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CONFERENCE REALIGNMENT IN THE FBS AND GAME-DAY FOOTBALL ATTENDANCE: ANOTHER LOOK

La reorganización de las conferencias en la FBS y la asistencia a los partidos de fútbol: Otra mirada

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ABSTRACT: Sixteen Football Bowl Subdivision (FBS) teams that changed conferences during 2004-2010 were used to estimate Tobit regression models via panel methods to examine if realignment affects home-game attendance. A conference change decreases attendance when an instrumented real ticket price is included in the pooled sample. When price is removed from the equation the conference change coefficient is insignificant. The model then is estimated for each post-change year. All coefficients for the conference change variable are insignificant. Second-mover advantages appear to be absent from this group of second-wave conference changers. Also absent is any evidence of a "honeymoon" effect.

KEY WORDS: College football, game-day attendance, stadium utilization, conference realignment

RESUMEN: *Se utilizaron dieciséis equipos de la Football Bowl Subdivision (FBS) que cambiaron de conferencia entre 2004 y 2010 para estimar modelos de regresión Tobit mediante métodos de panel y examinar si la realineación afecta a la asistencia a los partidos en casa. Un cambio de conferencia disminuye la asistencia cuando se incluye en la muestra agrupada un precio real de las entradas instrumentado. Cuando se elimina el precio de la ecuación, el coeficiente del cambio de conferencia no es significativo. A continuación, el modelo se estima para cada año posterior al cambio. Todos los coeficientes de la variable de cambio de conferencia son insignificantes. Las ventajas del segundo movimiento parecen estar ausentes en este grupo de cambiadores de conferencia de la segunda ola. Tampoco hay pruebas de un efecto de "luna de miel".*

PALABRAS CLAVE: Fútbol universitario, asistencia a los partidos, utilización de los estadios, reorganización de las conferencias

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1. Introduction

Programs at Football Bowl Subdivision (FBS or Division I-A) universities in the U.S. are major revenue makers for athletic department budgets. One of the primary sources has been ticket sales but a variety of related items also contribute to the revenue stream, e.g., parking, souvenirs and sponsorships. The games generate revenue for the local economies as well (Baade, 2008; Lentz & Laband, 2009). The financial success of these football programs owes to the popularity of the sport in American culture and the market power exercised by some of the FBS conferences in terms of game scheduling, bowl appearances and broadcasting rights. Access to potentially larger revenue streams provides an incentive for athletic departments to switch conferences.

Not all conferences in the FBS, however, are created equally. The "Power Six" conferences[1] possess the greatest advantages both on the field and in revenue generation. Programs outside the Power Six aspire to join them to improve the financial health of their entire athletic program including the non-revenue generating sports teams. Membership in the FBS alone is no guarantee of financial viability as the majority of athletic departments are subsidized, often heavily, by their university's general budget (Hoffer & Pincin, 2015).[2] However, Jones (2013) provides some evidence that athletic department expenditures are positively and strongly correlated with athletic department on-field success in the FBS.

Aspirants to improve their financial positions are not limited to FBS schools. Teams in the Football Championship Series division (FCS or Division I-AA) often seek to join the less powerful conferences of the FBS. The movement from the FCS to the FBS can generate additional revenues but it also generates greater costs for athletic departments via larger number of scholarships, additional coaches etc. Greater expenditures and possible budget deficits have not deterred potential entrants: between 2004 and 2018, thirteen football programs have left the FCS for the FBS and other teams are scheduled to join soon.[3]

Despite the importance of conference affiliation to the financial health of athletic departments there has been little empirical work on the impact of realignment. Hoffer and Pincin (2015) focus on the impacts on athletic department budgets. Groza (2010) estimates regression models to examine the impact that changing conference affiliation had on FBS teams' game-day attendance during 2002-07. The major finding was that teams experienced a substantial increase in attendance after changing conferences.

Conference switching has accelerated. Of the 126 FBS teams in 2014, nearly half (55 teams or 44%) changed conferences or the ranks of the independents since 2005. These changes affected every conference, included the demise of two conferences (Western Athletic Conference and the Big East), the creation of another (American Athletic Conference) and thirteen teams that moved up from the FCS.

This study looks at the earlier stages of conference realignment in the FBS during 2004-2010. It contributes to the literature by: 1) using data over a seven-year period; 2) examining changes in conference realignment to determine if they are short-lived (i.e., has a "honeymoon" effect) or persists over time; 3) improving the model specification by: a) including more control variables (e.g. ticket price, income and television broadcasts); b) employing an instrumental variable technique to account for endogeneity of attendance and

ticket prices; and c) using panel data estimation methods (which take into account time-series and cross-section effects on the error terms) rather than using a set of dummy variables for each team as a method of controlling for "fixed effects".

Conference Realignment

The financial fortunes of college football teams in Division I-A during the last sixty years have been dictated, to a large degree, by conference affiliations. In the 1960s and 1970s, there were relatively few post-season bowl games and access to those were typically limited by conference affiliation in a power conference. For example, the regular season champions of the Big 10 and Pacific 10 conference always met in the Rose Bowl. In the 1970s the National Collegiate Athletic Association (NCAA) could choose which games would be televised both regionally and nationally and regularly chose games between lower-profile programs. Once the Supreme Court ruled that individual conferences and schools could negotiate their own broadcasting contracts, the NCAA could no longer be effective in redistributing revenues from broadcasting contracts toward lower-profile programs. Power conferences and programs soon negotiated individual contracts, once again leaving the low-profile programs at a competitive disadvantage both in revenue generation and on the field.

