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Down, Set, Hike: The Economic Impact of College Football Games on Local Economies

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Abstract

This paper provides an empirical examination of the economic impact of spectator sports on local economies. Confirming the results of other ex post analyses of sports in general, this paper finds no statistically significant evidence that college football games in particular contribute positively to a host's economy. Our analysis from 1970-2004 of 63 metropolitan areas that play host to big-time college football programs finds that neither the number of home games played, the winning percentage of the local team, nor winning a national championship has a discernable impact on either employment or personal income in the cities where the teams play. While successful college football teams may bring fame to their alma mater, fortune appears to be a bit more elusive.

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Introduction

College football is among the most popular spectator sports in the United States. Total live attendance at all college football games in 2006 was nearly 48 million fans, which is more than double the attendance of the National Football League (NFL), National Basketball League (NBA), or National Hockey League (NHL) during recent seasons. Average attendance among the 119 National Intercollegiate Athletic Association (NCAA) Division 1-A football teams, the highest level of collegiate play, totaled over 46,000 fans per game in 2006 and several teams routinely attract over 100,000 fans per home game. Outside of auto racing and a small handful of golfing events, individual college football games at places like the University of Michigan and the Ohio State University have the largest live paid attendance of any sporting events in the country. Television ratings are equally impressive. The Bowl Championship Series (BCS) championship game is the second-most watched sporting event in the country every year (behind the NFL's Super Bowl) and typically draws a television audience nearly double the size of games during the NBA finals or baseball's World Series.

The popularity of the sport has led colleges and universities and occasionally local communities to invest generously in infrastructure for their teams. Similar to the major professional sports leagues in the U.S., dozens of colleges and universities have upgraded their playing facilities over the past 15 years adding to both the number and quality of seats. It is not unusual for top programs to have a significant number of high-priced luxury boxes, a far cry from the simple bleachers of yesteryear.

Numerous articles have explored the indirect economic impact of college football and college football success on measures such as applications, graduation rates, and alumni giving. McCormick and Tinsley (1987), Tucker and Amato (1993), Murphy and Trandel (1994), and

Tucker (2005) all find that successful sports programs, especially in football, enable universities to attract more and better qualified undergraduate applicants although in each case the size of the effects was small. Toma and Cross (1996) identifies a clear increase in applications following a school winning the national championship, although the increase in applications did not appear to measurably impact the quality of the incoming class with respect to SAT scores or grades.

Tucker (1992) concludes that success on the field spills over into lower graduation rates for the student body as a whole although he comes to the opposite conclusion for a more recent data set (Tucker, 2004). Amato, Gandar, Tucker, and Zuber (1996), Amato, Gandar, and Zuber (2001), and Rishe (2003) all examine the effects of on-field success on student-athlete rather than overall graduation rates and find that increased success on the field, particularly in big-time football programs, tends to reduce athletic graduation rates.

With respect to alumni donations, the empirical record is mixed. Siegelman and Carter (1979) and Siegelman and Brookheimer (1983) conclude that an increase in a football team's winning percentage results in higher alumni donations to university or its athletic program. Baade and Sundberg (1994) find that higher football winning percentages don't translate into increased alumni giving but that bowl appearances do. Other researchers such as Grimes and Chressanthins (1994) and Rhoads and Gerking (2000) report either mixed effects from football success or effects that are not significantly different from zero at a reasonable statistical certainty.

This paper examines a distinctly different set of effects from these previous studies by estimating the effect of college football on more direct economic indicators such as employment and personal income. The results of this paper suggest that college football games, as well as a team's success on the gridiron, have a negligible impact on real economic variables in host cities.

Background

Economic impact analyses are divided into two main categories: *ex ante* studies and *ex post* studies. *Ex ante* studies predict the economic effect of an event by estimating the number of visitors to the event as well as their average expenditures. A multiplier is typically also applied to these direct economic impact figures resulting in a total impact number that is often at least twice as large as the direct economic impact. Critics of *ex ante* economic analysis point out these studies often fail to account for the substitution effect which occurs when fans merely spend money at a sporting event rather than at other venues in the local economy. College sports may simply shift the pattern of spending in a local area rather than increasing overall spending. In addition, *ex ante* studies have difficulty accounting for the crowding out that occurs when the crowds and congestion associated with large sporting events deters non-sports fans from engaging in other economic activities in the local economy during game days. Finally, many economists are skeptical of the multipliers used in *ex ante* studies to generate indirect economic benefits. These multipliers are calculated using complex input-output tables for specific industries grounded in inter-industry relationships within regions based upon an economic area's normal production patterns. During game days, however, the economy within a college town may be anything but normal, and therefore, these same inter-industry relationships may not hold. Since there is no reason to believe the usual economic multipliers apply during major events, any economic analyses based upon these multipliers may, therefore, be highly inaccurate (Matheson, 2004).

