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Beer Availability and College Football Attendance: Evidence From Mid-Major Conferences

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Abstract

We examine the relationship between beer being sold at college football stadiums and both attendance and football revenue for 29 mid-major universities over the 2005-2012 period. Using both ordinary least squares and instrumental variable estimation, no evidence that beer availability increases attendance or football revenue is found.

Keywords

beer, college football, attendance

> Primarily economics would drive [selling alcohol at football games]. The disadvantages are security and fan behavior and other things that go with that. And so it's a trade-off. It is done successfully in places throughout the country. We're in the Bible Belt; we may not be the first ones to do that.
>
> Alabama Athletics Director, Bill Battle (quoted in Wolken, 2014, p. 7c)

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Introduction

At many universities, alcohol goes hand in hand with college football. Many fans gather in parking lots several hours before the opening kickoff for "tailgate" parties featuring abundant alcohol and large spreads of food. Drinking often continues during the game, especially among students who are adept at smuggling alcohol into stadiums. Hence, it is not surprising that colleges, particularly those without high-profile programs that generate millions of dollars of revenue, might consider selling beer in their stadiums. Doing so could potentially increase revenue both by attracting more fans to games and by increasing concession revenue, perhaps by capturing some of fans' spending on pregame partying.

Indeed, several universities have begun selling beer at their home football games in recent years. Examples include West Virginia University, the University of Louisiana at Lafayette, and Bowling Green State University. Conversely, a few colleges have stopped selling beer at football games because of state regulations or other factors. Examples include Fresno State and San Jose State, which had to stop selling beer because of a state regulation. Anecdotal evidence on the revenue gains from selling beer is mixed. West Virginia reports generating more than US$500,000 in concessions revenue during its first year of beer sales (Wolken, 2014). Conversely, Bowling Green is estimated to earn US$20,000–US$25,000 (Briggs, 2012).

This article examines the relationship between beer availability and college football attendance. The relationship between beer availability and sports attendance has not been extensively studied and what research that does exist has mixed results. Paul, Toma, and Weinbach (2009) and Cebula (2013) find that beer promotions, typically discounted beer prices, increase attendance at minor league baseball games. On the other hand, Paul, Paul, Toma, and Brennan (2007) and Paul, Paul, and Holihan (2008) find no relationship between beer promotions and attendance. In the only study to examine attendance and beer availability per se, Chupp, Stephenson, and Taylor (2007) find that allowing beer sales is associated with a small (approximately 2%) and statistically insignificant increase in attendance.

Beyond the relative paucity of articles on alcohol and sports attendance as well as their conflicting results, the existing research is confined to studies of minor league baseball attendance. In examining the attendance effects of the recent changes in alcohol offerings, this article extends the study of beer availability and attendance to college football. In the appendix, we also briefly return to the possibility that beer sales increase revenue.

Empirical Framework

Few institutions in the major football conferences such as the Southeastern Conference, the Big 10, and the Big 12 sell beer at their football games. Many of these

Table 1. Institutions Selling Beer at Their Home Football Games.

Institution	Years Selling Beer (Between 2005 and 2012)
Akron	2005-2008, 2012
Bowling Green	2009-2012
Fresno State	2005
Hawaii–Manoa	2005-2012
Kent State	2005-2012
Louisiana–Lafayette	2009-2012
Nevada (Reno)	2005-2012
San Jose State	2005-2009
Western Kentucky	2012

teams draw large crowds and often sell out their stadiums, so selling beer would not enhance their attendance. (Selling beer might, of course, increase concession revenue.) The primary exception is the Big East, where most of the teams have sold beer at their games for decades.

Instead of focusing on major conference teams, which typically draw large crowds and have experienced little change in beer sales status in recent years, our analysis focuses on institutions in three so-called mid-major conferences: the Mid-American Conference (MAC), the Western Athletic Conference (WAC), and the Sun Belt Conference. Teams in these conferences rarely sell out their stadiums, and several institutions in these conferences have in recent years either started selling beer or stopped selling beer at their home football games. As indicated in Table 1, nine schools in these three mid-major conferences sold beer for some or all of the years between 2005 and 2012. Many either started selling beer at their home football games or ceased selling beer at their home football games (one ceased then resumed beer sales).