Over time, the low-profile programs' revenues were improved by two new developments: 1) their own broadcasting contracts over an expanding number of cable and satellite television channels; and 2) quick growth in the number of postseason bowl games. However, the revenue growth of these programs continued to lag behind those of the high-profile programs. The imbalance in financial power among teams in Division I-A football was accentuated with the formation of the Bowl Championship Series in 1998. This alliance of the six power conferences[4] consolidated negotiating power and revenue in the hands of the preeminent programs.

Two criteria are typically used to rate the quality of a Division I-A football conference: team performance and the size of its fan base. Teams playing in weaker conferences often aspire to move to a power conference both to improve the quality of competition on the field and to increase its revenue stream by increasing its visibility and fan base. However, teams from weaker conferences face substantial hurdles to becoming a member of a power conference. A new conference member must be approved by the current members of the conference and the newcomer must agree to be admitted.

The Atlantic Coast Conference (ACC) started the realignment process in Division I-A football in 2004 by admitting two members of the Big East conference with strong football tradition: Miami (Florida), Virginia Tech. Boston College followed them to the ACC a year later. This set off a chain reaction which involved 18 additional teams and seven of the 11 Division I-A conferences.[5] The ACC members apparently believed that the conference's reputation would be strengthened and it could leverage that reputation to negotiate better bowl deals and television contracts. The ACC's action forced the Big East to recruit new members and other conferences followed as their own members moved to different conferences.

All teams that voluntarily changed conference affiliation probably believed that their new conference would provide an improved stream of revenue. After considering this first wave of conference realignments, Groza (2010) concluded that "each team moved to a conference

whose teams appeared in more bowl games, had larger average attendance, and had a higher average Sagarin Rating compared to the conference they came from."

Groza (2010) focused on the 21 FBS teams that changed conferences in 2003 and 2004. The data span 2002-07 and only includes the 612 games played against other FBS teams. The regression models control for factors influencing game-day attendance (measured by percent of stadium capacity). The equations also included a dummy variable which took on a value of one in the year a team changed conferences and the next two consecutive years. The model was estimated using both ordinary least squares and Tobit procedures since the dependent variable is constrained by stadium capacity. Each model estimated captures "fixed effects" by including a dummy variable for each of the 21 football programs. Groza concluded that teams experienced an increase in attendance after changing conferences: a gain between 3.3 and 6.6 percent of capacity.

There are, however, some limitations to this methodological approach: 1) a single dummy variable to measure the effect of conference change over a three-year period assumes identical impacts for each of the three years after a conference change. It ignores the possibilities that the sign and magnitude of this "honey-moon effect" could fluctuate over time and that it could influence attendance beyond three years; 2) panel data estimation methods could more accurately estimate the influence of the independent variables of the models; 3) the estimating equations omit ticket price as a dependent variable which ignores the potential endogeneity between the supply and demand for game-day attendance; 4) a television broadcast variable, demographic measures and weather conditions are absent although other studies have shown these variables to be a substantial influences on game-day attendance (Price & Sen, 2003; Falls & Natke, 2014); 5) the model excludes any measure of a fan's ability to pay (e.g. income) suggesting that the model may have a specification error since attendance is a revealed preference for consumer demand.

2. The Data and Econometric Model

The teams included in this study comprise a "second wave" of conference changers taking place in 2005. The movement of Miami, Virginia Tech and Boston College from the Big East into the ACC left the Big East with a public relations issue since two of these teams (Miami and Virginia Tech) were the highest-rated teams in the conference when they left. Big East officials quickly filled the void by recruiting three prominent members of Conference USA: Cincinnati, Louisville and South Florida. Conference USA, in turn, replaced these defectors from other non-power conferences and added a few other members as well. In our sample, only 25 percent of the teams made a move between power conferences or from a non-power conference to a power conference. Most teams in our sample moved between non-power conferences or moved to independent status either from a non-power conference or a power conference. The extent of this movement is presented in Tables 1 and 2.

Table 1 Team movement in the FBS, 2005-2010

Team	Moved from	Moved to	Year
Army	Conference USA	Independent	2005
Boston College	Big East	Atlantic Coast	2005
Central Florida	Mid-American	Conference USA	2005
Cincinnati	Conference USA	Big East	2005
Florida Atlantic*	FCS	Sun Belt	2005
Florida International*	FCS	Sun Belt	2005
Idaho	Sun Belt	Western Athletic	2005
Louisville	Conference USA	Big East	2005
Marshall	Mid-American	Conference USA	2005
New Mexico State	Sun Belt	Western Athletic	2005
Rice	Western Athletic	Conference USA	2005
South Florida	Conference USA	Big East	2005
Southern Methodist	Western Athletic	Conference USA	2005
Temple	Big East	Independent	2005
Texas Christian	Conference USA	Mountain West	2005
Texas El Paso	Western Athletic	Conference USA	2005
Tulsa	Western Athletic	Conference USA	2005
Utah State	Sun Belt	Western Athletic	2005
Western Kentucky*	FCS	Sun Belt	2009

*These teams were not included in this data set. They did not change conferences within the FBS division rather they changed divisions, from FCS to FBS, as well as conferences.

The data used here is comprised of 650 football games played at the home stadium by sixteen FBS football teams during the regular season for the years 2004-2010[6]. It is an unbalanced panel because teams may have played a different number of home games in any season. Bowl games, conference championship games, and games played at neutral sites are not included.

