

## **The Uncertainty of Outcome Hypothesis in Division IA College Football**

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## **Abstract**

This paper provides evidence that the uncertainty of outcome, as measured by various indexes of competitive balance, does pertain to Division IA college football. Using aggregated season attendance in an unbalanced panel representing nineteen Division IA college football conferences from 1978-2004, we find that fans have a propensity to attend in fewer numbers when competitive balance declines. However, there are qualitative differences in the impact of the uncertainty of outcome on attendance to smaller and larger conferences. The results provide empirical evidence of a sufficient condition provided in previous theoretical discussions of conference realignment in college sports.

***JEL Classifications:*** L13, L83, D43

***Keywords:*** NCAA, competitive balance, conference realignment

## 1. Introduction

The uncertainty of outcome hypothesis (UOH) has become a popular explanation for a unique element of sports leagues. Unlike traditional product markets, in which a monopoly is generally a desirable position for a firm to hold, in sports a monopolist of on-field success can be a detriment to the financial well being of the league and ultimately of the monopolist itself (Rottenberg, 1956; El-Hodiri and Quirk, 1971). The rationale supporting the UOH is that without a degree of competition between the teams playing in a particular sporting event, and therefore a bit of uncertainty as to the outcome of the event, the demand for the event will drop. Because individual teams desire to monopolize their potential share of wins, the UOH provides a justification for leagues to limit the possibility of monopolization, including limits on labor mobility, restricted methods of labor allocation, limitations on labor expenditures, and the sharing of earned revenues.

There seems to be a gap in the investigation of the UOH as it pertains to collegiate athletics. Yet, the impact of uncertainty on the attractiveness of a college football game to both in-stadium attendance and television audience is perhaps a more pressing empirical question given recent theoretical advancements into how college sports conferences are aligned and realigned over time. Fort and Quirk (1999) and Quirk (2004) suggest that conferences may realign or “churn” over time as conference members recognize differences in “drawing disparities.” The intuition is that over time some teams are naturally able to draw larger crowds, either because of larger regional markets, larger alumni bases, or because of consistently high quality. Therefore, schools that draw more than others may be motivated to leave a conference and join those with similar drawing power. Alternatively, schools that are unable to draw consistently high audiences may be motivated or asked to leave a conference and are *de facto* forced to join like schools in a different conference.

Conference realignment has become rather pronounced since 1995 when the Southwest Conference dissolved, with half of its members merging into the Big 8, thus forming the Big 12. Those schools not included in the merger, Houston, Rice, Southern Methodist, and Texas Christian, were left to join other conferences. Houston joined Conference USA, Rice and Southern Methodist joined the Western Athletic Conference and in 2005 moved to Conference USA, while Texas Christian University joined the Western Athletic Conference in 1996, moved to Conference USA in 2001, and moved to the Mountain West Conference in 2005. Since 1990,

every Division IA football conference has undergone expansion or contraction with the exception of the Pacific 10 conference.<sup>1</sup>

Such churning resembles, in spirit, the relegation and promotion system used in English football leagues. The recent realignments might indicate movement towards a steady state core of mega-conferences (the Atlantic Coast, Big 10, Big 12, Southeast, and Pac-10, along with Notre Dame), and a “fringe” of lesser conferences populated with schools unable to draw large fan bases and less able to draw the top amateur recruits on a consistent basis. This two-tiered system of conference structures could fundamentally alter the financial and competitive status of collegiate football, which might motivate intervention by the NCAA or governmental regulatory agencies.

To date, however, there has been no major study investigating whether the UOH holds in college football. This paper addresses this gap in the literature by investigating how competitive balance influences aggregate attendance to Division IA football conferences. Using data for nineteen Division IA college football conferences from 1978 through 2004, aggregate conference attendance is related to two measures of competitive balance and other control variables. When measuring competitive balance using differences in winning percentage we find a positive relationship between competitive balance and aggregate attendance, suggesting support for the UOH. We also find a positive relationship between attendance and competitive balance in points scored on the field. However, when including both measures of competitive balance, attendance is inversely related to balance in wins and positively related to balance in points scored. This last, seemingly counterintuitive, result suggests that there is a general disdain for “running up the score.”