The dependent variable in our analysis is average per game attendance for school i in season t ($ATTEND_{it}$). Per game attendance rather than season total attendance is used because teams play different numbers of home games. (We also estimated the model using the log of ATTEND or attendance as a percentage of stadium capacity as the dependent variable, and the results were similar to those reported below.) Our data set consists of 228 team-season observations, with 28 of the institutions included for all 8 years between 2005 and 2012 and Western Kentucky only included since its 2009 move up to Division I. Descriptive statistics are reported in Table 2.

Our explanatory variables include BEER, a dummy taking a value of 1 if school i sold beer at its home games in season t. Note that BEER will only take a value of 1 if beer is available to all attendees (of legal age), and BEER takes a value of 0 for institutions that limit beer sales to selected areas (typically luxury suites).

The estimated coefficient on BEER will be positive if beer availability increases attendance. However, it is not clear a priori that there should be a positive relationship between beer availability and college football attendance. Alcohol is ubiquitous

Table 2. Descriptive Statistics.

Variable	Mean	*SD*	Max.	Min.
ATTEND	18,462	6,753	43,514	3,923
BEER	0.193	0.396	1	0
WINPCT	44.930	22.387	100.00	0.00
LAGWINPCT	43.863	21.619	100.00	0.00
VISWINPCT	46.239	9.165	77.27	22.92
POPULATION	419.123	546.867	2,554.766	29.685
UGENROLL	17.615	5.506	35.888	7.243
PCTFTENROLL	81.509	10.405	98.100	48.400
BOISE	0.035	0.184	1	0
MAC	0.421	0.495	1	0
WAC	0.316	0.466	1	0
CAPACITY	29,173.27	6,075.917	50,000	16,000

Note. MAC = Mid-American Conference; WAC = Western Athletic Conference.

at many colleges' pregame tailgate parties, and at many institutions, students who want to consume alcohol during a game often have little difficulty smuggling it into the stadium. (Boyes & Faith, 1993, found that intoxication increased after Arizona State University stopped permitting fans to bring alcohol into home football games, thereby suggesting that fans substituted pregame consumption for consumption during the game or that fans had little difficulty smuggling alcohol into the stadium.) Moreover, if the institutions which sell beer at their home games set a high price for stadium beer, as many professional sports teams do, stadium beer may be a poor substitute for alcohol smuggled into a stadium.

The model also includes WINPCT_{it} and LAGWINPCT_{it}, which are school i's winning percentage in the current season and the prior season, respectively. (Since we use season-level data instead of game-level data, the win percentage measures are the season-long winning percentages.) Current and lagged winning percentages are included because schools' ticket sales may be influenced by both current and prior team quality. Season ticket sales, for example, may be primarily driven by a team's quality in the previous season while walk-up ticket sales may be affected by current team quality. It is expected that both winning percentage variables will be positively correlated with attendance.

VISWINPCT_{it}, the average winning percentage of team i's home opponents in year t, is also included in the model to control for the quality of a team's opponents. (Again, winning percentage over the entire season is used because we have season-level data.) If better quality visiting teams make fans more likely to attend games, then the expected coefficient on the visiting teams' average winning percentage is positive.

The control variables also include UGENROLL_{it} and COUNTYPOP_{it}, which are a school's undergraduate enrollment in year t and the population of the county in

which the school is located, respectively. (Both variables are entered in thousands.) If more students increase attendance, then UGENROLL would have a positive relationship with football attendance. Likewise, if being located in a more populous county increases football attendance, then COUNTYPOP would also have a positive relationship with attendance. On the other hand, institutions with larger enrollments or located in more populous counties may have more alternative activities for students, so the effects from $UGENROLL_{it}$ and $COUNTYPOP_{it}$ will not necessarily be positive.

$PCTFTENROLL_{it}$, the percentage of students who are enrolled full time, is also included in the model. Full-time students may have a higher level of campus engagement than part-time students. If so, then there should be a positive relationship between attendance and the percentage of students who are enrolled full time.

