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Abstract

College football and men's basketball are the largest revenue generators in college athletics. Studies funded by athletic boosters tout the economic benefits of a college athletic program as an incentive for host cities to construct new stadiums or arenas at considerable public expense. Our analysis of the economic impact of home football and men's basketball games on Tallahassee (home of Florida State University) and Gainesville (home of the University of Florida) between 1980 to early-2007 fails to support these claims. Men's basketball games at these universities have no statistically significant impact on taxable sales, while football yields a modest gain of $2 to $3 million per home game. While this positive finding is one of the first in the academic literature of the impact of sports, these gains pale in comparison to the figures in many of the studies funded by athletic boosters.

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1. Introduction

Sports boosters often claim that sports teams, facilities, and events inject large sums of money into the cities lucky enough to host them. Promoters envision hoards of wealthy sports fans descending on a city's hotels, restaurants, and businesses, and showering them with fistfuls of dollars. For example, the National Football League (NFL) typically claims an economic impact from the Super Bowl of around $400 million (National Football League, 1999) and Major League Baseball (MLB) attaches a $75 million benefit to the All-Star Game (Selig, Harrington, and Healey 1999) and up to $250 million for the World Series (Ackman 2000). College sports generate equally eye-popping numbers. The estimated effect of the National Collegiate Athletic Association (NCAA) Men's Basketball Final Four ranges from $30 million to $110 million (Mensheha 1998; Anderson 2001) and major football bowl games and their surrounding activities generate figures up to $400 million in benefits (Fiesta Bowl, 2007; Tournament of Roses, 2007).

Even regular season games prompt claims of huge benefits. For example, the Oregon Baseball Campaign, a group dedicated to bringing MLB to Portland, reported that "a MLB team and ballpark would generate between $170 and $300 million annually in gross expenditures to the state of Oregon" (Oregon Baseball Campaign 2002) while a similar analysis completed for the Virginia Baseball Authority stated that a "a major league baseball franchise and stadium in northern Virginia would pump more that $8.6 billion into the economy over 30 years," or $287 million annually. Of course, professional leagues are not the only ones providing rosy economic impact numbers. The University of Nebraska, for example, estimated that during the 2004-05 school year, its football program alone generated $87.1 million in output, $31.2 million in worker income, and 2,130 jobs in the Lincoln area. Estimated statewide economic impact of University of Nebraska athletics ranged from $48 to $155 million (Thompson, 2005).

Of course, colleges, leagues, team owners, and event organizers have a strong incentive to provide economic impact numbers that are as large as possible in order to justify heavy public subsidies. In professional leagues, the prospect of large economic benefits is highlighted to minimize the team or league's required contribution to the funding of a new stadium or arena. For universities, large economic impact estimates are used to justify public expenditures on athletic programs or improvements to playing facilities. In addition, the majority of the largest college football and college basketball programs are public institutions. In 2009, for example, the University of Minnesota will open a new $288 million stadium, 55% of which was paid for with state funds (although the precise line between what constitutes state and university funds is admittedly unclear when dealing with a public university).

This paper estimates the economic impact of home football and men's basketball games for two small to mid-sized metropolitan areas that house large public institutions: Gainesville (University of Florida) and Tallahassee (Florida State University). Football and men's basketball are the largest revenue generators in college athletics, and both schools have popular and successful programs. For example, in the 2006-07 school year the University of Florida attracted 633 thousand football fans and 213 thousand fans in men's basketball and won national championships in both sports. The results of this paper suggest that men's basketball games have no identifiable impact on a city's economy while college football games have a measurable but small positive impact on real economic variables in host cities.

2. Criticisms of *ex ante* and *ex post* studies

Independent studies of the economic impact of spectator sports have cast doubt on the promises of significant financial gains accruing to host cities. A typical *ex ante* economic impact study used by league and event promoters estimates the number of visitors an event or team is expected to draw, the number of days each spectator is expected to stay in the city, and the amount each visitor will spend each day. Combining these figures, an estimate of the "direct economic impact" is obtained. This direct impact is then subjected to a multiplier to account for the initial round of spending recirculating through the economy, and this additional spending is known as "indirect economic impact." The sum of the direct and indirect impact is the total economic impact.

While such an estimation method is relatively straight-forward, numerous academic articles such as Crompton (1995) and Baade, Baumann, and Matheson (2008), to name just two, have pointed out the shortcomings of such *ex ante* studies. In summary, the general criticism of impact studies is that while they may do a credible job in determining the economic activity that occurs as a result of a sports team or mega-event, they rarely account for economic activity that is displaced due to sporting events. In other words, economic impact studies typically measure gross economic activity rather than net activity and therefore bias upward the true impact of an event on the local economy.

