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Do College Football Games Affect the Level of Crime in the Local Community?

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Executive Summary

On the local news channels in major college football towns, there are anecdotal stories during that detail celebratory riots that took place during or after a college football game. Few empirical studies have focused on whether there is a relationship between college football games and crime. This paper attempts to determine that relationship by exploiting the fact that college football games are played in a home stadium and an away stadium.

More specifically, the study addressed the following two questions:

- Do jurisdictions in which a home football game is played differ in crime rate from those where an away game is played?
- Do crime rates in the same jurisdiction vary depending on whether a home or away game is played there?

Data for the analysis was collected for the 2007 NCAA Division I football season. Crime data for the analysis was obtained from the 2007 National Incident Based Reporting System; sixty jurisdictions having college football teams reported data. The data set included jurisdiction demographic information from the 2007 American Community Survey. Various other data sources were used to collect information specific to the college football game, such as rivalry identification, point spread, conference game, game time and outcome of the game. The analysis of data included t-test of difference in means for significance of home versus away games and other t-tests related to the game outcome of home games. The analysis included two regression models, a standard OLS and a fixed effects regression.

The regression results found that home games had a significant and positive impact on total crime, compared to away games (i.e. home games increase crime rates). Homes games had a significant and positive impact when both models were run with disorderly conduct, drunkenness and liquor law violation as the dependent variable crime category. In the fixed effects model, the relationship between home games and DUI crime was significant and positive although the magnitude was not meaningful. The game characteristics or outcome of the game had little impact on crime.

Recommendations are made for future research to increase the sample size by analyzing multiple years. Further research is needed to analyze the police force and policing practices during college football games. Recommending increasing the number of police on duty during college football games could have either a positive or negative impact on the crime rate. More police could either reduce the number of crimes as they are more visible to spectators or increase crime as police can cover a larger area.

Introduction

The economics of college football are big business. According to The Business of College Sports website[1], the top 10 teams profited[2] over $481 million in the 2010-2011 season. The University of Texas, from the Big 12 conference, had excess revenues of $71 million last year, even without the additional revenues associated with a postseason bowl game. The university's athletic department was not the only beneficiary of a good year. Local businesses earned extra revenue and the university itself received a portion of the profits. According to Forbes magazine, Texas football revenue contributed over $6 million to university programs last year and generated nearly $10 million in local spending. College football games are important to fans, boosters, the university, local businesses, coaches, students and the players. Although the economic benefits of college football are positive, few reports examine the external costs of game activity. It may be straightforward to estimate the personnel, equipment, utility and other direct costs associated with college football, accounting for indirect costs is less clear.

One potential outcome of a large group of spectators gathering to watch a violent and aggressive sport is an increase in crime in the local community. The attendance of spectators reached an all-time high in 2010 with over 47.6 million individuals attending National Collegiate Athletic Association (NCAA) Division I college football games. There have been reports over the last few years that suggest that not all sporting events are devoid of spectator violence. After the 2006 victory of the No.1 Ohio State football team over No.2 Texas, an Ohio State student was arrested after driving his car into three people, 40 fires were reported ablaze, and 17 individuals were arrested (ESPN.com).

[1] Businessofcollegesports.com
[2] Profit is measured by excess of revenues over expenses

Another report from a NFL preseason game in 2011 described more violence. During the San Francisco 49ers versus Los Angeles Raiders game, there was a beating in the restroom, a brawl in the stadium, and two individuals were shot in the parking lot. Recently, after the 2012 NCAA national basketball championship game, fans in Lexington, KY took to the streets for a celebratory riot leading to 50 arrests, 60 fires and more than 20 people needing to be taken to the hospital[3]. Reports of spectator violence such as these, generally only receive local or national coverage if they are extreme in nature. Anecdotal stories such as these provide a glimpse into spectator violence but do not provide empirical evidence that college football games cause an increase in crime.

While fans attend games as spectators, they also have the opportunity to partake in pre and post-game activities. Most colleges and cities provide tailgating areas around football stadiums where large groups can gather. Tailgating at college sporting events often times involves the consumption of alcohol. The consumption of alcohol can lead to an increase in poor judgment and the possibility of increased criminal activity. In the late 1990s, violent behavior that erupted because of public drunkenness at University of Colorado at Boulder led officials to ban the sale of alcohol in the stadium, except in luxury suites and club seats. The NCAA does not allow alcohol sales and alcohol advertising at its 88 championship events. During the regular season, however, schools are allowed to sell alcohol. Even though they are allowed to sell alcohol the majority of colleges prohibit alcohol sales during the regular season; of the 120 Division I colleges only 35 allow alcohol sales and the majority only allow sales in luxury suites and club seats. Colleges made the decision to not sell alcohol to reduce the chance of violent fan

[3] Warren, Jim and Josh Kegley. "Police analysis of UK post-game celebration." Lexington Herald Leader. 6 Apr 2012.

behavior and to combat student binge drinking. A recent article for the September 12th 2009 edition of the Wall Street Journal reports that some cash strapped colleges have begun to sell alcohol at stadiums as a way to increase revenue[4]. This trend could lead to an increase in alcohol related crimes as fans will have access to alcohol inside the stadium, other than illegally sneaking it into the stadium.

Although the topics of crime and sports are often considered separately by the academic community; I propose to jointly examine the topics. There have been relatively few empirical studies that have attempted to establish a relationship between college football and crime. The majority of the literature on crime and sports has focused on professional sporting events in North American, although European academics have published numerous studies focusing on European football hooligans and crime.

Literature Review

In the following literature review, I provide background on the early theories behind spectator violence and highlight current studies of crime and sporting events.

Collegiate sports and crime

In the 1970s, spectator violence at sporting events began to increase and this led academia to begin studying the underlying causes of the violent outbursts. Sport psychologists developed theories focusing on the aggression level of fans, while sport sociologists used collective behavior theories to explain crowd violence (Case & Boucher 1981). The majority of the early studies were based on anecdotal reports from media about a riot or incident that took place at a sporting event, and it does not seem like

[4] OPdyke, Jeff & David Kesmodel. "Beer Sales Make a Comeback at College Stadiums." The Wall Street Journal on the Web. 12 Sept 2009. 14 Mar 2012. <Online.wsj.com/article/SB125271416817105157.htm>.

research has progressed much since then (Roberts and Benjamin 2000). Recently, academic studies from Europe have examined criminal activity as it relates to European soccer matches. However, North American studies about sporting event crime are sparse, especially outside of professional sports.

Rees and Schnepel (2009) have one of the few empirical studies of crime and college football. They found that assault, vandalism, arrests for disorderly conduct, and alcohol-related arrests increased on football game days (69). Using Associated Press (AP) poll data, the study determined that the number of crime incidents was greater when an upset occurred. The study matched 26 police agencies to college football towns and used six years of crime incident and football data. One issue with this study is the relatively few controls in place for demographics of the local jurisdiction. In addition, AP rank may not be the best variable to use to categorize upsets. Las Vegas betting lines may be a better estimator for upsets. The authors failed to consider the effect rivalries, game time or conference games may have on crime rates.