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<sup>1</sup> Perhaps the most dramatic recent conference realignment in terms of athletic prowess occurred before the 2004 football season when Miami (FL) and Virginia Tech left the Big East Conference to join the Atlantic Coast Conference (ACC); Boston College did likewise in 2005. While in the Big East, Miami and Virginia Tech contended for conference and national championships on a regular basis whereas other conference members such as Temple and Rutgers were consistently near the bottom of the overall Division IA rankings in performance as well as attendance. After the defections from the Big East, Cincinnati, Connecticut, Louisville, and South Florida were enlisted to join from other conferences. If Quirk and Fort are correct in their theoretical analysis, such disparities likely had a strong influence in the decisions of the three schools to abandon the Big East. In response to Cincinnati, Louisville, and South Florida leaving Conference USA and join the Big East as well as the losses of Texas Christian and Army, Conference USA invited Rice, Southern Methodist, Texas-El Paso, and Tulsa from the Western Athletic Conference and Central Florida and Marshall from the Mid-American Conference to join.

## 2. The Uncertainty of Outcome Hypothesis: Motivation and Literature Review

If attendance is a primary source of revenue in college athletics (as suggested by Brown, 1993) and is positively related to the uncertainty of a contest's outcome, then league members desire closely contested athletic competitions, all else equal. Thus, schools with similar abilities to attract quality athletes will have a motivation to join together in a conference. However, if non-outcome-related factors influence game attendance, such as population, local demographics, the absolute quality of the team, or historic traditions of the program, then each institution will have an incentive to pursue playing talent and affiliations that are individually optimal.

Regardless of whether a football program is affiliated with a particular conference, coaches and fans desire the football program to pursue the best talent possible, given the constraints of the NCAA membership agreement. In the absence of the NCAA limitations on scholarships and financial interaction between the student athlete and the proponents of a particular program, there is fear that one or a few football programs would so dominate the game that not only the popularity but also the "spirit" of the amateur game would be compromised. The NCAA was created, in part, to mitigate some of the incentives individual programs have to *attempt* a monopolization of the best football talent in the country. Since football programs make a significant portion of their revenue from in-stadium attendance, if the distribution of talent within a conference were to become significantly skewed towards one or a few teams, institutions with lower levels of talent would enjoy lower attendance both at home and on the road, all other things constant.

Notwithstanding the efforts of the NCAA to limit the ability of one or a few schools to monopolize the best football talent, the dichotomy in playing talent across institutions can be significant. Unlike professional sports, which have reverse-order drafts, college football recruits choose where they will attend school and play football, although each school can offer only a limited number of scholarships and team positions. Hence, even within the structure of the NCAA membership agreement it is possible that one or a few schools can become significantly better than the majority of their conference peers, e.g., Miami (FL) and Virginia Tech in the Big East Conference.

If a conference were to become characterized by a permanent disparity in playing talent, one or more of the conference members might find it in their best interest to seek affiliation with other

teams that have similar talent levels (Quirk, 2004). Moreover, the majority of the members of such a conference, all of which have similar talent but less than one or two other conference members might ask the members that represent the disparity in playing talent to seek affiliation with some other teams. Seeking different affiliations through conference realignment can, therefore, be a rational response to a disparity in playing talent that is reflected in a permanent disparity in on-field success, causing a reduction in in-stadium attendance to a conference's football games. For this reason, the uncertainty of outcome hypothesis plays an important role in the theoretical justifications for the actions taken by sport organizations.