Numerous studies have looked back at the actual performance of economies that have had professional franchises, built new playing facilities, and hosted mega-events and have compared the observed economic performance of host cities to that predicted in *ex ante* studies. These *ex post* analyses of stadiums and franchises, including Rosentraub (1994), Baade (1996), Siegfried and Zimbalist (2000), Coates and Humphreys (1999; 2003), and Baade, Baumann, Matheson (2008) among others, generally find little or no economic benefits from professional sports teams or new playing facilities. Studies of mega-events, such as Porter (1999), Baade and Matheson (2001; 2004; 2006), Coates and Humphreys (2002), Coates (2006), Coates and Depken (2006), and Baade, Baumann, and Matheson (2008), similarly uncover little relationship between hosting major sporting events and real economic variables such as employment, personal income, personal income per capita, and taxable sales.

A valid criticism, however, of the existing body of work regarding the *ex post* economic impact of sports is that these studies are trying to uncover the proverbial needle in a haystack. For example, even if a MLB franchise or a Super Bowl does result in a $300 million boost to the host city, this is less than 0.1 percent of the annual personal income of a large metropolitan area like Los Angeles. Any income gains as a result of a new franchise or a big game would almost certainly be lost within the normal fluctuations in the region's economy. In the study of mega-events, this problem is further compounded due to the time frames involved. Even if the effects of a mega-event are large in the time period immediately surrounding the event, this impact is likely to be obscured in the annual data upon which many studies, including Coates and Humphreys (1999; 2002) and Baade and Matheson (2001; 2004; 2006), rely.

In this paper, the football and basketball programs of the University of Florida (U-FL) and Florida State University (FSU) are examined using Florida taxable sales data. Taxable sales data are used because the state of Florida provides these data monthly, which increases the ability to isolate the economic effects of the sports. U-FL and FSU are chosen because they have popular and successful programs (in football at the very least) and are located in smaller cities. Both teams average home football crowds in excess of 80,000 fans per game, a figure that exceeds the average attendance of nearly every team in the NFL, yet both universities reside in relatively small metropolitan areas. The populations of the Gainesville (U-FL) and Tallahassee

(FSU) metropolitan statistical areas (MSA) in 2005 were 240 thousand and 333 thousand, respectively, a fraction of the median population of over 2.3 million for MSAs with an NFL team. Identifying the economic impact, should it exist, from events of the magnitude of a home football game using high frequency, monthly data on these small metropolitan areas, is likely to be a much easier task than performing the same job with annual data for a big metropolitan area.

3. The Data and the Models

The data include over 25 years of monthly sales tax data (December 1979 through March 2007) for every county in Florida. The Census county compositions of the metropolitan areas are used to construct taxable sales for Gainesville and Tallahassee. MSA taxable sales are used in lieu of county taxable sales because, as noted previously, it is important to differentiate between the gross and net impact of a franchise. If a football game simply causes residents to spend money at the stadium rather than elsewhere in the local economy, analysis of only a single county may not capture this substitution effect. Examining an entire MSA will account for the substitution effect if money is redirected between counties within a single MSA due to sporting events. The monthly consumer price index compiled by the Bureau of Labor Statistics is used to convert taxable sales data to 2006 dollars.

Since monthly taxable sales in Tallahassee and Gainesville can exceed $900 million in real terms, even the effects of a potentially major economic event such as a college football or men’s basketball game can be obscured by the normal economic fluctuations of these economies. Many factors including the local, regional and national business cycle, state and federal government policies, monetary policy and inflation, international factors, consumer and business confidence, wealth effects, and a host of other ingredients influence taxable sales. This paper approaches this problem using two specifications of taxable sales. Model 1 analyzes taxable sales for each MSA using controls for the number of home football and men's basketball games, in addition to other independent variables to account for general changes in economic conditions. Model 2 analyzes taxable sales for each MSA as a share of the rest of the state of Florida, henceforth called the taxable sales ratio. This specification filters the noise caused by changes in statewide economic conditions that affect both Gainesville and Tallahassee. In each model, growth rates are taken using 12-month differentials to account for seasonality, which shortens our sample frame to December 1980 through March 2007.