Table 2 Conference turn-over in the FBS, 2005-2010

Conference	Number of moves in	Number of moves out	Total moves	Net
Atlantic Coast	1	0	1	1
Big East	3	2	5	1
Conference USA	6	5	11	1
FCS	0	3	3	-3
Independent	2	0	2	2
Mid-American	0	2	2	-2
Mountain West	1	0	1	1
Sun Belt	3	3	6	0
Western Athletic	3	4	7	-1
Total	19	19	38	0

Table 3 presents descriptive statistics for the variables used to estimate the regression equations in three ways: the full sample; those teams that moved laterally between power conferences or from a non-power to a power conference (power conference); and those teams that moved laterally between non-power conferences or independent status (non-power conference). There are substantial differences in means between the power and non-power conferences for numerous variables. The power conference teams have higher means (differences in parentheses) in attendance (13,933), percent of capacity (24.76%), real ticket price ($3.89), non-Saturday games (10%), non-FBS games (5%), televised games (30%), undergraduate enrollment (6,742), state population per FBS team (894,641), lifetime winning percentage (7.19%), bowl appearances in the last 10 years (4.00), and NFL team nearby (33%). The only substantial difference in means in favor of non-power conference teams is in travel cost ($14.15), suggesting that visiting teams travel farther to play this subset of schools.

Table 3. Sample statistics

Variable	Mean	Standard deviation	Power conference mean	Non-power conference mean
Attendance	27,486	12,370	37,711	23,778
NCAA stadium capacity	42,284	13,463	44,474	41,490
Percent of NCAA stadium capacity	67.39	25.74	85.56	60.80
Real ticket price	15.04	3.76	17.89	14.00
Real state disposable income per capita	15,331	1,774	16,131	15,040
Real travel cost	74.30	57.14	63.91	78.06
Precipitation	0.11	0.52	0.12	0.11
Average cloud cover	40.15	32.48	46.34	37.90
Feels like temperature	62.34	16.11	61.77	62.55
Season game number	6.32	3.42	6.08	6.40
Absolute value home wins – visitor wins	3.02	2.17	2.73	3.12
Season wins	2.53	2.35	3.42	2.21
Traditional rival	0.14	0.35	0.14	0.14
Non-Saturday game	0.14	0.35	0.21	0.11
Non-FBS opponent	0.11	0.31	0.14	0.09
Any video coverage	0.68	0.47	0.90	0.60
Conference game	0.61	0.49	0.58	0.63
Home BCS visitor non-BCS	0.18	0.39	0.53	0.06
Home non-BCS visitor non-BCS	0.68	0.47	0.20	0.86
Home non-BCS visitor BCS	0.08	0.26	0.09	0.07
Undergraduate enrollment	14,780	10,895	19,728	12,986
City population	2,437,267	2,276,985	2,659,465	2,405,736
State population / FBS in state	2,530,351	1,744,761	3,186,880	2,292,239
Lifetime win percentage	48.73	6.23	54.00	46.81
Bowls in last 10 years	3.04	3.15	5.98	1.98
NFL team nearby	0.48	0.50	0.72	0.39
Conference change	0.87	0.33	0.88	0.87

Observations: total = 650; power = 173; non-power = 477.

Based on a review of the relevant literature (Falls & Natke, 2014; Mirable 2015; Paul 2012; Price & Sen, 2003; Schofield, 1983) we estimated a random effects Tobit model with the following form.

$$A_{it} = \alpha + E_{it}\beta + G_{it}\Psi + D_{it}\lambda + O_{it}\xi + e_i + v_{it} \quad (1)$$

where A_{it} , E_{it} , G_{it} , D_{it} and O_{it} are sets of variables containing attendance, economic characteristics, game-specific attributes, demographic variables and other control factors, respectively and α, β, Ψ, λ and ξ are parameters to be estimated.

In (1), $e_i + v_{it}$ is a residual in which e_i is a school specific residual, it differs across schools but is constant for any specific school, while v_{it} is a residual with the usual properties. Some of the independent variables are time invariant (e.g., proximity to an NFL franchise) so the random effects model was chosen. It is assumed that the school-specific component of the error term is distributed independently of the explanatory variables. A Tobit estimation procedure was used since a substantial portion of the games (10.5 percent) was sold out.

Other studies in the sports literature used different empirical methods to estimate attendance. Cebula (2013) estimated game-day attendance for a sample of teams in U.S. minor league baseball using a semi-log model and fixed effects panel estimation methods. Fullerton and Miller (2017) also employed a semi-log model and used two-stage least squares regression techniques to estimate and forecast game-day attendance at the University of Texas El Paso over 48 seasons.

The dependent variable A_{it} is attendance as a percent of the official stadium capacity (both measures as reported by the schools to the NCAA).[7] Different methods were used to measure attendance during the period. For the 2004 season, the number of fans attending the games was the only official measure of attendance. Both prior to 2004 and from the 2005 season onward, the NCAA allowed schools to choose between two methods of calculating official attendance: actual attendance or paid attendance (i.e., ticket sales). The method used to measure attendance at any specific game was not identified by the NCAA.

Assuming most fans reside in the same state as the home team's main campus we use the state's real per capita disposable income as a proxy for a home fan's budget constraint.[8] If the demand for sporting events is a normal good, rising income should increase attendance.

Travel cost is an important factor in a fan's attendance decision. Travel cost for a specific game is measured as the fuel cost of a round-trip via private automobile between campuses of the opponents. The number of gallons of fuel consumed is determined by the average fuel efficiency rating of the U.S. vehicle fleet and the distance between campuses. The weekly average price of unleaded gasoline in the home team's region then determines travel cost.[9] Fleet fuel efficiency figures change across years and gasoline prices vary across weeks and regions. Greater travel cost is expected to reduce attendance.