Alcohol and collegiate sports crime

One area that has drawn increased levels of research over the past two decades is the relationship between alcohol and tailgating at college football games. In 1981, Arizona State banned alcohol in their football stadium at the request of local law officials and the president of the University. The officials and university president believed the ban would reduce the number of postgame traffic accidents and the amount of unruly spectator behavior before and after games (Boyes and Faith 1993). An analysis using 13 years of DWI arrest reports in the City of Tempe indicated that because consuming

alcohol was not allowed in the stadium, fans seemed to shift drinking to before and after the game. The authors "concluded that drivers were more intoxicated following the ban than before the ban" (606). A University of Florida study (Glassman et al. 2007) found that fans of college football consumed more alcohol on game days than the last "non-game day" drinking event, with drinking event defined as the last time the person partied or drank in a social context. The results were found by surveying student and season football ticket holders during the 2004 season.

College football tailgating provides an opportunity for fans to gather and consume alcohol both before and after the game. Such drinking may increase the number of DUI arrests (alcohol-related arrests increased in the Rees and Schnepel study). Tailgating provides an opportunity to engage in heavy drinking not only by spectators who go inside the stadium, but also by other fans who come to enjoy a good time. Merlo et al. (2010) found "that levels of heavy episodic drinking were higher among tailgaters who did not plan to attend the football game at School2, suggesting a greater likelihood that those individuals would engage in driving while impaired (243)." A University of Florida study, Merlo et al. (2010) examined the effect alcohol had on the arrest rate during college football game days. This study used confirmed breath alcohol content data from two universities and 466 surveyed individuals. The study found that football game days had a significantly higher number of alcohol related arrests (70.3) when compared to away game days (12.3) and holidays (11.8). It should be noted that the majority of arrests on college game days were for open container violations. This study only evaluated one university during the analysis period and the home team was unbeaten so comparisons may not generalize to the population or measure the effect of losing.

Professional sports and crime

Although the literature on college sports and crime is not well developed, studies of professional sporting events and crime have provided some insights on the topic. European soccer events have experienced more violent riots than American sporting events and multiple authors have examined the subject. Ward (2002) in a review of studies highlights that "incidence of fan violence occurs in Britain, Italy, Germany, the Netherlands and Belgium, with English soccer fans being the most studied" (456). The study also mentions that roughly 50% of crimes committed by soccer fans in South America and Europe are from the under-20 age group (457). While soccer and crime have received more attention in terms of academic literature, there are some relevant North American studies of criminal acts relating to sporting events. Recently, Card and Dahl (2011) published a study that investigated the link between family violence and the emotional cues associated with the outcome of NFL games. The study matched six NFL teams to police jurisdictions within the home team state to see if there was a relationship between domestic violence crime incidents and wins and losses. The "empirical results show a roughly 10% effect on an upset loss by the local NFL team on the rate of male-to-female at-home IPV (inter-partner violence)" (38). The study used Las Vegas point spreads as a determinant for individuals' expected outcome of the game. Although the study found upset losses to have a large effect on domestic violence, losses in games that were expected to be losses had small and insignificant effects (39). While this study is only focused on only one category of crime, it does use Las Vegas point spreads to determine expected game outcomes.

The literature on sports and crime lacks studies that attempt to empirically measure the effect of college football games on crime in the local community. Rees and Schnepel (2010) are the first to tackle the issue outside of alcohol-related crime studies. However, the study has flaws with the methodology of using rank as a measure of upsets. The study is also void of analysis relating the game time and rivalry games to crime incidents. Numerous studies have examined the prevalence of alcohol and college football tailgating but the studies are focused on analysis from a sample of one or two schools. Examples of professional sports studies have shown that domestic violence may increase in the home state, when NFL teams experience an upset loss and European football has long been studied as to the causes of fan violence. The study I propose expands on the Rees and Schnepel study by incorporating Las Vegas lines much like Card and Dahl (2011) and introduces controls for game time, conference games, rivalries and jurisdiction demographic variables.

Research Design

To determine whether a college football game affects the number of reported crime incidents, I consider crime rates from the same jurisdictions as they differ on days with home and away college football games. One of the basic problems with studying the link between college football games and crime rates is my inability to observe all determinants of crime that are specific to a given jurisdiction. However, over a complete season I can measure the crime incident totals on home game days and compare that to away game crime incident totals, under an assumption that the most important difference in that setting is simply whether a game was played or not. Home college football games are associated with an increase in the number of people gathering near or at the stadium.

Home games bring visitors from outside the local jurisdiction to the city as well, including away fans and those home team fans that live outside the local community. This gathering of fans could produce an increase in crime incidents simply by the interactions of large numbers of people, in close proximity. However, away games should not bring a significant number of outsiders into the home team's community and allow for an opportunity to test for a relationship between crime and college football games.

Data Collection

The data for this analysis were gathered from multiple sources. The crime data are from the 2007 National Incident Based Reporting System (NIBRS)[5]. The data set collects a variety of crime data for each incident reported to police. Reporting to NIBRS is voluntary, so not every police jurisdiction in the United States is represented. The process to determine which localities reported in 2007 was simple. In the 2007 Division I football season there were 119 colleges. I created a list of those 119 colleges and matched the city location, creating a population of 238 (1 college and 1 city) police jurisdictions. The NIBRS dataset classifies crime incidents by reporting entity and assigns each entity a unique identification number (ID). For the 238 police jurisdictions, I identified the unique ID of each reporting unit in NIBRS. I checked each unique ID to see if data were present in the 2007 NIBRS dataset. I found 36 city and 24 university police jurisdictions that reported to NIBRS and have a university with a Division I college football team. The difference between university and local jurisdiction could be

[5] Data was accessed via the Inter-University Consortium for Political and Social Science Research website: http://www.icpsr.umich.edu/icpsrweb/ICPSR/

an important factor in the number of crime incidents. In total, there are 38 city/university police jurisdictions from different areas (for some jurisdictions both the university and local police report). The 38 unique entities corresponds to 33% of the total population of Division I college football teams. The data set for this report included all 60 jurisdictions and each team played 12 games, which corresponded to a total of 720 football games.

The NIBRS data set collects those crimes reported to police. The NIBRS data set includes the year, month, day, and time for each reported incident. The data will be summarized for each day that a college football team had a game. Most college football teams play twelve games during the regular season, with some playing an extra conference championship game. Teams that have a winning record at the end of the regular season become eligible to play in a post season bowl game. This analysis examines only those games that take place during the regular season. A conference championship game and bowl game often include significant travel for teams and there is not a clear home or away team. Not being able to easily assign a team as playing at home or away is the primary reason why championship and bowl games are excluded from the analysis. There were four games in the data set that were played on a neutral field and were classified as away games.