Both models use an ARMA(P,Q) model

$$y_t^* = \beta_0 + \sum_{p=1}^{P} \Phi_p \, y_{t-p}^* + \sum_{q=0}^{Q} \Theta_q \, \varepsilon_{t-q} + \gamma \, x_t + \beta \, z_t + \varepsilon_t$$

where y_t^* is the growth rate in taxable sales (Model 1) or growth rate in the taxable sales ratio (Model 2) in time period t, P is the number of lagged values of y_t^* in the model known as the autoregressive (AR) dimension of the model, ε_t is an error term, Q is the number of lagged values of the error term representing the moving average (MA) dimension of the model, x_t is a vector of exogenous variables that affect economic activity, and z_t is a vector of independent variables representing the effect of various sporting events in the MSA. Maximum likelihood estimates $\beta_0, \Phi_p, \Theta_q, \gamma, \beta,$ and σ, which is the standard deviation of the white noise error ε_t.

Augmented Dickey-Fuller and Phillips-Perron tests reject the existence of a unit root for all four time series. The autoregressive and moving average dimensions of the models are determined through trial and error testing. Only the optimal autoregressive and moving average structure, as determined by the Akaike Information Criterion, is presented in the results. Within each MSA, the optimal numbers of AR and MA components are the same for both specifications of taxable sales.

The vector of non-sports controls, x_t , is included to isolate the impact of home football and men's basketball games. First, Hurricane Andrew devastated southern Florida in late August 1992, but the economic effects were felt throughout the state. Second, the events of 9/11 significantly slowed tourism, which is an integral part of Florida's economy. Finally, we include controls for three months of abnormal Gainesville data: January 1990, April 1990, and September 1998. Because the dependent variable in both models is a 12-month growth rate, each of these events will affect growth rates in two periods. Therefore, two dummy variables, one for the actual time period, another for one year later, are included for each event.

In Model 1, x_t includes two other controls. First, the two-month lag of the national unemployment rate is included to account for national trends. Second, the state of Florida collected sales tax on services between August 1987 and May 1988, which impacted the gross amount of taxable sales. These controls are not statistically significant when included in Model 2 for either MSA, indicating these events did not disproportionately impact Gainesville or Tallahassee relative to the rest of Florida.

The vector of sports controls, z_t , contains the number of home football and men's basketball games in the MSA. Although both sports are always played in the same months, there is variation in the number of home games. Table 1 presents the frequencies of each variable. College football games are typically played on Saturday, and large programs like U-F and FSU usually play one or two more home games than away games. Not surprisingly, the range is between zero (off-season) and four, with two as the most common number of in-season home games per month. The number of men's basketball games each month ranges from zero (off-season) to eight. This variable has more variation because basketball games are played throughout the week and most teams play between 25 and 30 games each season.

Table 2 presents the results for Tallahassee under Model 1, which uses the growth rate of taxable sales as the dependent variable. The estimate of the effect of home football games is positive, but not statistically significant, and the number of men's basketball games does not affect taxable sales. Taxable sales in Tallahassee do not appear to be affected by Hurricane Andrew or 9/11, but remain in the model as a comparison to Model 2.

Table 3 presents the results for Tallahassee under Model 2, where the dependent variable is the growth rate of the taxable sales ratio. The effect of home football games is again positive but is also statistically significant at five percent, while the number of men's basketball games continues to have no observable effect on taxable sales. In other words, the effect of home football games is uncertain using the Tallahassee's taxable sales but is positive using Tallahassee's taxable sales as a ratio to the rest of Florida. The statistically significant result for football in Tallahassee under Model 2 makes this paper among the first *ex post* studies to find evidence of the positive economic benefits of spectator sports. The magnitude of this positive benefit is worth of further examination.

In Table 3 the estimate of the effect of a college football home game is 0.00557. Using sample means from fall 2006, this corresponds to about a relative $2.1 million net increase in Tallahassee's taxable sales compared to the rest of the state for each home game. The nature of the taxable sales ratio, however, suggests that some of this net gain may be caused by a loss in taxable sales elsewhere in Florida since a ratio can increase either by increasing the numerator (Tallahassee's taxable sales) or decreasing the denominator (the taxable sales of the rest of the state). Assuming that each home game attracts fans from all over the state, the money spent by these out-of-town fans in Tallahassee is money that presumably would have spent elsewhere within Florida. In Table 2, the estimated effect of a college football home game is 0.00260 (although this estimate is not statistically significant). At the sample means, this corresponds to about a $1.0 million increase in Tallahassee's taxable sales for each home game, or roughly half of the $2.1 million figure derived from the taxable sales ratio model. While one must be careful to attribute too much confidence to an estimate that is not statistically significant, if each home football game generates an extra $1.0 million in taxable sales for Tallahassee, in order for the data to result in a $2.1 million gain in Tallahassee's taxable sales ratio, taxable sales in the rest of the state must fall by a similar amount. The data appear to show that football games are indeed beneficial for the host city of Tallahassee, but this benefit comes at the expense of economic activity in the rest of the state, a classic case of the substitution effect.