There have been a number of studies that examine the affect of the uncertainty on sports attendance. In general, the UOH literature can be distinguished between studies looking at aggregate attendance and those investigating game-specific attendance. The UOH has been applied to professional sports with varying degrees of success. Early studies focused on aggregate attendance to a league's sporting events and showed that attendance was positively related to competitive balance (Noll, 1974; Hunt and Lewis, 1976). These studies suggested that the UOH seems to hold and is an important component to a league's financial success. As additional data became available it became possible to test the UOH on a game-by-game basis, often with ambiguous results.<sup>2</sup> For instance, Wilson (2003) shows that attendance to professional sporting events in North America is more strongly affected by the quality of play, reflected in the highest winning percentage of the two teams playing, than by the competitiveness of the event, reflected in the absolute difference between the two team's winning percentages at the time the event is held. The results suggest that fans are more interested in quality play, even if one team is considerably better than the other, than two equally matched poor quality teams. Thus bring into question whether competitive balance is, in itself, *per se* desirable or whether league structure should target high quality play.

Studies using annual attendance for individual teams or entire leagues have found support for the hypothesis even while using various measures for the uncertainty of outcome. Noll (1974), Hunt and Lewis (1976), Schmidt and Berri (2001), Butler (2002), and Humphreys (2002) with varying metrics, all find a positive effect of increased uncertainty on attendance in Major League Baseball. Borland (1987) found evidence that uncertainty contributed positively to game attendance in Australian Rules Football. Peel and Thomas (1988, 1992) studied the English Football (soccer) League and found that uncertainty, measured by pre-game betting spreads, were

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<sup>2</sup> For a detailed discussion of these and other sports demand studies, see Borland and MacDonald (2003).

positively correlated with game attendance. Peel and Thomas (1997) take the same approach to estimating game attendance to English Rugby games and find that betting odds have a significant relationship with game attendance, supporting the UOH. Jennet's (1984) study of Scottish League Football (soccer) was one of the first to use the pre-game betting spread as a measure of perceived uncertainty. He found that the UOH held at both the game and league level.

However, the findings have been inconsistent when using game-by-game data within U.S. professional sports.<sup>3</sup> Knowles et al. (1992) and Rascher (1999) provide conflicting evidence about the uncertainty of outcome's impact on attendance to in Major League Baseball games; Knowles et al. find that uncertainty matters but that attendance is maximized when the home team is favored. In the National Football League, Siegfried and Hinshaw (1979) find no evidence that uncertainty affects attendance whereas Welki and Zlatoper (1999) do.

The investigation of college football attendance has lagged behind that of professional sports.. Kaempfer and Pacey (1986) and Fizek and Bennett (1989) investigate the impact of television broadcasting on attendance but neither use any measure of competitiveness or uncertainty. Price and Sen (2003) investigate the determinants of attendance to individual Division I-A college football games in the 1997 season. They control for the uncertainty of outcome by including the win-loss ratio during the past 11 games for both the home and visiting team, and the squared differences between the home and visiting team's 11 game win-loss ratios. They find no significant influence of uncertainty on attendance in their sample. However, their study suffers from cross-sectional limitations. Thus the question remains whether customers of collegiate athletic events have a preference for closeness in competition or does a home-team preference dominate?

### **3. The Data and Empirical Methodology**

To test the UOH in Division IA college football, total seasonal attendance for nineteen Division IA football conferences for various years from 1978 through 2004 are employed. This unbalanced panel allows for the control of unobserved and unmeasurable conference specific effects.<sup>4</sup> While

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<sup>3</sup> For a more complete review of the previous literature on issues regarding the demand for sports see Borland and MacDonald (2003).

<sup>4</sup> The primary source of this imbalance is the fact that many conferences have not existed for the entire length of the sample. Some conferences, such as the Southeastern or Atlantic Coast, have been in existence for decades, including the period of the sample. On the other hand, conferences such as the Big 12,

game specific data is not included in the empirical specification, the panel nature of the data offers temporal and aggregated advantages over the cross-sectional environment studied by Price and Sen (2003) and provides additional evidence in support or against the UOH in college football.