Due to the difficulties associated with *ex ante* estimation, numerous scholars estimate the effects of stadiums, franchises, and sporting events on local economies by *ex post* estimation –

that is by looking back at the actual economic performance of cities that have built new playing facilities or have hosted franchises or large events. Most *ex post* studies including Baade (1996), Coates and Humphreys (1999; 2003), and Baade, Baumann, and Matheson (2007) to name just a few, generally find little or no economic benefits from professional sports teams or new playing facilities. Similarly, *ex post* examinations of major sporting events such as the Super Bowl (Porter, 1999; Baade and Matheson, 2006; Coates, 2006), All-Star Games (Baade and Matheson, 2001; Coates, 2006), and post season play (Coates and Humphreys, 2002; Baade, Baumann, and Matheson, 2007) also find no significant economic impact from hosting major sporting events.

Despite the popularity of collegiate sports, however, academic economic impact studies have focused almost exclusively on professional sports and leagues. A handful of credible *ex ante* impact analyses of collegiate sporting events appear in the academic literature including Mondello and Rishe (2004). On the *ex post* side, Matheson and Baade (2004) analyze the impact of the NCAA men's and women's Final Four basketball tournament finding no statistically significant effect of either tournament on employment in host cities. The most ambitious study comes from Coates and Depken (2006) who study the effect of college football games, among other sports related variables, on taxable sales in individual counties in Texas. They find that each additional game results in an increase in taxable sales of between $281 and $465 thousand resulting in an increase in tax revenues between $20,000 and $34,000. They note, however, that this effect appears limited to the smallest towns hosting college football games and that there is no statistically significant evidence that an NCAA football game has an effect sales tax revenues in the big conference cities of Dallas, Houston, Fort Worth, Austin, College Station, Lubbock and Waco.

The apparent lack of interest in the economic impact of college sports is likely two-fold. First, colleges and universities have been less explicit in their demands for local taxpayers to foot large bills for new stadiums, and therefore, the need for independent scholarly research to debunk the wildly exaggerated claims of professional sports boosters is less pressing.

More importantly, however, is the nature of college sports. Unlike professional teams, college teams essentially never relocate to new cities, and colleges rarely add or drop football programs. Therefore, the "before and after" comparisons which are crucial in *ex post* evaluation of the economic impact of sports are not widely available for colleges in the same way that that they are for professional teams in the United States. Stadium projects for colleges are also distinctly different than those for professional teams. The majority of major construction projects in the NFL over the past two decades have involved building entirely new stadiums to replace aging or economically obsolete facilities. In the college football, on the other hand, most construction projects have involved multiple incremental changes to existing facilities such as adding capacity, improving existing seating, or providing luxury boxes. Again, the requisite "before and after" comparisons are not as clear in college football as on the professional side. Finally, the same problem arises in the analysis of postseason play in college football. While the location of the NFL's Super Bowl or MLB's World Series changes from year to year, each of the major college bowls is always in the same city at the same time of the season, year after year. Thus, even if Miami's economy always surges around New Year's Day, it is impossible to determine with certainty whether this spike is due to the annual Orange Bowl or other attributes of the local economy.

This paper uses the annual variation in the number of home games for most college football teams to generate economic impact estimates. Unlike the professional leagues, which

play a balanced schedule of home and away games, college football programs have a great deal of leeway in creating their schedule. When scheduling games, opponents will often agree to a home and away schedule, where the opponents play at one school in first year and at the other school in the succeeding year. Most games played within a school's conference schedule as well as non-conference rivalries use an alternating home and away schedule. Alternatively, the largest and most successful schools will often also schedule non-conference opponents through the use appearance guarantees. When a guarantee payment is made, the payer is under no obligation to play future game at the opponent's home stadium. For example, a large school like the Ohio State University likely would generate larger home revenues than a smaller opponent such as the University of Cincinnati could expect to receive from hosting Ohio State. Thus, depending on the break-down of a particular year's home and away contracts as well as the number of appearance guarantees made or accepted by a school, the number of home games a specific college football program plays during a season may vary from year to year, a deviation from the rule in most professional leagues.