One ticket price measure was collected for each game: the single game price for the best available seat on the sideline (i.e., closest to the 50-yard line) which is not reserved for season-ticket holders[10]. An imputed ticket price series was constructed to replace missing values.[11] Approximately fifty percent of the series was imputed. In the analysis this imputed price series was instrumented (to reduce endogeneity problems) using stadium capacity as the instrument. Stadium capacity was chosen as the best instrument among several tested as potential instruments. Greater ticket prices are expected to reduce attendance.

Weather is one of the game-specific influences. There are three weather variables in the model: precipitation (measured in inches), average cloud cover (percent), and the day's average "feels like temperature" (degrees Fahrenheit). The last measure adjusts the air temperature for humidity and wind speed to provide a better measure of the comfort level of fans. Colder temperatures, more cloud cover and more precipitation are expected to discourage attendance.

The season game number (i.e., the game's sequential order during a season) is also included but its influence on attendance is uncertain. Early games may generate less fan interest because less is at stake at that point in the season or they may generate more fan interest since fans are optimistic about team performance. Fan interest could grow as the season progresses particularly if teams are competing for a conference championship or bowl eligibility (i.e., six wins). However, teams that have performed poorly may face substantial reductions in fan interest as the season wears on.

We also include a relative team performance variable. This measure is the absolute value of the difference between the number of home team wins in the last 11 games and the number of visitor wins in the last 11 games. A smaller magnitude for this variable signifies a more competitive game. According to the uncertainty of outcome hypothesis, increased game competitiveness encourages more fans to attend the game.

Other game-specific variables include a set of dummy variables used to measure the BCS affiliation of the home and visiting teams. A team's access to financial and physical resources, its ability to recruit athletic talent and its expected performance on the field may be measured, in part, by its affiliation with the BCS (i.e., a member of an automatically-qualifying or a Power 6 conference). Also, it is widely believed that most BCS teams have a larger fan base than non-BCS teams since they typically have larger enrollments, longer and stronger football traditions, and wider media exposure. A visiting BCS team is likely to draw more fans than a non-BCS visiting team regardless of the home team's BCS affiliation. Likewise, a BCS team playing at home is likely to have higher attendance than a non-BCS team playing at home regardless of the visiting team's BCS affiliation. We employ three dummy variables to capture these effects: home BCS – visitor non-BCS, home non-BCS – visitor non-BCS, and home non-BCS – visitor BCS. The default category is a BCS team hosting another BCS team. The coefficients of each of these three dummy variables are expected to have a negative sign.

Non-FBS opponent, non-Saturday game, conference game and traditional rival are included as game specific measures that influence attendance. The first two variables are expected to have a negative impact on attendance while traditional rivals should draw more fans (Quintanar, 2015). Whether conference games will attract more or fewer fans is not clear. Conference games could attract more fans since more is at stake (i.e., conference standings) or fewer fans because teams are too familiar. Non-conference games could generate more fan interest for their novelty or they may draw fewer fans since there is no tradition involved.

Another set of dummy variables identifies the specific conferences of the opposing teams.[12] For example, "Pac-12 participant" is one when either of the teams is from the Pac-12 Conference. These participant variables are intended as controls for characteristics specific to conference affiliation.

The regression model employs a dummy variable, "any video coverage" which takes on the value of one if the game is broadcast by any means (e.g. on-line, cable, pay-per-view or open-access) and zero if there was no video transmission of the contest. Given outcomes in the empirical literature, a broadcast is expected to increase attendance.

Demographic variables include the home university's undergraduate enrollment, population of the city where the home campus is located and state population divided by the number of FBS schools in the state. The closest potential audiences for a home game are measured by the first two variables. Fan loyalty in a state may be divided among several college teams which the third variable is designed to capture. Enrollment and state population per FBS team are expected to have a positive impact on attendance. City population should have a negative influence on attendance as larger cities have a greater number of entertainment substitutes for college football games.

Three other control variables measure team performance in the short-, intermediate- and long-term: number of wins in the season, number of bowl game appearances for the home team in the last ten years and the home team's lifetime winning percentage. Increases in these variables are expected to increase attendance. Competition for fans' loyalties could come from the professional level. The dummy variable "NFL team nearby" is equal to one if a National Football League team is based in a city within 50 miles of a college team's main campus. The close presence of a professional substitute should reduce college game-day attendance.

Conference changes are measured a dummy variable (conference change) which is used to identify all games after a team changes conference. This variable is employed in two ways: in regressions across all teams and years (pooled) and in separate regressions by year. Year 1 represents games played in the first year of a new conference. Years 2-6 follow sequentially. Since each team in the data set changed conferences in the same calendar year (2005) years 1-6 correspond to calendar years 2005-2010.

The pooled regressions measure the change in attendance as a percent of stadium capacity between games played prior to the conference change and those played after the change. The regressions for each year allow the magnitude and the sign of the coefficient to vary over time. This could demonstrate the existence of a "honeymoon effect" which dissipates over time (positive and declining magnitudes) or reveal an initial negative impact that turns into a positive one as fans adjust attendance behavior to the changes initiated by a conference realignment.

3. Results

Regression results from the two models employing all observations are presented in Table 4. These models differ by treatment of the ticket price variable: either included (second column) or excluded (third column). This is designed to make the results more directly comparable to previous football attendance studies which are divided on whether price should be included in the model.[13] Note that the coefficient of the conference change variable is negative and statistically insignificant when the instrumented real ticket price is excluded from the analysis. For teams in this sample, conference realignment has no direct impact on attendance. This result appears to conflict with Groza (2010) who found a rise in

attendance with a conference change. This conflict, however, may not hold for all games. Groza also included a "new conference opponent" dummy variable in his equations to denote games in which the two teams face each other as conference opponents for the first time. The coefficients for this variable are always negative and significant in the models he estimated while the coefficients for conference change are always positive and significant. It is important to note the magnitude of these coefficients: new conference opponent is always larger than conference change. This suggests that games against new conference opponents will experience a net decrease in attendance. If the same influences are operating on the sample of teams in this study then it could provide a partial explanation for the insignificance of the coefficient for the conference change variable.