To investigate whether or not the perceived outcome of the college football game has an effect on crime incidents, the model will take into account the Las Vegas betting lines. Two studies found that Las Vegas point spreads were more accurate in predicting expected game winners than rankings, experts or statistical models (Song, et al. 2007 and Fair 2007). Song, et al. found that the proportion of NFL game predicted winners was highest using the betting line compared to experts and statistical models. Fair and Oster

(2007) tested the efficiency of college football rankings and market efficiency and found that "74.7% of the games are predicted correctly with respect to the winner" (4). Using four years of college football rankings and betting spreads the authors found that "there is no information in the ranking systems that is not in the final Las Vegas betting spread, and that there is information in the betting spread that is not in the ranking systems" (13). Studies such as Song and Fair suggest that the best predictor of game outcome is the Las Vegas betting line.

The Gold Sheet has been publishing Las Vegas betting lines since 1957 and provides historical data on its website[6]. Betting lines are presented in two forms, one being the money line and other the point spread. Both of these can be used as measures of the expected outcome of the game. This model uses the spread as a measure of the expected outcome of the game. A *spread* is a range of outcomes and the bet is whether the outcome will be above or below the spread. Every spread has a favorite or an underdog; favorites are presented with negative spreads (-3, -6, etc) and underdogs as positive spreads (+4, +7, etc.). The higher the spread, the more confidence Vegas have that the team will win (large negative spreads) or lose (high positive spreads). This model will classify teams that have a negative spread (those that are favored to win) and lose the game as an upset loss. Conversely, those teams with a positive spread (expected to lose) and win are classified as an upset win. These two upset variables will be indicator variables. The dataset contains 59 upset wins and 55 upset losses. The other two outcomes are whether a team was favored to win and did and whether a team was expected to lose and did. These two outcomes are what fans should expect to happen and

[6] www.goldsheet.com

therefore, should not affect their behavior as much as something unexpected. There are reports of increases in crime incidence when teams win a national championship or rivalry game, but I controlled for rivalries and bowl games are excluded from the analysis.

Another characteristic of the game that will be controlled for is whether or not the game is considered a rivalry between the teams. Rivalries could affect the aggression level of fans who feel an emotional attachment to a team and thereby, the number of crime incidents. The rivalry variable will be an indicator variable, equal to one for a rivalry game. Rivalries were defined as those schools that compete for a trophy (e.g. Kansas and Kansas St play for the Governor's Trophy)[7]. There are 74 rivalry games in the data set. Related to rivalry games are conference games. Every team in the dataset is part of a Division I conference. If a team wins the conference regular season or conference title game they are assured of a bowl game. Fans may see conference games as more important than non-conference games because of the esteemed associated with winning the conference title. The conference game variable will be an indicator variable, equaling one if the team is playing a conference game. The other variable related to the football game is the time of the game. The game time is measured in the home team's time zone. The reason I included the game time is that it may be possible to determine whether or not tailgating has an effect on crime. For late night games, fans may have spent a longer period before the game engaging in tailgating activities, which oftentimes

[7] List available at http://en.wikipedia.org/wiki/List_of_NCAA_college_football_rivalry_games. University websites checked by author to confirm.

includes the consumption of alcoholic beverages. The game time will be an indicator variable that is equal to one if the game is played after 5:59 p.m.

There are also some other control variables that will be used in the model that relate to the city or college. Control variables for the city/college include: total college enrollment, estimated population, median age, median household income, unemployment rate, racial composition, and educational attainment. The descriptive statistics are presented below in Table 1. These data were collected at the city level from the 2007 American Community Survey (ACS). For cities that were too small to be included in the single year sample, I used 2005-2007 three year average data. There are 24 entities that use the demographic data from the ACS three year averages. Descriptive statistics for the football program include the Associated Press poll rank of football program and the stadium capacity. The dataset includes 13 teams that were ranked, sometime during the year in the Associated Press top 25 poll. A list of variable descriptions can be found in Appendix I, cities and colleges in the dataset are available in Appendix II and NCAA conference affiliations and U.S. regions are presented in Appendix III.

Table 1: Descriptive Statistics for Cities/Colleges

Measure	Observations	Mean	Std. Dev.	Min	Max
College Total Enrollment	720	24,617	9,122	4,467	52,568
Population	720	167,267	193,244	22,546	732,974
Median Age	720	28.86	4.68	21.1	37
Median Household Income	720	38,944	8,341	20,665	75,497
Unemployment Rate	720	0.0681	0.023	0.024	0.113
Educational Attainment	720	40.43	13.9	17.8	74.3
Stadium Capacity	720	53,562	23,229	16,000	109,901
Percent Minority	720	0.195	0.148	0.049	0.67

Research Model

The aim for this paper is to determine the effects of college football games on crime by holding constant the effects from other variables. Possible random error was reduced by accounting for variables related to the football game and demographic characteristics of the jurisdiction. Two methods were used to estimate the model, ordinary least squares (OLS) regression and an OLS fixed effects regression. Both models took advantage of the clustering command in STATA. Clustering is a way to correct the standard error estimates because data are correlated with one another. In this example, each city/college has observations for 12 unique, college football games. Since there is something in common with each set of 12 games, the city, we cannot rightly claim that there are 720 unique football games. In the models below, the results are clustered around the unique id for each city (i.e. there are 60 clusters). The dependent variable in this model will be the count of total crime for each game day. The research question is does a college football game have a relationship with crime in the home team's local community?

The OLS regression model (Model 1) was estimated using the following equation:

$$y_{it} = \beta_0 + \beta_1 Home_{it} + \beta_2 Win_{it} + \beta_3 Upset_{it} + \beta_4 UpsetWin_{it} + \beta_5 Rivalry_{it} + \beta_6 Night_{it} + \beta_7 Conf.Game_{it} + \beta_8 X_{it} + \varepsilon_{it}$$

Where y_{it} is the total number of crime incidents for jurisdiction *i* for game *t*. The variable X_{it} is a set of demographic controls for the city/college that include total enrollment, population, percent of minority ethnicity, median household income, median age,

unemployment rate and educational attainment, dry (no alcohol sale) areas and state run liquor stores. Model 1 poses the question; do jurisdictions in which a home football game is played differ in crime rate from those where an away game is played?

The OLS fixed effects regression model (Model 2) will be estimated using the following equation:

$$y_{it} = \beta_0 + \beta_1 Home_{it} + \beta_2 Win_{it} + \beta_3 Upset_{it} + \beta_4 UpsetWin_{it} + \beta_5 Rivalry_{it} + \beta_6 Night_{it} + \beta_7 Conf.Game_{it} + \delta_i + \varepsilon_{it}$$

Where δ_i is the "fixed effect." The fixed-effects model nets away time-invariant components of the crime rate associated with each specific *i*. In my case, a fixed effects model controlled for the stable aspects of the city/college demographic characteristics. Model 2 poses the question; do crime rates in the same jurisdiction vary depending on whether a home or away game is played there?

