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Competitive Balance and Conference Realignment: The Case of Big 12 Football

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Abstract:

Past research has indicated that an effort to achieve greater competitive balance has been one factor in conference realignments within college athletics. The purpose of this study was to determine if greater levels of competitive balance in football were realized after the Big 8 conference merged with four members of the Southwest Conference. Specifically, comparisons were made between competitive balance levels for the last ten years of the Big 8 with the first ten years of the Big 12. Three measures of competitive balance were employed; in general, the findings indicated that competitive balance in football has improved in the ten years after the merger.

Introduction:

In the area of competitive sports, it is mandatory that the outcome of any game or match contain some degree of uncertainty. If this was not the case, it is believed fans would lose interest (Depken & Wilson, 2006; El Hodiri & Quirk, 1971; Kesenne, 2006; Quirk & Fort, 1992; Sanderson & Siegfried, 2003) and thus there would be significantly lower revenues for the organizations involved, particularly media revenue. Stated somewhat differently, it is of vital importance that for any sports league or conference, there needs to be some degree of competitive balance among the various teams.

Competitive imbalance is often linked to disparate revenues among competing organizations (Kaplan, 2004; Sanderson, 2002). At the professional level, these disparities are commonly linked to variables such as the size of a particular team's media market or home facility. Organizations serving larger markets and/or having newer facilities may be able to generate more revenue than competitors, and thus secure the most talented teams. Likewise, at the collegiate level institutions may enjoy competitive advantages as a result of revenues generated from larger fan bases and better facilities. While those monies may not be passed to student-athletes in the form of salaries, high-revenue programs arguably enjoy significant recruiting advantages because they can invest in new or improved facilities and other program enhancements.

At the professional level, a variety of tactics are commonly employed to enhance competitive balance (Sanderson & Siegfried, 2003). They include salary caps, luxury taxes, revenue sharing, and draft orders favoring those teams that enjoyed the least success the previous season. At the college level, measures such as scholarship limits and prohibitions against extra benefits for student-athletes have attempted to promote competitive balance (Rhoads, 2004). These regulations are commonly enforced by a national governing body (e.g., NCAA, NAIA). However, college athletic conferences also play roles in promoting competitive balance. In particular, Rhoads (2004) has argued the conference realignments are at least partially driven by competitive disparity among institutions. Because of the large gate and television revenues that are often at stake, particularly in football and men's basketball, efforts to maintain a certain degree of competitive balance in these sports would serve as an incentive to bring about churning within, and mergers between, conferences (Rhoads, 2004).

The purpose of this paper is to attempt to measure the change in competitive balance as a conference changes its membership. Does this bring about the desired increase in competitive balance? In order to shed light on this question, we surveyed the changes in competitive balance as the Big 8 Conference merged with four members of the Southwest Conference to become the Big 12.

Since previous research has suggested no increase in competitive balance in men's basketball as conferences have gone through change (Rhoads, 2004; Perline & Stoldt, in

press), we have chosen to test the hypothesis that attempts to increase competitive balance in football are major reasons for conference realignment (Rhoads, 2004; Fort & Quirk, 1999; Quirk, 2004). More specifically, we compared levels of competitive balance in football in the ten years before the merger with the ten years after. Although the Big 12 separated football into two divisions, we chose to use the overall conference standings for our analysis. This seemed most appropriate, since the Big 8 was not so divided, and teams in each division of the Big 12 played three of their eight conference games with teams in the opposite division.

The Big 12 Conference

The Big 12 is a NCAA Division I-A level conference founded in 1995 (Big 12, 2006). Its membership includes Baylor University, the University of Colorado, Iowa State University, the University of Kansas, Kansas State University, the University of Missouri, the University of Nebraska, the University of Oklahoma, Oklahoma State University, the University of Texas, Texas A&M University, and Texas Tech University.

Each institution in the conference was formerly a member of either the now-defunct Big 8 or Southwest conferences. Changing dynamics in the collegiate athletics marketplace, such as other conferences churning members and new agreements for television coverage, provided an impetus for the formation of the Big 12 (Michaelis, 1996; Thompson, 2000). The new conference included each member of the Big 8 and four institutions from the Southwest Conference. Texas and Texas A&M were, arguably, the flagship programs in the Southwest Conference, so their selection was not surprising. The decision to include Baylor and Texas

Tech was more controversial because those institutions were from smaller markets than the four other members of the Southwest Conference that were not selected. However, both institutions had alumni in key offices within the Texas state government at the time of the merger, and the political influence of those state officials impacted Baylor's and Texas Tech's selection (Thompson, 2000; Waldman, 1995). The resultant geographic market of the new conference includes 42 million people and 18 million households with television -- roughly 16% of the nation's total (Big 12, 2006; Michaelis, 1996; Thompson, 2000; Waldman, 1995).