Table 4 Pooled regression results for attendance as a percent of capacity

Independent variable	**With instrumented real ticket price**	**Without instrumented real ticket price**
Conference change	-9.229*	-4.958
	(4.942)	(3.955)
Real ticket price	8.531**	
	(3.701)	
Real state disposable income per capita	0.000579	-0.000363
	(0.00293)	(0.00272)
Real travel cost	-0.0274**	-0.0311***
	(0.0133)	(0.0111)
Precipitation	-1.299	-0.747
	(2.534)	(2.387)
Average cloud cover	-0.0252	-0.0567***
	(0.0267)	(0.0223)
Average feels like temperature	0.0583	-0.0346
	(0.0920)	(0.070)
Season game number	-2.447***	-2.399***
	(0.513)	(0.547)
Absolute value home wins less visitor wins in last 11	-0.174	0.493
	(0.485)	(0.378)
Season wins	2.885***	3.816***
	(0.737)	(0.790)
Traditional rival	7.710***	5.699*
	(3.039)	(3.065)
Non-Saturday game	-0.301	-1.040
	(2.271)	(2.380)
Non-FBS opponent	-5.817	-7.846**
	(3.993)	(3.674)
Any video coverage	6.906***	3.868***
	(2.214)	(1.522)
Conference game	-5.488**	-6.893***
	(2.530)	(2.636)
Home BCS, visitor non-BCS	-5.928*	-3.363
	(3.384)	(3.234)
Home non-BCS visitor BCS	1.448	-4.656
	(13.209)	(12.864)
Home non-BCS visitor non BCS	4.036	-8.231
	(12.557)	(11.932)
Southeast Conference participant	11.456	16.057
	(16.611)	(17.961)

Pacific 10 Conference participant	8.587 (9.572)	-7.056 (6.454)
Big 12 Conference participant	12.533 (6.687)	20.594*** (6.069)
Mountain West Conference participant	8.535** (4.378)	8.997** (4.315)
Midamerican Conference participant	-4.236 (4.361)	-11.151*** (4.166)
Atlantic Coast Conference participant	-1.997 (6.708)	3.679 (5.505)
Big East Conference participant	-6.084 (8.229)	4.582 (6.229)
Conference USA participant	-2.531 (4.713)	1.748 (3.923)
Western Athletic Conference participant	-4.998 (4.013)	-0.900 (4.647)
Sun Belt Conference participant	0.940 (6.195)	-5.126 (4.666)
Independent participant	10.671** (4.861)	0.925 (3.472)
Undergraduate enrollment	-0.00016 (0.00135)	0.0026 (0.0018)
City population	-0.0000020 (0.00000426)	0.00000095 (0.00000646)
State population per FBS team in state	-0.00000539 (0.00000624)	0.00000107 (0.00000816)
Lifetime winning percentage	0.704 (1.343)	-0.365 (2.376)
Bowls in last 10 years	-3.621* (1.878)	1.376 (1.790)
NFL team nearby	10.553 (6.653)	-4.730 (3.716)
Constant	-61.187 (98.028)	65.212 (107.517)
Chi square	1295.69***	854.49***

Standard errors in parentheses; *, **, *** indicates significance at the 10%, 5% and 1% levels respectively.

The regression model in column two of Table 4 includes an instrumented real ticket price variable which is positive and significant. The inclusion of the price variable causes the conference change coefficient to become significant at the ten percent level: attendance drops by more than nine percent of stadium capacity after a conference change. Moving to a new conference clearly can reduce attendance for some teams and suggests, in this case, that second-movers in conference realignment may not experience the gain in ticket revenue that they may have hoped for.

The positive coefficient for ticket price appears counter-intuitive: economists maintain that demand curves are downward-sloping. However, there are a substantial number of empirical sports attendance studies that report a positive relationship between attendance and ticket prices (e.g., DeSchriver & Jensen, 2002). Fullerton and Miller (2017) suggest several reasons for their positive and significant coefficient for ticket price including a bandwagon effect, conspicuous consumption, and the income effect outweighing the substitution effect.

Other independent variables are statistically significant in each of these two models: real travel cost (negative), season game number (negative), season wins (positive), traditional rivals (positive), video coverage (positive), conference games (negative) and several of the conference control variables. Others independent variables are statistically significant in one of the two models: non-FBS opponent (negative), home BCS visitor non-BCS (negative), bowls in last ten years (negative).

Some of the conclusions about independent variables are corroborated by Fullerton and Miller (2017). Both studies conclude that attendance is positively related to ticket prices and rivalry games, negatively related to conference games, and enrollment has no impact. The studies reach different conclusions on weather variables: precipitation (negative) and temperature (positive) are significant for Fullerton and Miller but insignificant in this study. This last result may simply be the outcome of a cross-section of teams vs. one location (El Paso).