The two regression models were estimated using the count of total crime as the dependent variable. After testing the relationship between total crime and the independent variables, the model was estimated for specific seven crime categories. The four category B crimes were disorderly conduct, DUI, drunkenness and liquor law violations. The category B crimes are ones that I believe could be affected by a home football game. Three specifically relate to drinking crime offenses. I also estimated the model using three category A crimes (vandalism, assault, and sex offenses). The category A crimes are more violent in nature, compared to category B crimes. Descriptive statistics for each crime category are presented below in Table 2. Descriptive statistics for variables associated with the football game are presented in Table 3. The

descriptive statistics for the crime categories have some variability as there are some jurisdictions with high crime totals and some with low crime totals. In the data set 52% of the games were played at home, with the teams in the data set winning slightly more than half of the games at 56% or 405 games.

Table 2 Descriptive Statistics
Total Crime & Crime Categories

Variable	Observations	Mean	Std. Dev.	Min	Max
Total Crime	720	43.47	74.29	0	409
Disorderly Conduct	668	1.33	2.97	0	28
DUI	668	1.90	3.90	0	28
Drunkenness	668	2.36	5.05	0	45
Liquor Law Violation	668	3.47	7.81	0	86
Vandalism	720	4.81	9.25	0	58
Assault	720	7.24	17.17	0	113
Sex Offenses	720	0.28	0.76	0	6

Table 3 Descriptive Statistics
Football game variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Home Game	720	0.524	0.500	0	1
Win	720	0.563	0.496	0	1
Upset	720	0.250	0.433	0	1
Upset Win	720	0.126	0.333	0	1
Rivalry Game	720	0.164	0.370	0	1
Night Game	720	0.375	0.484	0	1
Conference Game	720	0.647	0.478	0	1

While the results of the regression analysis are presented in the next section, I also performed various difference of means tests. These simple t-tests can be run when you have two groups within the sample. The two groups of interest in this sample are home versus away games. Difference of means test can be expanded from a simple home

versus away test by looking at characteristics within home games. This allows an examination of whether certain characteristics of home games have a relationship with total crime and the crime categories. The difference of means tests are all two tailed with the null hypothesis being that there is no difference between the means. The various tests are presented in the tables below. The first difference of means test (Table 4) is for home versus away games. As you can see, the difference in total crime is significant at the 5.3% level with a p-value of 0.053. Total crime for home games is 10.7 crimes higher than compared to away games. There was a statistically significant relationship between drunkenness and liquor law violation crimes, indicating higher crime in those categories for home games. The difference coefficients in the drunkenness and liquor law violations are small with drunkenness crimes almost two crimes higher for home games and liquor law violations roughly three crimes higher for home games.

Table 4 Difference of Means Test
Home vs. Away

	Home	Away	Difference	Pr(|T| > |t|)
Total Crime	48.58	37.84	-10.74*	0.053
Disorderly Conduct	1.40	1.25	-0.16	0.500
DUI	2.08	1.69	-0.39	0.194
Drunkenness	3.16	1.44	-1.73***	0.000
Liquor Law Violations	4.84	1.90	-2.94***	0.000

*** p<0.01, ** p<0.05, * p<0.1

The next sets of equality of means test are all related to crime and game characteristics. Table 5 below is testing the difference of means for home game wins versus home game losses. The only statistically significant difference in means was for the disorderly conduct category, with home game losses having higher disorderly conduct crimes than home game wins at the 5% level of significance. Here again the magnitude of the

difference is not very meaningful at 0.68 crimes. All the other crime categories were statistically insignificant meaning that the mean crime for home game wins is not different than the mean crime for home game losses.

Table 5 Difference of Means Test
Home Games – Win vs. Loss

	Home Game Win	Home Game Loss	Difference	Pr(|T| > |t|)
Total Crime	50.73	44.20	-6.53	0.441
Disorderly Conduct	1.18	1.86	0.68**	0.029
DUI	2.07	2.10	0.03	0.950
Drunkenness	3.44	2.59	-0.84	0.224
Liquor Law	4.94	4.63	-0.31	0.783

*** p<0.01, ** p<0.05, * p<0.1

Table 6 examines the relationship of means of home game wins for rivals versus non-rivals. For rivalry games that the home team won, two categories of crime were statistically significant higher compared to home game wins of non-rival games; disorderly conduct at the 2.1% level and liquor law violations at the 1% level. The magnitude of the coefficient on the liquor law violations is worth mentioning. Liquor law violations for rivalry home game wins are 6.54 crimes higher than non-rival home game losses. In Table 7, you can see the test of difference of means for home game losses of rivals versus non-rivals. None of the variables were statistically significant. This is interesting because for home game wins of rivals versus non-rivals, three crime categories were statistically significant. It could be the case that when a team wins a game against their rival at home, fans stick around and bask in the glow of the win and have a few extra cocktails after the game, increasing liquor law violations. Conversely, when the home team loses the game against their rival, fans pack up and go home, reducing the chance of being cited for liquor law violations.

Table 6 Difference of Means Test
Home game wins – Rivals vs. Non-rival

	Home Game Win Rival	Home Game Win Non-rival	Difference	Pr(|T| > |t|)
Total Crime	64.07	49.07	-15.0	0.342
Disorderly Conduct	2.16	1.07	-1.09**	0.021
DUI	3.20	1.94	-1.26	0.128
Drunkenness	4.68	3.29	-1.39	0.301
Liquor Law	10.80	4.26	-6.54***	0.003

*** p<0.01, ** p<0.05, * p<0.1

Table 7 Difference of Means Test
Home game losses – Rivals vs. Non-rival

	Home Game Loss - Rival	Home Game Loss – Non-Rival	Difference	Pr(|T| > |t|)
Total Crime	47.19	43.59	-3.60	0.840
Disorderly Conduct	1.40	1.96	0.56	0.527
DUI	0.90	2.35	1.45	0.183
Drunkenness	1.60	2.80	1.20	0.389
Liquor Law	7.40	4.05	-3.35	0.120

*** p<0.01, ** p<0.05, * p<0.1

Table 8 and Table 9 test the relationship between home games where the team was favored and then when the home team was the underdog. When the home team was favored and won, drunkenness crime increased and the result was statistically significant at the 1% level of significance. Disorderly conduct crimes increased (seen in Table 9) for home games where the team was the underdog and won. This result was statistically significant at the 5.9% level with a p-value = .059. Even though the result was statistically significant the magnitude of the difference was small at 0.61 crimes.