The uncertainty of outcome hypothesis is tested using two competitive balance measures. The first is the Herfindahl-Hirschman Index (HHI) of intra-conference winning. Though rare, prior to 1996 ties were possible in college football. Thus each team's intra-conference performance is measured with two performance points for each win and one for a tie. Second, the HHI of offensive points scored in intra-conference games is used. While the two measures are positively correlated, arguably they measure two different aspects of competitive balance.

The HHI of performance points measures the concentration of game outcomes. The greater the concentration, the less uncertainty there is regarding the outcome of games within a conference. On the other hand, the HHI says relatively little about the uncertainty of outcome between the two worst teams in a particular conference. However, the lack of game-by-game attendance data requires the use of aggregated attendance figures, which in turn requires aggregate competitive balance measures to match the nature of the attendance data. Conversely, the HHI of points scored measures the concentration of football performance on the field, whether interpreted as a concentration of offensive strength or defensive weakness within a conference. The greater the HHI of points scored, the greater the concentration of offensive prowess, which might actually increase the uncertainty of outcome for a game between two low quality teams. On the other hand, the increased concentration of offensive output might reduce the uncertainty of the outcomes and hence reduce attendance consistent with the findings in other sports.

Given that these two measures capture different aspects of the competitive balance within a conference, it is likely that they will impact attendance in different ways. To test whether these two measures of competitive balance impact aggregated attendance in similar or different ways, three models are estimated of the general form:

$$ATT_{it} = f(CB_{it}, Time_{it}, BCS_{it}, BIG6CONF_t) + \varepsilon_{it}, \quad (1)$$

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Conference USA, and the Sunbelt conference have existed for only a decade or less. Finally, other conferences, such as the Southwestern Conference, cease to exist.

where  $ATT_{it}$  is the total attendance to conference  $i$  in year  $t$  and  $\varepsilon_{it}$  is a composite error structure accommodated with a panel estimator.<sup>5</sup> The explanatory variables include one or both of the competitive balance measures ( $CB$ ), a time trend relative to 1978 ( $Time$ ), a dummy variable that takes a value of one after the Bowl Championship Series was introduced in 1996 to determine a national champion ( $BCS$ ), and a dummy variable that equals one for each of the so-called Big Six conferences ( $BIG6CONF$ ): the ACC, Big East, Big Ten, Big XII, Pac 10, SEC, and the Southwest and the Big Eight conferences, the latter two which merged to create the Big XII. While other season level sports demand studies have included various demographic controls, most, if not all, of the measures used in disaggregated data would be impractical in our aggregated setting. For example, it is not obvious how to measure the per-capita income of the Southeastern Conference. Rather, a minimalist approach is taken and the conference specific variables subsumed into the composite error term. The Hausman test between the fixed and random effects is used to identify whether there is correlation between the white noise portion of the composite error term and the conference-specific effects.

College football attendance has been increasing over time and the Big Six conferences have enjoyed greater aggregate attendance than other conferences (the Big Six conference members consistently have the largest stadium capacities in the country). There is a potential ambiguity concerning the influence of the implementation of the BCS system. The BCS system might have reduced overall attendance because the system severely limits the likelihood that a non-BCS conference member will contend for a national championship. On the other hand, attendance might have been increased across all Division IA conferences if the system sufficiently augments demand in the BCS conferences. As described above, there is also a bit of ambiguity in the ultimate effects of the two competitive balance measures, however if college football is affected by the uncertainty of outcome hypothesis, then one or both measures should have a inverse relationship with aggregate attendance.

Table 1 reports the descriptive statistics of the entire sample and the sub-sample of BCS conferences. The average aggregate conference attendance to football games during the sample period was 2.24 million, with the lowest attendance being the Big West, previously known as the

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<sup>5</sup> The use of total season data is necessitated by data availability; single game data going back to the 1970s is not currently collected. The use of intra-conference competitive balance measures introduces measurement error in our dependent variable. The dependent variable includes the attendance to intra-conference home games *and* non-conference home games. This measurement error can cause inefficiency in the estimation; however it is not clear if the inefficiency would be enough to change qualitative inference. The results suggest that the measurement error is not debilitating to the estimation.