The conference is separated into two divisions for football. The North Division features Colorado, Iowa State, Kansas, Kansas State, Missouri, and Nebraska. The South Division is comprised of Baylor, Oklahoma, Oklahoma State, Texas, Texas A&M, and Texas Tech. Each year, each school plays one game against its divisional opponents and three games against teams from the other division. A rotation system is used to select which three "other division" opponents a team will face in a given system. Over four years, each team will play every team from the other division twice -- once at home, once away. All conference games count toward the division standings, and the two division winners meet in a conference championship game each year. The winner of that championship game receives an automatic bid to participate in the Bowl Championship Series (BCS).

Big 12 football teams have enjoyed considerable success at the national level. The conference has placed a team in the BCS national championship game five times, more than any other conference (Big 12, 2006). Further, three teams have won national championships since the conference was founded: Nebraska in 1997, Oklahoma in 2000, and Texas in 2005.

Measuring Competitive Balance:

Several methods have commonly been used to measure competitive balance. The most appropriate of these methods often depends on what the researcher is attempting to measure. Methods most appropriate for measuring competitive balance within a given season may be different from those used to measure competitive balance between seasons (Leeds & VonAllmen, 2005). Since different concepts are being measured, there is no reason to assume the various methods will reach the same conclusions about degree of competitive balance. Indeed, if it is argued that competitive balance is necessary to keep fans interested and thus revenues maximized, it could be argued that no particular method can address theoretical optimal balance, i.e., what the fans who buy tickets and watch television believe is most appropriate. One could even argue that overall conference revenue could be maximized if the teams in the largest markets, with the largest fan base, won most often. Given these caveats, efforts have been made to measure competitive balance. In addressing our task, we rely on such methods.

Three of the most commonly employed measures are:

- the standard deviations of winning percentages of the various teams in the conference or league

- the Hirfindahl-Hirschman Index to measure the number of teams that achieve championship status over a given period of time
- the range of winning percentages

Standard Deviation of Winning Percentages

The method probably used most often to measure competitive balance within a conference in a given season is the standard deviation of winning percentages. Since there will, outside of a tie, always be one winner and one loser for each game, the average winning percentage for the conference will always be .500.

In order to gain insight into competitive balance, we need to measure the dispersion of winning percentages around this average. To do this, we can measure the standard deviation. This statistic measures the average distance that observations lie from the mean of the observations in the data set. The formula for the standard deviation is:

$$\sigma = (\sqrt{\sum(\text{WPCT} - .500)^2}) / N$$

The larger the standard deviation, the greater the dispersion of winning percentages around the mean, thus the less the competitive balance. (If all teams have winning percentages of .500, there would be a standard deviation of zero and there would be perfect competitive balance.)

Using the actual standard deviation in our case presents a potential problem. This occurs because, all things being equal, there is a likelihood that the larger the number of conference games played, the more likely there will be less deviation of winning percentages, since various lucky breaks, injuries, etc. will, over time, even out. Since the number of league games played in the Big 8 was seven and the number of league games played in the Big 12 was eight, there is a need to adjust for these differences. This adjustment entails finding the ideal competitive balance in which each team has a 50% chance of winning each game. This ideal can be measured as:

$$\sigma = 0.5 / \sqrt{N}$$

where .5 indicates the .5 probability of winning, and n is the number of games played by each team in the season.

In the Big 8, the ideal standard deviation ratio would be $0.5 / \sqrt{7} = 0.1890$ and for the Big 12 would be $0.5 / \sqrt{8} = 0.1768$.

To measure the competitive balance within a given season, we find the ratio of the actual standard deviation to the ideal standard deviation.

$$R = \sigma A / \sigma I$$

The closer the measure is to one, the more competitive balance there is.

Championship Imbalance

While using the standard deviation as a measure of competitive balance provides a good picture of the variation within a given season, it does not indicate whether the same teams win every season, or if there is considerable turnover among the winners i.e., whether there is between-season variation.