Table 8 Difference of Means Test
Home game favored – Win vs. Loss

	Home Game Favored Win	Home Game Favored Loss	Difference	Pr(|T| > |t|)
Total Crime	43.41	48.31	4.90	0.751
Disorderly Conduct	1.50	2.11	0.61	0.392
DUI	1.91	2.93	1.02	0.352
Drunkenness	5.29	2.07	-3.22***	0.002
Liquor Law	5.79	4.40	-1.39	0.517

*** p<0.01, ** p<0.05, * p<0.1

Table 9 Difference of Means Test
Home game underdog – Win vs. Loss

	Home Game Underdog Win	Home Game Underdog Loss	Difference	Pr(|T| > |t|)
Total Crime	50.78	43.29	-7.49	0.541
Disorderly Conduct	1.12	1.92	0.80*	0.059
DUI	2.06	1.33	-0.72	0.195
Drunkenness	3.41	3.69	0.28	0.807
Liquor Law	5.25	4.27	0.98	0.561

*** p<0.01, ** p<0.05, * p<0.1

Report of Analysis & Findings

The results of the empirical analysis provided some interesting and unexpected results. The OLS regression results are presented in Table 10 and the fixed effects regression results are presented in Table 11. I suspected that more violent crimes would not have a relationship with football games and indeed that was what was found. The category A crimes were not statistically significant for the variables associated with the football game and only statistically significant for two of the city/college demographic variables and hence not included in the analysis discussion or results tables. Both regression models estimates for the category A crimes can be found in Appendix IV. In

both models, the home variable was positive and statistically significant, at least at the 5% level of significance, for the following dependent variables: total crime, disorderly conduct, drunkenness, and liquor law violations. This means that for those categories, crime increases for home football games, when compared to away games, holding all other variables constant.

It is interesting that DUI crime is not statistically significant in the regression model, but is statistically significant at the 5% level in the fixed effects regression model. In both models, night games lead to a decrease in DUI crimes, holding all else constant. In the regression model, night games lead to a 0.78 decrease in DUI crimes at the 5% level of significance and a 0.59 decrease in DUI crimes at the 5% level of significance, holding all else constant. The magnitude of these coefficients is small; where night games do not decrease DUI crime by a full unit. What is interesting about this result is that home games increase crime in the drunkenness and liquor law violations categories, both drinking crimes, but DUI crimes fall on home football game days. This result could highlight differences in policing practices for those crime categories. During pregame or postgame tailgating, it is easier to tell if someone is drunk or is violating open container laws than someone driving under the influence. Also at the end of games, police main objective may be to safely get spectators back to their vehicles and keep traffic moving in an efficient manner and not necessarily enforcing DUI laws. Specific results to each regression model are presented below.

Regression Results

See Table 10 for the following discussion. The regression model tested the relationship between crime and home football games while controlling for game characteristics and demographic characteristics for the jurisdiction. The relationship between total crime and home games was positive and statistically significant at the 4.0% level of significance (p=0.040). When compared to away football games, a home game led to an increase of 5.5 total crimes, holding all else constant. While the relationship between the home variable and total crime is positive and statistically significant, only one of the game characteristic variables was statistically significant. Conference games were statistically significant at the 5% level of significance and lead to a 3.7 crime decrease in total crime, ceteris paribus. The regression models that were separately run with disorderly conduct, drunkenness and liquor law violations as the independent variable, each resulted in a positive and statistically significant, home game variable coefficient. Disorderly conduct crime was positive and statistically significant, but the estimated coefficient was 0.28, which is not a meaningful jump in crime associated with home games. The coefficients for drunkenness and liquor law violations were larger and deserve mention. Drunkenness crimes increased by 1.61 for home games; the result was significant at the 1% level (p=0.001). Liquor law violations increased by 3.17 violations for home football games, ceteris paribus; the result was significant at the 1% level of significance (p=0.005).

A few game characteristics were statistically significant for the liquor law violations category. Both the win and conference game variable coefficients were negative and statistically significant at the 5% level. The upset variable was negative and

statistically significant at the 7.4% level and upsets that were wins had a positive and statistically significant impact at the 7.8% level. One interesting note is that the coefficient on upset wins is positive and far larger than the negative coefficient of upsets, meaning that upset wins increase liquor law violations compared to upset losses.

Few jurisdiction demographic characteristics were significant or if statistically significant not meaningful. Jurisdiction demographic characteristics that were statistically significant at the 5% level include percent minority (positive) and unemployment rate (negative) for drunkenness crime. One interesting thing to note is that there were two completely dry areas in study and 14 alcohol control areas that only sold alcohol in state run stores. The dry variable was only statistically significant for disorderly crimes while the alcohol state run variable was not significant for any crime category. The interpretation of the dry variable and disorderly conduct crime is meaningful; disorderly conduct crimes decreased by 1.31 crimes in areas that did not sell alcohol. The result was significant at the 5% level of significance.

Some variables in Model 1 did not have a relationship to crime in the local community. It is interesting that a rivalry game, night game or stadium capacity did not affect crime. The night variable was only statistically significant ($p<0.01$) in the DUI category and even then it was negative. The hypothesis was that the longer individuals had to tailgate the more they may drink and this would lead to an increase in crime. It was thought that for the fans that feel a strong emotional attachment with the home team, a rivalry game may lead to an increase in group B crimes. The rivalry variable was not significant at conventional levels for any crime category.

Fixed Effect Regression Results

See Table 11 for the following discussion. The interpretation of a fixed effects model is somewhat different than a regression model. Since a fixed effects model holds what is unique to each jurisdiction as constant, the model is estimating within jurisdiction changes. This model estimates the difference between each unique police jurisdiction over time. Even though the model is somewhat different, the estimated coefficients are very similar to the regression model. The home variable was positive and statistically significant for the total crime, disorderly conduct, DUI, drunkenness and liquor law violation crime categories. This is reassuring as the fixed effects regression takes into account all the differences between the communities and focuses strictly on the characteristics of the game. Instead of being significant at the 5% level of significance, total crime and disorderly conduct categories become significant with the home variable at the 1% level of significance. The home coefficient is slightly larger with the fixed effects regression. Total crime increases by 7.61 crimes for home games compared to away games, ceteris paribus. The coefficients of the home variable for disorderly conduct, drunkenness and liquor law violations are very similar to those estimated under the OLS regression. The coefficient of the home variable for disorderly conduct and DUI are less than one and not meaningful. Just as in the OLS regression the upset, rivalry, night and conference game indicator variables were either not significant or the magnitude of the coefficients was small.