Pacific Coast Athletic Association, in 2001 (279,000 attendees) and the largest attendance enjoyed by the Southeastern conference in 2003 (6.15 million attendees).

The full sample includes nineteen Division IA football conferences of different size, strengths, and drawing power. In 1982, many smaller conferences were relegated to Division I-AA status, drawing a stronger distinction between larger and smaller schools. The full sample includes these relegated conferences, such as the Ivy League, the Southland and the Southern Conferences. To test whether the results obtained in the full sample are robust, the sample is divided into smaller and larger Division IA conferences. Our first sub-sample includes the Big West, the Ivy League, the Mid-American Athletic Conference, the Missouri Valley Conference, the Pacific Coast Athletic Association, the Southern Conference, the Southland Conference, and the Sunbelt Conference. Our second sub-sample includes the remaining larger conferences. A final sub-sample focuses only on the conferences that participate in the Bowl Championship Series (along with the Southwest and the Big Eight conferences).

There are reasons to suspect that different conferences might reflect different quantitative and qualitative effects of competitive imbalance on attendance. For the entire sample of schools, the impact of the disparity of performance might be considerably less than the impact of the disparity of points scored, especially if “running up the score” is a turnoff to fans. However, as the sample of schools is pared down, it is likely that the disparity of wins will become more important as wins determine lucrative bowl opportunities for many of the schools in larger conferences.

The panel nature of the data allows for the control of unobserved or unmeasurable conference-specific effects. The first approach is to estimate conference fixed effects using the within estimator. While this estimator is conservative, because it estimates each conference fixed effect, for several conferences in the sample there are a limited number of observations (the Big XII conference has only eight observations in the sample), the within estimator may not be appropriate. The alternative is to use a random-effects estimator, which is more parsimonious and gains efficiency but assumes that the conference fixed effects are not correlated with the explanatory variables.

Both fixed and random effect forms of each specification are estimated and, in general, the Hausman (1978) test does not reject the random effects model in favor of the fixed effects model. From this, concerns about bias introduced by not specifically estimated conference fixed effects

are minimal and the random effects estimates are used. Note that there is one sub-sample in which the Hausman test suggests the random effects model may be inconsistent; however we report the random effects estimates for compositional consistency and note that there were only minor qualitative differences between the two sets of estimates.

#### **4. Empirical Results**

Tables 2 and 3 present the empirical results for the various samples. The first three columns of Table 2 report the estimation results for the entire sample, and the sub-samples are presented in the right panel of Table 2 and in Table 3. In each sample, Model 1 includes the concentration of performance points, Model 2 includes the concentration of points scored, and Model 3 includes both measures of competitive balance.

In general, Division IA football attendance has been increasing over time: on average between 17,000 to 23,000 additional attendees per year. This increase in attendance likely reflects increased popularity of the sport, the expansion of stadiums, and additional games played in recent years. The BCS format has, in general, had a statistically significant impact on attendance, especially in larger conferences. The BCS format has had only a weakly significant impact on attendance among smaller football conferences (the variable is significant in only one of three specifications), perhaps because these conferences are not directly included in the original agreement, nor were they likely to have a team included in the BCS bowls. However in the sample focusing on the larger conferences, the BCS format has correlated with an increase in attendance. This might reflect some of the expansion and realignment of these conferences during the same period the BCS has been in place. However, it is more likely that the increase in attendance reflects the increased importance of each game in potentially determining the national champion. This factor might provide an additional incentive to attend games in these conferences, *ceteris paribus* on competitive balance.

The so-called Big Six conferences consistently enjoy a significantly greater level of attendance relative to other conferences. On average, a Big Six conference attracts approximately a half million more attendees than other conferences, *ceteris paribus*, reflecting the fact that the greatest capacity stadiums and the most popular teams in college football are members of a Big Six conference.