The regression model including the instrumented ticket price variable was estimated for each of the six years after teams changed conferences in 2005 to determine if the effect grows or diminishes over time. These results are presented in Table 5. All of the conference change coefficients are negative but none is significant at the ten percent level although in the Year 5 model it approaches classical significance (a p-value of 0.107). This is both consistent with the results of Table 4 in that all coefficients share negative values but inconsistent in terms of statistical significance. The magnitudes of the coefficients range from the greatest in year 1 (nearly -12) and lowest in year 3 (-3.4) but there is no consistent pattern to the coefficients' size over time and each one is statistically equal to zero. The conclusion from Table 5 is that changing conferences has no impact on attendance for the first six years and, therefore, there is no honeymoon or novelty effect associated with conference realignment.[14]

Table 5 Regression results for attendance as a percent of capacity by year since conference change

Independent variable	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Conference change	-11.976	-9.716	-3.406	-10.860	-11.096	-8.735
	(14.254)	(8.563)	(8.116)	(10.157)	(6.883)	(8.900)
Real ticket price	13.357	12.954	11.403	13.531*	15.889***	10.635*
	(15.632)	(10.347)	(7.081)	(8.081)	(4.477)	(5.885)
Real state disposable income per capita	0.004	-0.00174	0.00083	-0.00098	-0.0018	-0.0027
	(0.0177)	(0.00713)	(0.004)	(0.0066)	(0.0065)	(0.0078)
Real travel cost	-0.018	-0.0367	-0.0065	-0.0203	-0.0067	-0.0249*
	(0.025)	(0.0247)	(0.0248)	(0.0182)	(0.0305)	(0.0142)
Precipitation	0.625	-15.168**	-0.866	-4.777	4.396	0.325
	(3.874)	(6.906)	(6.607)	(3.676)	(5.349)	(5.300)
Average cloud cover	-0.056	0.0044	-0.0153	0.0161	0.0043	0.0344
	(0.0571)	(0.0465)	(0.040)	(0.0444)	(0.0408)	(0.040)
Average feels like temperature	-0.049	0.117	-0.224	0.099	0.0302	-0.160
	(0.307)	(0.142)	(0.159)	(0.158)	(0.207)	(0.140)
Season game number	-3.481***	-2.311***	-3.206***	-2.541***	-3.655***	-2.726***
	(1.129)	(0.606)	(0.765)	(0.643)	(1.040)	(0.636)

Absolute value home wins less visitor wins in last 11	-1.474 (1.456)	-1.045 (.859)	-0.435 (0.725)	-1.13 (.830)	-1.574*** (0.538)	-.0289 (1.175)
Season wins	2.892 (2.298)	1.193 (2.050)	2.681* (1.435)	2.058 (1.289)	3.865*** (1.443)	0.975 (1.366)
Traditional rival	7.449 (8.237)	7.838* (4.553)	12.027* (7.302)	10.773** (5.122)	3.120 (7.143)	2.932 (2.798)
Non-Saturday game	0.140 (4.833)	3.305 (2.561)	1.196 (4.057)	0.482 (3.101)	12.657*** (3.249)	0.1700 (4.108)
Non-FBS opponent	-5.927 (8.662)	-4.601 (5.862)	-4.003) (6.767)	-6.938* (3.826)	-0.235 (5.548)	0.583 (4.583)
Any video coverage	5.998 (7.667)	4.509 (5.680)	4.454 (3.966)	7.594* (4.024)	3.169 (2.660)	9.707*** (3.725)
Conference game	-4.603 (6.478)	1.173 (4.301)	0.653 (5.501)	-3.314 (3.280)	0.933 (4.765)	0.939 (5.359)
Home BCS, visitor non-BCS	4.622 (3.714)	0.754 (7.087)	-9.31 (9.288)	-0.0057 (3.261)	-6.512 (11.211)	2.547 (6.326)
Home non-BCS visitor BCS	7.659 (45.127)	-2.463 (26.902)	-6.522 (24.018)	4.304 (33.745)	-3.862 (24.477)	12.998 (13.963)
Home non-BCS visitor non BCS	4.515 (54.549)	-1.075 (31.382)	2.682 (32.333)	1.603 (35.027)	-3.202 (24.736)	12.742 (17.314)
Southeast Conference participant	54.81*** (12.713)	37.442*** (7.173)	52.341 (68.719)	35.879*** (6.626)	17.243 (19.146)	54.109 (82.053)
Pacific 10 Conference participant	32.918 (42.104)	Note 1	12.723 (17.703)	19.552 (19.19)	Note 1	19.497 (14.340)
Big 12 Conference participant	12.598 (30.914)	33.836** (15.708)	14.374 (19.012)	25.855 (31.392)	19.974 (34.173)	36.531 (56.437)
Mountain West Conference participant	6.602 (7.450)	14.165* (8.247)	5.046 (9.022)	18.299*** (7.037)	17.801 (12.827)	22.732*** (5.653)
Midamerican Conference participant	6.615 (13.507)	3.130 (14.602)	12.534 (9.967)	4.908 (9.251)	10.481 (8.163)	2.528 (8.993)
Atlantic Coast Conference participant	-10.595 (15.137)	-11.393 (14.517)	-8.25 (14.134)	-16.837 (12.173)	-9.119 (19.095)	-5.332 (10.562)
Big East Conference participant	-4.825 (17.959)	-13.961 (13.017)	-.0920 (11.919)	-11.19 (8.33)	-15.394** (7.540)	-4.089 (10.896)
Conference USA participant	-5.345 (11.949)	-1.233 (7.978)	0.171 (8.006)	-0.239 (6.481)	-4.277 (5.872)	4.057 (6.312)
Western Athletic Conference participant	-14.690 (16.675)	-1.911 (7.048)	0.811 (6.848)	-5.503 (7.773)	-4.535 (7.765)	-1.336 (9.383)
Sun Belt Conference participant	7.789 (13.369)	10.423 (10.262)	20.573** (10.095)	7.916 (7.295)	20.625** (9.011)	5.766 (12.700)
Independent participant	12.348 (18.775)	18.995 (19.083)	22.582* (12.433)	11.815 (11.317)	11.516 (9.695)	19.244* (9.889)
Undergraduate	-0.0008	-0.000751	-0.00049	-0.000876	-0.0010	-0.00513