We also include year dummies (2006-2012, with 2005 as the omitted year), a dummy variable for Boise State University, and dummies for two of the three conferences (MAC and WAC, with the Sun Belt Conference omitted). Year dummies control for any year-specific effects common to all schools in the sample. If, for example, the severe recession of the late 2000s reduced attendance, then this effect would be captured by the year dummies. The Boise State dummy variable (BOISE) is included because Boise State had a highly competitive program during the period of our study. Between 2005 and 2012, Boise State's football team had two undefeated seasons that culminated with wins in Bowl Championship Series bowls, four top-10 finishes, and six top-25 finishes. The conference dummies control for factors common to schools within each conference. Such factors might include overall team quality or the extent to which the conference faces competition for fans from teams in major conferences. (For example, most of the MAC institutions are located in Ohio and Michigan, so they must compete with schools such as Ohio State, Michigan, and Michigan State for fans' attention.)

Lastly, in some specifications, we include stadium capacity ($CAPACITY_{it}$) as a regressor. Johnson, Perry, and Petkus (2013) suggest that teams adjust their stadium capacity to meet their attendance expectations. The idea is that teams that draw well increase their stadium capacity. Hence, including $CAPACITY_{it}$ as an explanatory variable can be a way to control for otherwise difficult to parameterize factors affecting attendance. Of course, it is doubtful that teams adjust their stadium capacity annually or that teams downsize their stadium capacity, so the use of $CAPACITY_{it}$ as an explanatory variable has some limitations.

Results

Ordinary least squares (OLS) estimation results are presented in the first two columns of Table 3. Estimation using OLS is chosen over Tobit because no team except Boise State had attendance approaching its stadium capacity. Parentheses contain t statistics derived from standard errors clustered by institution.

Table 3. Estimation Results Dependent Variable: ATTEND.

Variable	(1)	(2)	(3)	(4)
BEER	549.62	−944.32	2,957.29	1,844.97
	(0.24)	(−0.86)	(0.52)	(0.42)
WINPCT	111.16	83.40	107.43	80.76
	(5.02)	(4.68)	(5.43)	(4.49)
LAGWINPCT	87.94	48.64	81.63	43.73
	(3.55)	(3.36)	(4.35)	(3.09)
VISWINPCT	59.71	33.15	62.98	38.31
	(1.91)	(1.53)	(1.99)	(1.81)
POPULATION	1.21	0.32	0.80	−0.09
	(0.65)	(0.31)	(0.42)	(−0.06)
UGENROLL	11.88	78.67	31.52	97.03
	(0.09)	(0.91)	(0.25)	(1.19)
PCTFTENROLL	67.09	85.19	66.60	83.64
	(1.54)	(1.39)	(1.58)	(1.45)
BOISE	3,795.70	5,871.24	4,968.42	7,073.74
	(1.01)	(2.89)	(1.59)	(3.16)
WAC	1,681.20	697.83	1,167.74	175.49
	(0.74)	(0.49)	(0.58)	(0.13)
MAC	−3,510.84	−2,818.05	−3,792.68	−3,173.41
	(−4.22)	(−1.93)	(−3.57)	(−2.27)
CAPACITY		0.59		0.56
		(5.18)		(4.30)
Constant	−205.93	−15,361.04	−304.64	−14,628.03
	(−0.03)	(−2.04)	(−0.05)	(−1.89)
R^2	.50	.72	.49	.70
Estimation method	OLS	OLS	IV	IV

Note. There are 228 observations. All specifications also include year dummies for 2006-2012 (with 2005 omitted). Parentheses contain *t* statistics derived from standard errors clustered by school. OLS = ordinary least squares; MAC = Mid-American Conference; WAC = Western Athletic Conference; IV = instrumental variable.

The results in the first column are based on estimating the model without CAPACITY included. The results in the second column include CAPACITY as an explanatory variable. In both specifications, the estimated coefficient on BEER is small and statistically insignificant. These results provide no basis for concluding that beer availability increases football attendance.