The variables of particular interest in this study are the two competitive balance measures. For the broadest sample of conferences, it is clear from Models 1 and 2 that increased disparity within a conference, whether measured by performance or by points scored, has a negative impact on aggregate attendance. These results support the uncertainty of outcome hypothesis in college football. However, when both measures of competitive balance are included in the model, the greater the disparity in performance the greater is attendance, *ceteris paribus* on the disparity in points scored. On the other hand, the greater the disparity of points scored, *ceteris paribus* on the concentration of performance points, the lower is aggregate attendance.

Anecdotal evidence suggests that fans do not like teams that “run up the score.” This might indicate that the traditional impact of the uncertainty of outcome hypothesis on attendance is manifested in the concentration of points scored rather than the concentration of game results. A substantial reduction in competitive balance in this area would indicate that only one or two teams in a conference have substantial offensive prowess. If this aspect of the competitiveness of college football is important to fans, then aggregate attendance figures would naturally be more negatively correlated with this measure of competitive balance.

The right panel of Table 2 reports the results using the sub-sample of smaller Division IA conferences. Attendance within the smaller conferences is not significantly impacted by varying concentrations in performance points when not controlling for the concentration in points scored. However, upon controlling for the concentration in points scored, the results for smaller conferences mirror those of the full sample estimations. The left panel of Table 3 presents the estimation results restricting the sample to 11 larger Division IA conferences. In this case the results from the full sample are generally confirmed for Model 1 and Model 2, however in Model 3 only the concentration in performance points has a statistically significant, and negative, impact on aggregate conference attendance.

The right panel of Table 3 presents the estimation results for the six BCS conferences and the Big Eight and Southwest, which were the parent conferences of the Big XII. In this specification, the impact of disparity in performance is the greatest numerically of all the sub-samples. This suggests that competitive balance is of greater concern in the big moneymaking conferences than in the smaller Division IA conferences that do not have as much at stake financially.

To put the estimation results in perspective, using the estimated parameters from Model 3 in the full sample of conferences, a one standard deviation improvement in the concentration of performance points (points scored) would correspond to an increase in average aggregate conference attendance of 144,000 (283,000). Amongst the BCS conferences, the standard deviation of the concentration of wins (points scored) was 240.81 (190.74). Thus, from Model 3 of the sub-sample of BCS conferences, a one standard deviation improvement in the concentration in wins (points scored) would increase average aggregate conference attendance by 202,000 (247,000).

The results suggest that the uncertainty of outcome hypothesis is an important factor in the aggregate attendance for college football conferences. This, in turn, suggests a rationale for the NCAA cartel-like behavior in regulating input and output markets. In the input market, schools are limited in the number of student athletes they can have on scholarship and on their team. Moreover, the limitations on the monetary and non-monetary rewards that schools can offer student athletes clearly limit the ability for one or a few schools to dominate a particular football conference. On the output side, the realignment of many conferences over the past fifteen years may suggest that schools implicitly recognize that the uncertainty of outcome is a vital ingredient to increased conference attendance to football games. If one or two teams consistently dominate in on-the-field success, realignment might prove beneficial to both the conference that contracts and the conference that expands.

These results suggest that a sufficient condition for the theoretical justification of “conference churning,” as discussed by Quirk and Fort (1999) and Quirk (2004), is supported by the data describing aggregate conference attendance. Their intuition suggests that disparities in drawing power might motivate conference realignment. To date, there has been no direct empirical evidence to support their claim, yet the results presented herein suggest that they may be correct and further empirical research into the causes (and effects) of conference churning is warranted.

## **5. Conclusions**

This study has undertaken an empirical investigation of the UOH in collegiate football. Some previous studies in professional sports have shown that the greater the uncertainty of an event’s outcome, the more fan interest in the event. This increased interest is observed in greater in-arena attendance or television viewership. The UOH has therefore become an explanation for league

decisions that affect player-talent distribution. Professional sports leagues are for-profit enterprises and might find it necessary to suppress the desire of individual firms to monopolize talent for the greater “good”. However, there has been no investigation of the UOH in amateur sport, a gap in the literature this study addresses. The rationale for the UOH in professional sports is likely to hold in organized amateur sport; although players are not explicitly paid the teams (schools) are very much interested in generating greater profits from sporting events.