Table 10: Regression Output

	Estimated Coefficients				
Independent Variables	**Total Crime**	**Disorderly Conduct**	**DUI**	**Drunkenness**	**Liquor Law Violations**
Home Game	5.46** (2.603)	0.28** (0.117)	0.37 (0.230)	1.61*** (0.465)	3.18*** (1.076)
Win	0.62 (5.147)	-0.67* (0.344)	-0.05 (0.473)	-0.21 (0.522)	-1.91** (0.857)
Upset	2.77 (5.614)	0.32 (0.465)	-0.19 (0.469)	0.11 (0.547)	-1.50* (0.827)
UpsetXWin	-0.06 (8.967)	0.21 (0.606)	0.70 (0.709)	0.64 (1.096)	2.58* (1.434)
Rivalry	3.53 (3.388)	0.16 (0.202)	0.22 (0.281)	-0.06 (0.374)	1.75 (1.321)
Night Game	2.21 (2.929)	-0.07 (0.251)	-0.78*** (0.254)	0.29 (0.251)	-0.66 (0.550)
Conference Game	-3.68** (1.549)	0.09 (0.144)	0.04 (0.183)	-0.24 (0.329)	-1.27** (0.543)
Stadium Capacity	-0.00 (0.001)	0.00 (0.000)	-0.00 (0.000)	0.00 (0.000)	0.00 (0.000)
Alcohol dry	-22.85 (19.820)	-1.31** (0.529)	-0.68 (0.836)	0.39 (1.082)	-0.31 (0.916)
Alcohol state run	7.82 (11.539)	-0.08 (0.421)	0.14 (0.831)	-1.68 (1.117)	1.20 (1.305)
Enrollment	-0.00 (0.002)	-0.00* (0.000)	-0.00*** (0.000)	-0.00 (0.000)	0.00 (0.000)
Percent Minority	97.09 (90.818)	4.10 (2.642)	3.17 (2.321)	8.75** (4.008)	-7.59 (5.078)
Population	0.00** (0.000)	0.00 (0.000)	0.00* (0.000)	0.00 (0.000)	0.00 (0.000)
Median Household Income	-0.00 (0.001)	0.00 (0.000)	0.00 (0.000)	-0.00 (0.000)	0.00 (0.000)
Median Age	0.51 (2.117)	-0.05 (0.101)	-0.02 (0.093)	-0.16 (0.154)	0.11 (0.163)
Unemployment Rate	-53.38 (492.116)	15.14 (14.355)	-19.37 (25.780)	-70.19** (26.573)	22.31 (34.028)
Educational Attainment	0.45 (0.528)	0.02 (0.022)	0.02 (0.038)	0.06 (0.052)	0.07 (0.048)
Constant	-20.76 (55.496)	-0.35 (3.943)	3.39 (3.320)	9.68 (7.517)	-11.94 (8.822)
Observations	720	668	668	668	668
R-squared	0.471	0.237	0.352	0.222	0.155

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

Table 11: Fixed Effects Regression Output

	Estimated Coefficients				
Independent Variables	**Total Crime**	**Disorderly Conduct**	**DUI**	**Drunkenness**	**Liquor Law Violations**
Home game	7.61***	0.40***	0.29**	1.65***	3.14***
	(2.092)	(0.113)	(0.135)	(0.460)	(1.056)
Win	-2.19	-0.75**	0.12	-0.31	-0.99*
	(2.268)	(0.317)	(0.301)	(0.316)	(0.552)
Upset game	-1.60	0.08	0.01	-0.14	-1.34*
	(2.452)	(0.371)	(0.266)	(0.635)	(0.736)
UpsetXWin	3.34	0.49	0.15	0.32	1.86*
	(3.281)	(0.464)	(0.372)	(1.028)	(0.956)
Rivalry game	1.40	0.00	0.18	-0.15	1.26
	(2.625)	(0.187)	(0.228)	(0.250)	(1.116)
Night game	-0.82	0.01	-0.60**	0.22	-0.43
	(1.368)	(0.150)	(0.237)	(0.315)	(0.643)
Conference game	1.66	0.31*	0.30	-0.28	-0.54
	(1.529)	(0.168)	(0.186)	(0.308)	(0.553)
Constant	46.48***	1.61***	2.13***	2.07***	3.36***
	(3.277)	(0.217)	(0.387)	(0.586)	(0.992)
Observations	720	668	668	668	668
Number of Unique	60	60	60	60	60
R-squared	0.098	0.051	0.066	0.077	0.085

Standard errors in parentheses
Clustered standard error estimates
*** p<0.01, ** p<0.05, * p<0.1

Discussion

Study Limitations

There are a few limitations that deserve mention. First, the study could have a selection bias issue. I selected cities and colleges from those police jurisdictions that participate in the NIBRS program. NIBRS reporting is not mandatory, so police participation is strictly voluntary. This means that the jurisdictions in this capstone have self-selected into the study. The voluntary nature of reporting also gives rise to some external validity concerns. The jurisdictions that voluntarily report to NIBRS could vary by some important characteristic from those that do not report, thus the results found here may not be generalized to all of NCAA Division I college football. A further external validity concern is that while we have most Division I conferences represented in the sample, there are only schools from 16 states. This leaves a significant numbers of states that are not represented in the study.

There are also concerns of uncertainty in the data and results. Although I believe using home and away games is a good approximation of the counterfactual, I can still not be completely certain that home football games increase crime. There is also a concern over the reliability of crime data. I am relying on the local jurisdiction to accurately report crime data to NIBRS. There were some missing data for certain group B crimes for some game days. It was not certain whether these missing data would have affected the results of this analysis.

Another concern for this analysis is whether any omitted variable bias exists. It is possible that some important variable(s) have been omitted from the analysis, although model 2 essentially eliminates any such variables that are time-invariant. Time-variant factors such as weather could certainly effect the number of spectators at the game and hence the overall crime rate. However, my belief is that weather would be unlikely to be related to home and away

games, at least on average, since such a schedule was likely made months if not years in advance. Some interesting variables that would have been nice to include are spectator, or at least of season tickets holders, demographic information. Instead of local community demographics you would have some characteristics for spectators who attend the game. These demographics would be important because some spectators do not come from the local community and including something about them could improve the model.

Future Research

In the future, it would be informative to carry out the analysis over multiple years. Carrying out the analysis over multiple years would further validate these results. Multiple years would also increase the sample size which would make it easier to distinguish statistically significant results. Having a larger sample size would allow for a test of day of the week effects, something this study was unable to do because of the small number of games not on a Saturday.

Another recommendation for future research would be to incorporate some measure of police force or policing practices. I could not easily find an appropriate measure of police force monitoring during college football games. Analyzing the number of police on duty for college football game days is still not exactly what I would suggest measuring. The number of police on duty during college football games is surely greater than other days because police handle security inside the stadium and traffic control duties before and after the game. While these police officers would still be on the lookout for crime, they may miss crimes because of the nature of the work and the significant crowds entering or leaving the stadium. So what it needed is some measure of police force monitoring or the number of officers on duty that are not

performing traffic control. This measure would most likely have to be found be contacting or surveying each police jurisdiction.

Future research on college football and crime will want to take into consideration changing stadium alcohol policies. Starting with the 2009 football season, the University of Memphis and University of Louisiana-Lafayette began to offer alcohol inside the stadium. Changes such as these would allow for further testing of alcohol related crime and college football. With the numerous schools beginning to change conferences in the upcoming years it would be interesting to expand the test of conference effects and crime.