Turning to the other regressors, both the contemporaneous and lagged winning percentages are statistically significant. The estimated coefficient on each implies that an additional win (an increase in winning percentage of about 8% in a 12-game season) yields roughly 400–900 additional fans per contest or an attendance increase of 2–5% of the mean attendance. The estimated coefficients on BOISE, VISWINPCT, PCTFTSTUDENT, and MAC are also economically or statistically significant in one or both specifications. CAPACITY is positively related

to attendance as suggested by Johnson et al. (2013) and including it as a regressor increases the R^2 from .5 to .72.

Although some schools have exogenous restrictions imposed on their ability to sell beer at their home games, the decision to sell beer at home football games is endogenous for many teams. Other things equal, one might expect teams that do not draw well to be more likely to try to bolster their attendance via selling beer. If this is the case, then endogeneity would bias the coefficient on BEER downward when estimated via OLS.

To address this possibility, we repeat the estimation using instrumental variables (IVs) for BEER. For suitable instruments, we need one or more variables that should be correlated with schools' decisions to sell beer but uncorrelated with attendance. Religious beliefs should be suitable instruments. Michalak, Trocki, and Bond (2007) examine the relationship between religiosity and alcohol consumption. Among their findings is a strong negative association between alcohol consumption and being either Southern Baptist or Mormon. There is, however, no reason to believe that religiosity affects football attendance. Hence, we use the percentage of the population in each institution's home county that is either Baptist or Mormon as instruments for BEER. These data are obtained from the Association of Religion Data Archives (http://www.thearda.com/rcms2010/selectCounty.asp?state=01&county=48121). The religiosity of the local population could affect beer availability at football games through local regulations permitting or prohibiting alcohol sales. Moreover, all of the schools in the sample are regional public institutions that should attract many of their students from nearby areas, so the religious profile of the student body is probably similar to the local population. (As a robustness check, we broadened the measurement of the instruments to include each institution's home county and all adjacent counties. The results were similar to those presented below and are omitted for brevity.)

Columns (3) and (4) report the results from repeating the estimation after instrumenting for BEER. The estimated relationship between beer availability and attendance remains statistically insignificant. The magnitude of the coefficient on BEER is now considerably larger (10–15% of mean attendance), but these estimates should be treated cautiously because of the possibility of weak instruments biasing the coefficients upward. (The Cragg–Donald statistic for weak instrument bias is 7.9, which falls between the critical values of 7.25 and 8.75 for rejecting maximum weak instrument bias of 25% and 20%, respectively.) The other explanatory variables perform similar to the OLS results.

Discussion

The finding of no evidence that beer availability increases attendance and perhaps not revenue (see Appendix) may explain why only a slow trickle of schools has added beer sales to home football games. The lack of an attendance or revenue boost

suggests that adding beer sales would be of limited benefit to mid-major programs that struggle to attract fans to their games or to balance their athletic budgets. There remains one obvious direction for future research—the effect of beer availability on fan behavior and crime. Rees and Schnepel (2009) find that college football games are associated with sharp increases in assaults, vandalism, arrests for disorderly conduct, and arrests for alcohol-related offenses on game days in host communities. Although Boyes and Faith (1993) suggest that making beer available during games might mitigate excessive consumption, it is likely that many institutions worry that selling alcohol at their home games would increase rowdy fan behavior.

Appendix

Beer Availability and Football Revenue

At the request of a referee, we also gathered data on football revenue from 2005-2012 for the 29 mid-major schools used in the paper's attendance regressions. The football revenue data were obtained from the U.S. Department of Education's Equity in Athletics (EIA) website. The EIA website reports only total football revenue without providing more granular information on revenue from ticket sales or concessions, hence the data are not well suited for examining the relationship between beer availability and game day revenue. Estimating OLS and IV models for revenue similar to the attendance specifications in the body of the paper yields no evidence that beer availability increases football revenue (the estimated coefficients on the BEER dummy are actually negative). These results are omitted from the paper both for brevity and because the EIA data are not well suited for analyzing the relationship between beer availability and football revenue. However, the results are available from the corresponding author. The relationship between beer availability and revenue certainly warrants more analysis if more appropriate data become available.

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