		-0.131**			-0.125**
		(0.057)			(0.055)

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
Panthers					
Day Before Home			0.184***	0.174***	0.178***
			(0.030)	(0.030)	(0.030)
Day of Home Game			0.586***		
			(0.081)		
Day after Home			0.086	0.071	
			(0.053)	(0.053)	
Win (Home / Away)			-0.053		
			(0.073)		
Home					
Win			-0.070		
			(0.124)		
Expected Win				0.415***	0.441***
				(0.079)	(0.078)
Unexpected Loss				0.515***	0.528***
				(0.091)	(0.091)
Surprise Win				0.521***	0.559***
				(0.159)	(0.158)
Expected Loss				0.606***	0.626***
				(0.126)	(0.129)
Away					
Expected Win				-0.131	
				(0.095)	
Unexpected Loss				-0.448***	
				(0.099)	
Surprise Win				-0.038	
				(0.102)	
Expected Loss				-0.175*	

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
Bobcats					
Day Before Home			-0.049*	-0.056**	-0.051*
			(0.028)	(0.027)	(0.027)
Day of Home Game			-0.045		
			(0.034)		
Day after Home			-0.023	-0.028	
			(0.030)	(0.028)	
Win (Home / Away)			0.060*		
			(0.035)		
Home					
Win			-0.048		
			(0.056)		
Expected Win				-0.066	-0.055
				(0.060)	(0.059)
Unexpected Loss				-0.226**	-0.221**
				(0.105)	(0.102)
Surprise Win				-0.014	0.002
				(0.066)	(0.065)
BHomeLoseLost				-0.135*	-0.130
				(0.081)	(0.080)
Away					
Expected Win				0.026	
				(0.102)	
Unexpected Loss				0.154*	
				(0.084)	
Surprise Win				0.078*	
				(0.046)	
Expected Loss				-0.029	

Table B4: (Continued)

VARIABLES	(1) Control Model	(2) Local Sporting Event Venues	(3) ProSports Home-games and Wins	(4) ProSports Full Expectations Model	(5) Final Model
Constant	10.422***	10.473***	10.402***	10.436***	10.512***
	(0.558)	(0.558)	(0.515)	(0.505)	(0.512)
Observations	2,427	2,427	2,427	2,427	2,427

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1