Conclusions

This paper set out to determine if there is a relationship between crime and college football games. Both the OLS regression model and the fixed effects regression model found that home football games are associated with higher crime than away football games. The regression model suggested that total crime increased by 5.6 crimes for home football games. The fixed effects model results were that total crime increased by 7.6 crimes for home football games. One topic related to the magnitude of this effect that has not been discussed is reporting of crimes. The group B dataset from the NIBRS data set is limited to crimes for which an arrest was made. It is quite possible that some individuals reported disturbances to police but because an arrest was not made, the incident was not included in the dataset. If these unreported crimes are related to home football games and not away game days then my results have understated the true effect.

The characteristics of the game, win, upset and upset win were statistically significant at the 10% level in the fixed effects model for liquor law violations. While upsets had a negative

effect on crime, upsets wins had a larger, positive effect. What is interesting about the upset variable and the interaction variable is that they relate to the game outcome. Spectators would most likely not know whether a game will result in an upset win until the second half of the game. Even if liquor law violations increase for certain outcomes of the game it is difficult to provide recommendations to police and universities. If liquor law violations are shown to be given shortly after the game ends for upset wins, universities could restrict the amount of time tailgaters can spend in the lot after the game to curb drinking. However, implementing this policy may be difficult and could increase DUI crimes as fans may stay in the lot after the game to sober up before driving home. I found it interesting that wins, night, rivalry or upset games had little effect on crime. None of the variables were statistically significant for total crime and rarely significant for the specific crime categories. It seems the characteristics of the game do not matter, only if the game is played at home or away.

It is somewhat difficult to make a recommendation for increasing police officers on duty during home football games. On one hand, the number of officers could decrease the number of crimes. Levitt (2005) found that increasing officers around election cycles did cause a decrease in crime. In this case however, increasing police on duty could very easily lead to an increase in crime. As the ratio of officers to spectators increases, it would be easier to spot crimes or cover a far larger area of the city. If the local community can accept that college football games increase the less violent crime then there need not be significant policy changes. The mean of total crime in the data set is 43.47 crimes. The estimated coefficient for the home variable was the greater under the fixed effects regression and only increased total crime roughly eight crimes. In the grand scheme of things this number does not seem to be a very significant increase in the crime rate. However, universities certainly care about the welfare of their students and increased

alcohol consumption may deserve attention. One recommendation to curb drinking would be to restrict the amount of tailgating time before and after games, although this policy may be very unpopular with alumni and athletic boosters.

Appendix I. Explanation of Variables

Crime Variables	
Total Crime	Count of Group A and Group B crimes
Disorderly Conduct	Count of disorderly conduct crime
DUI	Count of DUI crime
Drunkenness	Count of drunkenness crime
Liquor Law Violations	Count of liquor law violations crime
Vandalism	Count of vandalism crime
Assault	Count of aggravated and simple assault and intimidation
Sex Offenses	Count of forcible and nonforcible sexual offenses
Football Game Variables	
Home_Away	Game was played at home
Win	Data set team won game
Upset	Team with positive spread won game
Rivalry	Game was classified as a rivalry
Stadium Capacity	Data set team stadium capacity
Night	Game was played after 6:00 pm in home team time zone
Demographic Variables	
Percent Minority	Total percent of Black and Hispanic ethnicity
Population	Total population
Median Household Income	Measured in dollars
Median Age	Measured in years
Unemployment Rate	Measured in %
Educational Attainment	% of Bachelor degrees and greater
Alcohol dry	Jurisdiction does not allow alcohol sales
Alcohol state run	Jurisdiction is limited in alcohol sales or stores are state run

Appendix II. Local Jurisdictions in Data Set

College/City	State	Total Crime Home	Total Crime Away	College/City	State	Total Crime Home	Total Crime Away
JONESBORO*	AR	160	139	CORVALLIS - ORE. ST.*	OR	121	71
AR STATE UNIV: JONESBORO*	AR	18	12	CLEMSON*	SC	58	15
FAYETTEVILLE	AR	184	165	CLEMSON UNIVERSITY*	SC	120	17
UNIV OF ARKANSAS: FAYETTEVILLE	AR	58	8	COLUMBIA	SC	359	254
COLORADO SPRINGS - AIR FORCE	CO	668	793	UNIV OF SC: COLUMBIA	SC	33	8
FORT COLLINS	CO	211	276	NASHVILLE*	TN	1954	1041
COLORADO ST UNIV: FORT COLLINS	CO	110	42	VANDERBILT UNIVERSITY*	TN	95	26
UNIV OF CT: STORRS, AP&H*	CT	18	19	KNOXVILLE	TN	801	561
IOWA CITY	IA	345	198	UNIV OF TENNESSEE: KNOXVILLE	TN	42	3
UNIVERSITY OF IOWA	IA	163	42	MURFREESBORO	TN	219	292
AMES*	IA	172	81	MIDDLE TENN. ST UNIV	TN	21	26
IOWA STATE UNIVERSITY*	IA	150	16	UNIVERSITY OF MEMPHIS	TN	15	5
BOISE - BOISE ST	ID	10	3	MEMPHIS	TN	2400	1801
MOSCOW - UNIV IDAHO*	ID	45	26	DENTON - North Texas University	TX	187	236
LAWRENCE	KS	535	237	LUBBOCK - TX TECH	TX	129	61
UNIV OF KANSAS	KS	28	6	FORT WORTH - TCU	TX	1598	1463
KANSAS STATE UNIVERSITY*	KS	55	12	LOGAN*	UT	63	85
EAST LANSING	MI	175	83	UTAH STATE UNIVERSITY*	UT	4	3
MICHIGAN STATE UNIVERSITY	MI	549	50	SALT LAKE CITY - UNIV UTAH	UT	858	777
MOUNT PLEASANT*	MI	88	58	PROVO	UT	167	175
CENTRAL MICHIGAN UNIV*	MI	19	7	BRIGHAM YOUNG UNIV	UT	14	12
KALAMAZOO	MI	328	279	CHARLOTTESVILLE*	VA	96	21
WESTERN MICHIGAN UNIV	MI	33	32	UNIVERSITY OF VIRGINIA*	VA	107	37
ANN ARBOR - UNIV MICHIGAN	MI	410	99	BLACKSBURG*	VA	197	27
YPSILANTI - Eastern Michigan Univ.	MI	54	110	VIRGINIA TECH*	VA	137	138
ATHENS - Ohio University*	OH	42	51	PULLMAN - WASH ST UNIV*	WA	66	43
OH STATE UNIV: COLUMBUS	OH	222	26	HUNTINGTON*	WV	123	126
COLUMBUS	OH	438	580	MARSHALL UNIVERSITY*	WV	17	6
AKRON - University of Akron	OH	682	727	MORGANTOWN*	WV	82	78
CINCINNATI - UC	OH	2060	1370	WEST VIRGINIA UNIV.*	WV	61	25