enrollment	(0.00489)	(0.00294)	(0.0014)	(0.00259)	(0.00076)	(0.0016)
City population	-0.00000339	-0.00000217	-0.0000027	-0.0000019	-0.0000011	-0.0000019
	(0.0000187)	(0.0000107)	(0.0000092)	(0.0000119)	(0.00000418)	(0.0000033)
State population per FBS team in state	-0.0000131	-0.00000683	-0.00000937	-0.0000065	-0.0000102	-0.00000441
	(0.0000235)	(0.0000117)	(0.0000117)	(0.0000172)	(0.0000070)	(0.0000112)
Lifetime winning %	1.327	1.272	1.537	.920	1.845*	0.955
	(2.524)	(2.236)	(1.997)	(2.273)	(1.006)	(1.219)
Bowls in last 10 years	-7.236	-6.006	-4.638	-5.654	-9.285***	-3.005
	(10.266)	(6.574)	(5.25)	(5.948)	(3.533)	(2.73)
NFL team nearby	23.181	17.966	25.945	14.730	31.649	12.043
	(120.576)	(71.390)	(67.210)	(58.751)	(25.44)	(8.100)
Constant	-164.401	-106.072	-120.414	-109.260	-152.672	-55.38
	(324.783)	(158.062)	(141.796)	(176.23)	(108.7)	(107.66)
Chi square	691.75***	882.00***	727.17***	4518.92***	288.11***	4248.64***

Standard errors in parentheses; *, **, *** indicates significance at the 10%, 5% and 1% levels respectively. Note 1: no team in the sample played a member of the Pacific 10 conference in years 2 and 5 (i.e., 2005 and 2008).

It is worth noting that the conference (Mountain West) that gained a higher-rated team (Texas Christian) experienced a significant increase in attendance (see the coefficients for the Mountain West participant dummy variable) while a conference that experienced a net decrease in team quality (Big East) experienced a decrease in attendance (see the coefficients for the Big East participant dummy variable).

4. Summary and Conclusions

Probably one of the major goals for athletic department managers to choose conference realignment for their football team is an expected increase in revenue from attendance. Using a sample of teams constituted of mostly second-movers, this study provides evidence that game-day football attendance either does not change or it decreases after a conference change. Thus, this goal is apparently not always realized by the team. The statistical results suggest that there is no novelty or honeymoon effect associated with a conference change and that many of these second movers primarily change conferences for reasons other than an expected increase in attendance revenue.

Most of our sample could be described as second-movers. Given the empirical results there appears to be no advantage to being a second-mover when considering games attendance alone over a six-year period. In fact, there is some evidence that a change in conference reduces attendance. When the impact of the conference change coefficient is combined with that of the conference game dummy variable the net effect on attendance is negative. Apparently, fans are not excited to see new and unfamiliar conference opponents.

Although this study examines one motive for FBS teams to change conferences, namely greater game-day attendance and associated revenues such as parking, concessions etc. (Coates & Humphreys, 2007), there are others. From a wide perspective, decision-makers in athletic departments may want to increase the net cash flow from their operations. This can be accomplished through revenue enhancements or cost reduction. Joining a new

conference could increase revenue from greater broadcasting revenue because of a wider coverage area or a more generous conference broadcasting contract which is shared among member schools, a greater number of and more lucrative post-season bowl game commitments for the new conference and potential revenue from an appearance in a conference championship game or directly via greater ticket sales (both football and non-football contests). Our results suggest football ticket sales decrease or at best do not change as the result of a conference change. So athletic departments may be forced to weigh the benefit of additional revenue from the new conference affiliation against the potential loss of ticket revenue because of the change. Some athletic departments (although maybe not the ones in our sample) may be willing to forgo some ticket sales revenue for greater revenue from the new conference affiliation. A new conference affiliation could also increase fan interest, increase booster club participation and improve fund raising for the athletic department.

A reduction in costs could also increase cash flow via reduced travel cost for all sports teams or, more drastically, the elimination of some non-revenue sports if the new conference requires fewer teams to maintain conference affiliation.

Other possible motives are tied less directly to athletic department cash flows but more to broader institutional goals. A change in conference affiliation could raise the general visibility of a university and its athletic programs. Increased visibility could lead to higher student enrollment both on-campus and online (Perez, 2012; Pope & Pope, 2014), higher quality of admission applications (Tucker, 2006), improved fund raising among alumni and friends of the university (Cohen, 2011; Martinez, 2010) and, if publicly-funded, enhanced revenues from state government appropriations (Alexander & Kern, 2010; Humphreys, 2006). Local businesses may also benefit through increases in spending (Baade, 2008; Lentz & Laband, 2009) as well as governments via collections on sales and room excise taxes (Coates & Depkin, 2011). To the extent that universities gain benefits from higher general visibility generated by conference realignment, despite a possible drop in football attendance revenue, they may be willing to increase the university's subsidies to the athletic department thereby increasing net cash flow for athletics.

Proper model specification for attendance studies remains unresolved. Issues arise about the need to include a ticket price variable, whether ticket price needs to be instrumented given the potential simultaneity problem with attendance (i.e., quantity), which variables are best suited to instrument ticket price and alleviate the simultaneity problem, whether panel methods or ordinary least squares are most appropriate for estimating the models, and the choice between attendance or attendance as a percent of stadium capacity as the dependent variable.