Similarly, Table 3 shows positive and statistically significant effects of Hurricane Andrew and 9/11 on Tallahassee's taxable sales ratio. However, it is likely these net gains are caused by losses in taxable sales throughout the state. This is supported by the results in Table 2, which suggest that of Hurricane Andrew and 9/11 did not have an effect on Tallahassee's taxable sales.

Tables 4 and 5 present the results for Gainesville under Model 1 and Model 2, respectively. The effect of college football home games is positive in each model, but is not statistically significant. In addition, just as in Tallahassee, men's college basketball games are a poor fit in the model. At U-FL and FSU, basketball games typically draw crowds that are one-fifth to one-tenth the size of those at football games, and the events tend to generate less excitement than do the all-day extravaganzas of home football games. It is then, perhaps, no surprise that basketball does not generate significant results in either city.

As noted previously, the underlying Gainesville data are noticeably “muddier” than the Tallahassee figures due to anomalies in data. The football coefficients are of the expected sign, however, and achieve a one-sided p-value of just under 10%. In Table 5 the estimate of the effect of a college football home game using the taxable sales ratio is 0.00815. Using sample means from fall 2006, this corresponds to about a relative $2.9 million net increase in Gainesville’s taxable sales compared to the rest of the state for each home game. In Table 4, the estimated effect of a college football home game using taxable sales growth is 0.00853. At the sample means, this corresponds to about a $3.0 million increase in Gainesville’s taxable sales for each home game. The Gainesville estimates, which are based on coefficients on the very edge of statistical significance, do not corroborate the findings of the substitution effect that occurred in the Tallahassee data, but do generate dollar impacts of roughly similar magnitudes.

4. Conclusions

Sports boosters have long held that spectator sports hold the promise of riches for host cities. In the past, league and industry-sponsored studies have estimated that mega-events such as the Super Bowl and All-Star games increase economic activity by hundreds of millions of dollars in host cities. Similar studies claim that new stadiums or franchises, as well as college athletic programs, also can have hundreds of millions of dollars of annual local economic impact. Our regression analysis of taxable sales in Florida over the period from 1980 to early-2007 fails to support these claims. Men’s basketball games at FSU and U-FL were found to have no statistically significant impact on taxable sales in Tallahassee and Gainesville, and indeed, the coefficient on the variable was even negative in two of the four models.

Football is another story, however. In the two models tested for each city, the coefficient on the football variable is positive in all four cases, statistically significant in one case, and borderline significant in two others. Each additional home football games increases taxable sales in the host city by $2 to $3 million, although we find evidence that the city's gain may come at the expense of economic activity in the rest of the state.

While this paper is one of the first in the academic literature to find a positive economic impact of sports on host communities, the numbers give boosters little to cheer about. If a college football game that attracts 80 or 90 thousand fans to a relatively small community only generates small identifiable economic gains, there is no reason to place any serious credence in economic impact estimates in other sports that can easily range into the hundreds of millions of dollars. Furthermore, a $2 or $3 million bump in taxable sales per home game does not justify large public handouts for sports facilities. The results show that cities would be wise to view with caution economic impact estimates provided by sports boosters, who have an obvious incentive to inflate these estimates. The loud roars inside the stadium are only quiet blips in the economic data.

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Table 1: Frequency Table of Sports Variables

number of home football games at *t*	Tallahassee frequency	Gainesville frequency
0	230	234
1	29	26
2	46	36
3	9	19
4	2	1
sum	316	316

number of home men's basketball games at *t*	Tallahassee frequency	Gainesville frequency
0	195	201
1	20	21
2	17	19
3	27	19
4	25	29
5	25	18
6	7	7
7	0	0
8	0	2
sum	316	316

Table 2: *(Sample 1980.12 - 2007.4)*: Tallahassee Model 1

Dependent variable: 12 month percent change in Tallahassee's taxable sales

Variable	coefficient	std. err.	*z*-statistic
Constant	0.02854**	0.00897	3.18
two month change in unemployment	-0.03597*	0.02092	-1.72
9/11 impact	-0.01391	0.03331	-0.42
9/11 impact, one year later	-0.02566	0.03135	-0.82
Services taxed	0.13119**	0.03849	3.41
Services taxed, one year later	-0.06907**	0.02529	-2.73
Hurricane Andrew	-0.00252	0.01864	-0.14
Hurricane Andrew, one year later	0.00672	0.02128	0.32
number of home football games	0.00260	0.00293	0.89
number of home basketball games	-0.00202	0.00166	-1.22
AR(2)	0.74233**	0.04434	16.74
MA(1)	0.39935**	0.07097	5.63
MA(2)	-0.60067**	0.07098	-8.46
$\hat{\sigma}$	0.05264**	0.00284	18.53
log pseudo-likelihood	480.0977		