*denotes 2005-2007 ACS 3 year average data Blue highlight = University police

Appendix III. Conference Affiliations & U.S. Regions

Conference	Count	Percent
Mountain West	5	13.2%
SEC	4	10.5%
Western Athletic	3	7.9%
Big East	3	7.9%
ACC	3	7.9%
Big Ten	4	10.5%
Big 12	4	10.5%
CUSA	2	5.3%
Sun Belt	3	7.9%
Mid-American	5	13.2%
PAC 10	2	5.3%

Regions	State	Count	Percent		Regions	State	Count	Percent
Northeast	Connecticut	1	1.7%		**Midwest**	Iowa	4	6.7%
	SUBTOTAL	**1**	**1.7%**			Kansas	3	5.0%
Southeast	Arkansas	4	6.7%			Michigan	8	13.3%
	South Carolina	4	6.7%			Ohio	5	8.3%
	Tennessee	8	13.3%			**SUBTOTAL**	**20**	**33.3%**
	Virginia	4	6.7%		**West**	Oregon	1	1.7%
	West Virginia	4	6.7%			Idaho	2	3.3%
	SUBTOTAL	**24**	**40.0%**			Utah	5	8.3%
Southwest	Texas	3	5.0%			Colorado	3	5.0%
	SUBTOTAL	**3**	**5.0%**			Washington	1	1.7%
						SUBTOTAL	**12**	**20.0%**

Appendix IV. Regression Results – Category A Crimes

Regression Estimated Coefficients			
Independent Variables	**Assault**	**Vandalism**	**Sex Offenses**
Home Game	-0.59 (0.594)	-0.66 (0.433)	-0.06 (0.050)
Win	1.09 (1.017)	1.20* (0.675)	0.21** (0.094)
Upset	0.81 (1.102)	0.72 (0.761)	0.14 (0.093)
UpsetXWin	-1.37 (1.408)	-1.40 (1.097)	-0.21 (0.129)
Rivalry	-0.51 (0.624)	-0.10 (0.470)	-0.07 (0.062)
Night Game	0.67 (0.713)	0.35 (0.382)	-0.04 (0.054)
Conference Game	-0.00 (0.000)	-0.00 (0.000)	-0.00* (0.000)
Stadium Capacity	-4.78 (5.107)	-3.27 (2.588)	-0.07 (0.130)
Alcohol dry	-0.18 (1.940)	0.98 (1.275)	-0.02 (0.087)
Alcohol state run	0.00 (0.000)	-0.00 (0.000)	0.00 (0.000)
Enrollment	23.11 (21.816)	11.30 (11.310)	1.14* (0.654)
Percent Minority	0.00* (0.000)	0.00* (0.000)	0.00* (0.000)
Population	-0.00 (0.000)	-0.00 (0.000)	-0.00 (0.000)
Median Household Income	0.13 (0.446)	0.04 (0.237)	0.04* (0.022)
Median Age	10.54 (109.930)	3.88 (52.969)	-1.45 (2.590)
Unemployment Rate	0.05 (0.118)	0.04 (0.060)	0.01** (0.004)
Educational Attainment	0.69 (0.726)	0.46 (0.474)	0.01 (0.050)
Constant	-4.38 (10.460)	-2.92 (6.807)	-1.17* (0.680)
Observations	720	720	720
R-squared	0.388	0.398	0.239

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

Appendix V.

Fixed Effects Regression Results – Category A Crimes

Fixed Effects Regression Estimated Coefficients			
Independent Variables	**Assault**	**Vandalism**	**Sex Offenses**
Home games	-0.33 (0.466)	-0.36 (0.353)	-0.02 (0.047)
Win	0.64 (0.591)	0.66 (0.433)	0.13** (0.066)
Upsets	0.16 (0.453)	0.08 (0.458)	0.05 (0.091)
UpsetXWin	-0.90 (0.684)	-0.71 (0.575)	-0.08 (0.121)
Rivalry games	-0.12 (0.493)	-0.33 (0.419)	-0.08 (0.074)
Night games	-0.18 (0.709)	0.01 (0.353)	-0.04 (0.051)
Conference games	1.70 (1.031)	0.70 (0.480)	-0.02 (0.070)
Constant	6.35** (2.710)	3.64*** (1.213)	0.41*** (0.112)
Observations	720	720	720
Number of Unique_Numeric	60	60	60
R-squared	0.020	0.026	0.038

Standard errors in parentheses
Clustered standard error estimates
*** p<0.01, ** p<0.05, * p<0.1

References

Boyes, William and Faith, Roger. (1993) Temporal Regulation and Intertemporal Substitution: The Effect of Banning Alcohol at College Football Games. *Public Choice, 77* (November) 595-609.

Card, David and Dahl, Gordon. (2011) Family Violence and Football: The Effect of Unexpected Emotional Cues on Violent Behavior. *The Quarterly Journal of Economics,* 126, 1-41.

Case, Robert and Boucher, Robert. (1981) Spectator Violence in Sport: A Selected Review. *Journal of Sport & Social Issues,* 5, 1-14.

Coates, Dennis and Depke, Craig. Do College Football Game Pay for Themselves? The Impact of College Football Games on Local Sales Tax Revenue. Association of Sports Economists Working Paper Series, No. 08-02. Retrieved January 24, 2001.

Fair, Ray and Oster, John. (2007). College Football Ranking and Market Efficiency. *Journal of Sports Economics,* 8, 3-18.

Glassman, T., Welch, C., Jobli, E., and Bian, H. (2007) Alcohol-Related Fan Behavior on College Football Game Day. *Journal of American College Health, 56* (Nov-Dec.) 255-260.

Merlo, Lisa et al. (2011) Alcohol consumption associated with collegiate American football pre-game festivities. *Drug and Alcohol Dependence,* 116, 242-245.

Merlo, L., Hong, J. and Cottler, L. The association between alcohol-related arrest and college football game days. *Drug Alcohol Depend.* National Institute of Health. January, 1 2010.

OPdyke, Jeff & David Kesmodel. "Beer Sales Make a Comeback at College Stadiums." The Wall Street Journal on the Web. 12 Sept 2009. 14 Mar 2012. <Online.wsj.com/article/SB125271416817105157.htm>.

Rees, Daniel and Schnepel, Kevin. (2009). College Football Games and Crime. *Journal of Sports Economics,* 10 (February), 68-87.

Roberts, Julian and Benjamin, Cynthia. (2000). Spectator Violence in Sports: A North American Perspective. *European Journal on Criminal Policy and Research, 8* (June) 162-181.

Song, ChiUng, Boulier, Bryan and Stekler, Herman. (2007). The comparative accuracy of Judgemental and model forecasts of American football games. *International Journal of Forecasting,* 23, 405-413.

Ward, Russell. (2002) Fan violence: Social problem or moral panic? *Aggression and Violent Behavior,* 7, 453-475.

Warren, Jim and Josh Kegley. "Polica analysis of UK post-game celebration." Lexington Herald-Leader. 6 Apr 2012.