This study has improved on the model specifications often chosen in the literature to estimate college football attendance. However, it is uncertain how much these changes in specification are responsible for the disparate conclusions on the impact of conference change on attendance and how much is due to other factors such as being a group of second-movers.

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Footnotes

1. The current Power Six conferences in Division I-A football are the American Athletic, Atlantic Coast, Big Ten, Big 12, Pac-12 and Southeastern. Some observers consider the American Athletic, like the Big East before it, as a lesser member and prefer to ignore it thereby addressing the top conferences as the “Power 5”.

2. Hoffer and Pincin (2015) discovered that athletic departments in the NCAA’s Division I received an average annual institutional subsidy of $8.8 million in the period 2006-2011. This average subsidy was over 53% of average total athletic department revenue for all Division I schools. Those athletic departments in automatically qualifying schools of the BCS (i.e., the Power Six conference teams) received an annual average subsidy of $5.8 million per year. Only two public Division I universities did not grant an institutional subsidy to their athletic department: University of Nebraska-Lincoln and Louisiana State University.

3. Teams that joined the FBS from the FCS are Appalachian State, North Carolina – Charlotte, Coastal Carolina, Florida Atlantic, Florida International, Georgia Southern, Georgia State, Massachusetts, Old Dominion, South Alabama, Texas State, Texas – San Antonio and Western Kentucky. Liberty is scheduled to join the FBS in 2019. Idaho is scheduled to move from the FBS to the FCS in 2020.

4. The Big East Conference was the sixth power conference from 1998 to 2012. This conference ended its affiliation with BCS football in 2012. Six football members of the Big East joined four other teams to form the American Athletic Conference in 2013. The American inherited the Big East's automatic berth in the BCS.

5. Conferences outside the Power Six in 2004 were Conference USA, Mid-American, Mountain West, Sun Belt, Western Athletic. By 2014, the Big East and Western Athletic were no longer football conferences in the FBS and a new conference, American Athletic, had been created.

6. Teams in the data set are: Army, Boston College, Central Florida, Cincinnati, Idaho, Louisville, Marshall, New Mexico State, Rice, South Florida, Southern Methodist, Temple, Texas Christian, Texas - El Paso, Tulsa, and Utah State.

7. Stadium capacity is reported by the university to the NCAA. Capacity is not the physical limits of the stadium. Attendance at some games exceeds the official capacity. Open-admission student sections and standing-room-only sales account for many of these cases.

8. All data measured in nominal monetary figures were converted to real U.S. dollars using a monthly regional consumer price index.

9. Data on gasoline prices are available for seven regions in the U.S.: New England, East Coast, Central Atlantic, Gulf Coast, Midwest, Rocky Mountain and West Coast.

10. Ticket price information primarily was collected from a school's athletic department website via: 1) ticket office information; 2) annual ticket brochures; and 3) archived news releases. Some athletic departments were contacted via e-mail and many responded to specific requests for information.

11. A single-game ticket price was found for 47 percent of all observations. The methods used to impute the missing single-game prices were: 1) single-game price of a different game from the current season at the same school (12%); 2) season ticket price divided by the number of home games from the current season at the same school (17%); 3) single-game price from a different season at the same school (55%); 4) season ticket price divided by the number of home games from a different season at the same school (16%). Parenthetical percentages indicate how many of the missing values were replaced by each technique.

12. For this set of dummy variables, the Big Ten is the default conference because it is the oldest conference and the co-authors are lifelong residents of Big Ten territory.

13. Groza (2010) omitted a ticket price variable on the grounds that empirical results from one previous study of football attendance (DeSchriver & Jensen, 2002) reported an insignificant coefficient for ticket price. There are several issues regarding this claim. One, DeSchriver and Jensen argue that a price variable should be included in a model of

attendance. Two, they include a price variable in each of the five regressions they estimate: four without controls for each team (three individual years and one pooled across the three years) and one pooled regression with team controls. The coefficients of the price variable are always positive and significant at the one percent level for the regressions without team controls. The price coefficient for the regression with team controls also has a positive sign and its p-value is 0.117. These results suggest a statistically significant relationship between attendance and price. Three, it is not certain that statistical results from a study of Division II teams necessarily apply to the FBS since many aspects of their respective market structures are likely to be different. It should be noted, however, that DeSchriver and Jensen did not instrument for price, arguing that with a marginal cost approaching zero that profit-maximization reduces to revenue-maximization which is independent of supply conditions. This may be truer in Division II than in the FBS since official stadium capacities are less constraining for attendance at Division II stadiums since it is rare that stands completely surround the football field. One study of a sample of FBS teams (Paul 2012) argued that ticket prices did not vary much over the short period of the study for a given team so this variable was unlikely to have a statistically significant impact on attendance. Gathering a consistent series of data on ticket prices was also difficult. The estimated equation, the authors insisted, was not a demand equation so that a ticket price variable was excluded.

14. One measurement issue in the data could have affected the results of this study: the change in how the NCAA recorded attendance in 2004. In that year only, FBS teams were required to measure actual attendance (e.g., turnstile count). In all other years, FBS teams could choose to record attendance as either actual attendance (turnstile count) or paid attendance (number of tickets sold). It is unclear whether this change in measurement could impart a positive or negative bias to results (i.e., overstate or understate attendance in 2004 relative to other years) for any single FBS team, the teams in this study, or all FBS teams. It should be noted, however, that when a dummy variable for 2004 was included in a previous empirical study of FBS attendance (Falls & Natke, 2014) as a method for capturing any effect of the policy change on attendance, the coefficient was statistically insignificant.