Using data describing nineteen Division IA football conferences from the late twentieth century, we test whether improved competitive balance is tested, which proxies for greater uncertainty of outcomes, has a similar qualitative impact on aggregate football conference attendance as in other sports. In our full sample of conferences, the concentration in performance points and the concentration of points scored are both found to unconditionally negatively related to aggregate attendance. However, when including both measures of competitive balance in the same empirical specification, the concentration of points scored are found to reduce attendance, when controlling for the concentration in performance, but that the concentration in performance actually enhances attendance, after controlling for the concentration in points scored. These results provide evidence that college football fans tend to disdain “running up the score” but that attendance (especially fans traveling to visiting games) may actually increase as one or a few teams account for a larger percentage of intra-conference wins.

The robustness of this result is tested by investigating the impact of competitive balance on ever-smaller sub-samples of our original nineteen conferences. In general, as the focus narrows to fewer, larger, Division IA conferences, the concentration in performance and the concentration of points scored are found to remain negatively correlated with aggregate attendance. However, when controlling for both measures of competitive balance, it is the concentration in performance that remains significantly and inversely related with attendance. This suggests that in the bigger conferences, where there are more lucrative post-season bowl opportunities, the uncertainty of outcome as reflected in win-loss rather than total points scored is more important.

The results presented herein also suggest that a sufficient condition is met for the theoretical discussions by Quirk and Fort about the churning of Division IA football conferences. Quirk and Fort posit that disparity in drawing power is a primary motivation for dominant schools to leave a conference for another conference with teams that have similar drawing power. As bowl payouts are partly shared by all conference members and visiting teams often share in the gate, a high-

drawing team would rather play in a conference with similar drawing teams. The results in this paper suggest that on-field dominance, e.g., Miami (FL) that consistently routed their Big East opponents while a member of that conference, may reduce attendance more so than disparities in winning percentage.

This paper does not directly address the empirical causes of conference churning but our results suggest that a prime candidate cause might be imbalance in offensive talent as reflected in either total wins or total points scored. The results hint at a potential cause in the recent trend in college football to a small set of mega-conferences that have dramatic revenue potentials and a “fringe” of conferences, populated by smaller schools that have less drawing power.

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**Table 1: Descriptive Statistics of the Full Sample**

Full Sample of Nineteen Division IA Conferences (1978-2004)				
Variable	Mean	Std. Dev.	Min	Max
Conference Attendance (1000s)	2241.021	1383.609	279.772	6146.89
HHI of Points Scored	1225.358	294.550	603.166	3645.981
HHI of Wins	1460.702	428.127	664.062	6250
Time Trend	12.758	8.141	0	26
BCS Format (After 1996)	0.342	0.475	0	1
Big Six Conference <sup>a</sup>	0.587	0.493	0	1
YEAR	1991		1978	2004
Observations	281			
Conferences	19			
Big Six Conferences Plus Southwest and Big Eight Conferences (1978-2004)				
Conference Attendance (1000s)	3069.905	1118.792	1475.41	6146.89
HHI of Points Scored	1174.509	190.740	882.652	1671.863
HHI of Wins	1394.107	240.810	1033.058	2063.492
Time Trend	13.01	7.74	0	26
BCS Format (After 1996)	0.327	0.471	0	1
YEAR	1991		1978	2004
Observations	165			
Conferences	8			
<sup>a</sup> Big Six Conferences include: Atlantic Coast, Big East, Big XII, Big Ten, Pac Ten, the SEC, and the Big 8 and Southwest (which merged to form the Big XII). <sup>b</sup> The maximum value the Herfindahl-Hirschman Index can take is 10,000.				