Notes: All dollar impact values are in 2006 dollars using the CPI. For each dichotomous variable, a second dummy variable is included for the following year because the dependent variable is a 12 month percent change. The dummy variables for months of unusually large or small data (January 1990, April 1990, and September 1998) are excluded for brevity. Finally, ** and * represent statistical significance at the one percent and ten percent levels, respectively.

Table 3: *(Sample 1980.12 - 2007.4)*: Tallahassee Model 2

Dependent variable: 12 month percent change in Tallahassee's share of Florida's taxable sales

Variable	coefficient	std. err.	*z*-statistic
Constant	-0.00817	0.00620	-1.32
9/11 impact	0.07188**	0.02444	2.94
9/11 impact, one year later	-0.09054**	0.02300	-3.94
Hurricane Andrew	0.09823**	0.02155	4.56
Hurricane Andrew, one year later	-0.03889	0.03030	-1.28
number of home football games	0.00557**	0.00268	2.08
number of home basketball games	0.00010	0.00126	0.08
AR(2)	0.80303**	0.04200	19.12
MA(1)	0.26421**	0.04650	5.68
MA(2)	-0.73579**	0.04650	-15.82
$\hat{\sigma}$	0.04148**	0.00205	20.24
log pseudo-likelihood	555.6729		

Notes: All dollar impact values are in 2006 dollars using the CPI. For each dichotomous variable, a second dummy variable is included for the following year because the dependent variable is a 12 month percent change. The dummy variables for months of unusually large or small data (January 1990, April 1990, and September 1998) are excluded for brevity. Finally, ** and * represent statistical significance at the one percent and ten percent levels, respectively.

Table 4: *(Sample 1980.12 - 2007.4)*: Gainesville Model 1

Dependent variable: 12 month percent change in Gainesville's taxable sales

Variable	coefficient	std. err.	*z*-statistic
Constant	0.02948**	0.00858	3.44
two month change in unemployment	-0.05353**	0.02048	-2.61
9/11 impact	0.06125*	0.02606	2.35
9/11 impact, one year later	-0.07345**	0.02339	-3.14
Services taxed	0.06034**	0.02265	2.66
Services taxed, one year later	-0.07534**	0.02927	-2.57
Hurricane Andrew	-0.03845	0.02485	-1.55
Hurricane Andrew, one year later	-0.04495	0.08101	-0.55
number of home football games	0.00853	0.00677	1.26
number of home basketball games	-0.00020	0.00229	-0.09
AR(1)	0.81403**	0.05970	13.63
MA(1)	-0.55352**	0.08778	-6.31
$\hat{\sigma}$	0.06688**	0.00499	13.41
log pseudo-likelihood	406.1751		

Notes: All dollar impact values are in 2006 dollars using the CPI. For each dichotomous variable, a second dummy variable is included for the following year because the dependent variable is a 12 month percent change. The dummy variables for months of unusually large or small data (January 1990, April 1990, and September 1998) are excluded for brevity. Finally, ** and * represent statistical significance at the one percent and ten percent levels, respectively.

Table 5: *(Sample 1980.12 - 2007.4)*: Gainesville Model 2

Dependent variable: 12 month percent change in Gainesville's share of Florida's taxable sales

Variable	coefficient	std. err.	*z*-statistic
Constant	-0.00596	0.00763	-0.78
9/11 impact	0.15073**	0.02005	7.52
9/11 impact, one year later	-0.12239**	0.01756	-6.97
Hurricane Andrew	0.06977**	0.02494	2.80
Hurricane Andrew, one year later	-0.05912	0.06988	-0.85
number of home football games	0.00815	0.00617	1.32
number of home basketball games	0.00028	0.00154	0.18
AR(1)	0.88820**	0.04867	18.25
MA(1)	-0.71287**	0.07218	-9.88
$\hat{\sigma}$	0.05710**	0.005533	10.31
log pseudo-likelihood	456.1566		

Notes: All dollar impact values are in 2006 dollars using the CPI. For each dichotomous variable, a second dummy variable is included for the following year because the dependent variable is a 12 month percent change. The dummy variables for months of unusually large or small data (January 1990, April 1990, and September 1998) are excluded for brevity. Finally, ** and * represent statistical significance at the one percent and ten percent levels, respectively.