The Model

Ex ante models may not provide credible estimates on the economic impact of a college football program on its home city for the reasons cited. An *ex post* model may be useful in providing a filter through which the promises made by sports boosters can be strained. Generally, sports franchises tend to be small relative to the overall economy in which they play, and the primary challenge for those doing a post-event audit involves isolating the event's impact. This is not a trivial task, and those who seek insight into the question of economic impact should be cognizant of the challenges and deficiencies common to both *ex ante* and *ex*

post analyses. Of course, one advantage to studying college sports rather than the major professional leagues is that professional teams are invariably located in the largest metropolitan areas in the country. Regular economic fluctuations of these large diverse economies are like to obscure the impact of even the biggest sporting events. While some major college football programs such as UCLA or the University of Miami are located in large metropolitan areas, many others are located in small "college towns." In fact, the median population in 2004 of the 63 metropolitan statistical areas (MSAs) examined in this study is 441 thousand compared with a median population of over 2.3 million for MSAs with an NFL team. Identifying any economic changes resulting from spectator sports within smaller cities, should they exist, is likely to be an easier task than performing the same task in a major metropolitan area.

Several approaches have been suggested in past scholarly work to estimate the impact an event on a city. Mills and McDonald (1992) provide an extensive summary of models that explain metropolitan economic growth. These studies seek to explain increases in economic activity through changes in key economic variables in the short-run or the identification of long-term developments that enhance the capacity for growth in metropolitan economies.

Our task is not to replicate explanations of metropolitan economic growth, but to use past work to help identify any effects of college football games on economic indicators. To this end we have selected explanatory variables from existing models to predict economic activity in the absence of the game. Estimating the economic impact of college football programs involves accounting for normal activity and determining whether the number of home games and/or success of the program increases economic activity. Thus, this approach depends on our ability to identify variables that account for the variation in growth in economic activity in host cities.

Given the number and variety of variables found in regional growth models and the inconsistency of coefficient size and significance, criticisms of any single model could logically focus on the problems posed by omitted variables. Any critic, of course, can claim that a particular regression suffers from omitted-variable bias, but it is far more challenging to specify the model so as to remedy the problem. In explaining regional or metropolitan growth patterns, at least some of the omitted variable problem can be addressed through a careful specification of the independent variables. As noted above, representing relevant variables as deviations from city norms, leaves the scholar a more manageable task, namely that of identifying those factors that explain city growth after accounting for the impact of those forces that generally have affected regional or national metropolitan statistical area (MSA) growth.

The purpose of *ex ante* studies is to provide a measure of the net benefits a project or event is likely to yield. To our knowledge there is no prospective model that has the capacity for measuring the net benefits of a project relative to the next best alternative use of those funds. If one assumes that the best use of funds has always occurred, then the growth path observed for a city can be considered optimal. If this optimal growth path, identified by the city's secular growth trend, does not increase during years in which a team plays a higher than normal number of games at home or wins more games than usual, then the evidence does not support the hypothesis that college football contributes positively to a region's economy and that any publicly subsidization of a collegiate team or its playing facility puts public monies to the best use.

Our model is designed to predict changes in real personal income, employment, and real per capita income attributable to college football in host cities between 1970 and 2004. The cohort of 63 cities used in the sample includes all cities that are home to a team in one of the six

Bowl Championship Series (BCS) conferences. In addition, three additional universities, Notre Dame, Air Force, and Brigham Young, were added to the sample based on the prominence of their programs both in terms of average attendance and success on the playing field. Two MSAs, Los Angeles and Raleigh-Durham, North Carolina, are home to two football programs. The 63 MSAs in the sample include the home of every national football champion since 1970 and every school whose average attendance typically ranks within the top 50 in college football. While the choice of sixty-three cities is somewhat arbitrary, the list includes essentially every university that would be generally be considered to have a "big time" football program and excludes minor schools with lesser athletic ambitions.