**Table 2: Random Effects Estimation Results**  
(Dependent Variable: Aggregate Conference Attendance in Thousands)

	Nineteen Division IA Conferences (1978-2004)			Small Division IA conferences - Big West, Ivy League, Mid American, Missouri Valley, Pacific Coast Athletic Association, Southern, Southland, Sunbelt (1978-2004)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
HHI Wins	-0.193** (0.060)		0.337** (0.155)	-0.028 (0.029)		0.393** (0.091)
HHI Points Scored		-0.438** (0.099)	-0.961** (0.261)		-0.106** (0.049)	-0.773** (0.158)
Time Trend	23.026** (4.648)	21.113** (4.659)	17.478** (4.778)	13.136** (4.407)	12.264** (4.324)	5.179 (4.124)
BCS Format	163.173** (76.120)	175.592** (74.831)	195.517** (74.727)	82.191 (71.932)	88.298 (69.327)	166.572** (66.819)
Big Six Conference	2064.132** (319.24)	2029.854** (318.117)	2014.373** (329.189)			
Constant	843.557** (236.539)	1159.286** (257.99)	1347.888** (277.456)	495.120 (70.753)	603.295** (89.967)	928.646** (103.269)
Observations	281	281		74	74	74
Conferences	19	19		8	8	8
H <sub>0</sub> : Zero Slopes	184.79**	198.40**	202.40**	41.90**	48.07**	78.29**
H <sub>0</sub> : OLS vs. RE	2174.31**	2080.34**	2026.82**	82.79**	44.76**	31.27**
Hausman: RE vs. FE	7.35	4.44	2.15	NA	1.34	0.06
H <sub>0</sub> : HHI Wins = HHI Points Scored			10.04**			22.29**

Notes: Absolute value of z statistics in parentheses. \* (\*\*) indicates significant at 10% (5%) level.

**Table 3: Random Effects Estimation Results**  
(Dependent Variable: Aggregate Conference Attendance in Thousands)

	Larger Division IA Conferences – Atlantic Coast, Big East, Big 8, Big Ten, Big XII, Conference USA, Mountain West, Pacific Ten, Southeastern, Southwest, Western Athletic Conference (1978-2004)			Big Six Conferences – ACC, Big East, Big Eight, Big XII, Big 10, PAC-10, SEC, Southwest (1978-2004)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
HHI Wins	-0.992** (0.146)		-0.574** (0.282)	-1.473** (0.209)		-0.839** (0.301)
HHI Points Scored		-1.296** (0.195)	-0.637* (0.375)		-2.272** (0.322)	-1.294** (0.464)
Time Trend	15.452** (5.561)	12.602** (5.705)	13.333** (5.664)	15.173** (5.577)	10.577* (5.786)	11.041** (5.644)
BCS Format	204.758** (89.979)	216.394** (90.013)	210.190** (89.255)	291.031** (89.990)	189.829** (89.920)	287.076** (87.613)
Big Six Conference	1533.348** (459.081)	1491.888** (484.377)	1503.422** (492.653)			
Constant	2587.162** (467.573)	2800.513** (505.580)	2810.872** (510.015)	4768.246** (416.973)	5448.089** (492.892)	5466.442** (507.608)
Observations	207	207	207	165	165	165
Conferences	11	11	11	8	8	8
H <sub>0</sub> : Zero Slopes	167.84**	164.92**	171.31**	199.64**	200.30**	216.48**
H <sub>0</sub> : OLS vs. RE	1156.16**	1048.65**	1088.23**	1111.72**	1024.98**	1078.19**
Hausman: RE vs. FE <sup>a</sup>	16.95**	4.73	5.82	3.96	2.54	1.36
H <sub>0</sub> : HHI Wins = HHI Points Scored			0.92			0.41

Notes: Absolute value of z statistics in parentheses. \* (\*\*) indicates significant at 5% (1%) level. <sup>a</sup> In those instances where the Fixed Effects estimator is statistically supported, the quantitative differences between the random and fixed effects were primarily in the BCS Format and BCS Conference variables. The fixed effects results are not reported here but are available from the authors upon request.