Following Coates and Humphreys (1999; 2002) and Baade and Matheson (2004; 2006) we use the following fixed-effect model for our time series panel data:

$$Y_t^i = \beta_0 + \beta_1 Y_{t-1}^i + \beta_2 POP_{t-1}^i + \beta_3 TECH_t^i + \beta_4 CFB_t^i + \alpha_1^i C_t^i + \alpha_2^i CTR_t^i + \gamma_i t_t^i + \varepsilon_t^i \quad (1)$$

We use two different dependent variables (Y_t^i): the natural log of employment and the real personal income in year *t* and MSA *i*. We include the lagged values of the dependent variable to correct for autocorrelation, and to purge out carry-over effects of each dependent variable from one year to the next. As Coates and Humphreys (2001) point out, lagged dependent variables bias their own coefficients, but not the coefficients of other variables in a linear model. Thus, we attach no interpretation of these coefficients. We include the lagged natural log of population POP_t^i to test whether each dependent variable is sensitive to MSA size. $TECH_t^i$ is a dummy variable that represents the tech boom in Silicon Valley during 1999 and 2000. CFB_t^i represents our college football proxies, which include number of home games, winning percentage, and dummy variables for teams in a national championship season and the year following a national championship. Finally, to account for the panel nature of our data, we

include dummy variables for each MSA (C_t^i) and year (t_t^i), and time trends for each MSA (CTR_t^i). Ideally, this specification allows MSAs to have different growth paths and also purges national trends.

Tables 1 and 2 present the results for each dependent variable. For brevity, we omit the estimates for the MSA dummies, year dummies, and MSA trends. Nearly all of the MSA dummies are statistically significant in both models, as are most of the MSA trend variables. In addition, nearly all of the year dummies are statistically significant and generally increase over the sample frame. These results suggest that MSAs have different growth paths, but are influenced by national trends. We find positive effects on employment and personal income from the tech boom, and that larger populations inhibit personal income growth. We omit population from the employment equation because of these variables have a correlation coefficient just below one.

Using employment as a dependent variable, none of the college football variables are statistically significant. In fact, the only estimates to have the expected signs (under the assumption that college football increases economic activity) are the effects of the number of games on employment and the effect of a national championship year on personal income. Therefore, we can find no benefit on additional games or a winning program on employment or personal income. Given that all of our schools have had college football programs throughout the sample frame, we cannot test whether the existence of a large football program helps or hurts an area. Rather, our results suggest that additional games or a winning program, conditional of already having a team, does not impact employment or personal income.

Conclusions

This paper provides yet another empirical examination of the economic impact of spectator sports on local economies. Confirming the results of other *ex post* analyses of sports in general, this paper finds no statistically significant evidence that college football games contribute positively to a host's economy. Our analysis from 1970-2004 of 63 metropolitan areas that play host to big-time college football programs find that neither the number of home games played, the winning percentage of the local team, nor winning a national championship has a discernable impact on either employment or personal income in the cities where the teams play. While successful college football teams may bring fame to their alma mater, fortune appears to be a bit more elusive as big plays and big crowds inside the stadium don't seem to translate into big money outside the stadium.

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Table 1: Dependent Variable: ln (employment), 1970 to 2004

Variable	coefficient	std. err.	*t*-statistic
Constant	1.2733**	0.1026	12.42
ln (employment$_{t-1}$)	0.8757**	0.0101	86.55
Tech boom	0.0292*	0.0142	2.05
Number of games	0.0005	0.0006	0.78
Winning percentage	-0.0002	0.0023	-0.11
National champs	-0.0018	0.0031	-0.58
National champs $_{t+1}$	-0.0055	0.0030	-1.81
adjusted *r*-squared	0.9998		

Table 2: Dependent Variable: ln (personal income), 1970 to 2004

Variable	coefficient	std. err.	*t*-statistic
Constant	2.8365**	0.2136	13.28
ln (personal income$_{t-1}$)	0.8744**	0.0140	62.31
ln (population$_{t-1}$)	-0.0963**	0.0249	-3.87
Tech boom	0.1261*	0.0160	7.91
Number of games	-0.0003	0.0026	-0.13
Winning percentage	-0.0002	0.0023	-0.11
National champs	0.0015	0.0035	0.43
National champs $_{t+1}$	-0.0031	0.0034	-0.92
adjusted *r*-squared	0.9998		