Therefore, another method economists have used to measure imbalance is the Hirfindahl-Hirschman Index (HHI), which was originally used to measure concentration among firms within an industry (Leeds & von Allmen, 2005). Whereas the standard deviation was used to measure percentage winning imbalance, the HHI is used to measure championship imbalance -- how the championship is spread amongst the various teams. Using this method, the greater the number of teams which achieve championship status over a specific time period, the greater the competitive balance. The HHI can be calculated by measuring the number of times each team won the championship, squaring that number, adding the numbers together, and dividing by the number of years under consideration. Using this measure, it can be concluded that the lower the HHI, the more competitive balance among the teams.

Range of Winning Percentage Imbalance

Although the standard deviation of winning percentages can tell us about variation around the mean, it does not specifically reveal if the same teams win or lose from season

to season. Likewise, whereas the HHI gives us some perspective on the number of teams who win the championship over a period of time, it does not tell us what is happening to the other teams in the conference. It is quite possible that a few teams could always finish first, but that the other teams could be moving up or down in the standings from one year to another.

One way of gaining insight into the movement in the standings of all teams over time is to get the mean percentage wins for each team over a specific period. The closer each team is to .500, the greater the competitive balance over this period. If several teams had very high winning percentages and others had very low winning percentages, it would suggest that there was not strong competitive balance over time, because the same teams would be winning losing, year after year.

Results:

We employed each of the three measures of competitive balance in our analysis of football results for the Big 8 and Big 12 Conferences. Findings are offered in the following sections.

Standard Deviation of Winning Percentages

Source: Information provided by Big 12 Conference office.

Table 1: Winning Percentages at the Big 8 Conference

Year	MO	KU	OU	KSU	NU	ISU	OSU	CU	
1986	.286	.000	1.000	.143	.714	.428	.571	.857	
1987	.428	.071	1.000	.071	.857	.286	.714	.571	
1988	.286	.143	.857	.000	1.000	.428	.714	.571	
1989	.143	.286	.714	.000	.857	.571	.428	1.000	
1990	.286	.357	.714	.286	.714	.357	.286	1.000	
1991	.143	.428	.714	.571	.928	.214	.071	.928	
1992	.286	.571	.571	.286	.857	.286	.357	.786	
1993	.286	.428	.571	.643	1.000	.286	.000	.786	
1994	.286	.428	.571	.714	1.000	.071	.071	.857	
1995	.143	.714	.286	.714	1.000	.143	.286	.714	
Mean	.257	.343	.700	.343	.893	.307	.350	.807	.500

Source: 2005 Big 12 Football Media Guide contained data for 1996-2004. Big 12 Website contained data for 2005.

Table 2: Winning Percentages at the Big 12 Conference

Year	KU	CU	UT	ISU	TTU	OU	NU	OSU	BU	MU	TAMU	KSU	
1996	.250	.875	.750	.125	.625	.375	1.000	.250	.125	.375	.500	.750	
1997	.375	.375	.250	.125	.625	.250	1.000	.625	.125	.625	.750	.875	
1998	.125	.500	.750	.125	.500	.375	.625	.375	.125	.625	.875	1.000	
1999	.375	.625	.750	.125	.625	.625	.875	.375	.000	.125	.625	.875	
2000	.250	.375	.875	.625	.375	1.000	.750	.125	.000	.250	.625	.750	
2001	.125	.875	.875	.500	.500	.750	.875	.250	.000	.375	.500	.375	
2002	.000	.875	.750	.500	.625	.750	.375	.625	.125	.250	.375	.750	
2003	.375	.375	.875	.000	.500	1.000	.625	.625	.125	.500	.250	.750	
2004	.250	.500	.875	.500	.625	1.000	.375	.500	.125	.375	.625	.250	
2005	.375	.625	1.000	.500	.750	.750	.500	.125	.250	.500	.375	.250	
Mean	.250	.600	.775	.313	.575	.688	.700	.388	.100	.400	.550	.663	.500

Tables 1 and 2 display the annual winning percentages for the football teams in the Big 8 and Big 12 Conferences, respectively. Tables 3 and 4 display the annual standard deviations, the standard deviation ratios, and the means for the ten years of data in the Big 8 and Big 12 conferences.

Source: Authors' calculations according to formulas in text from data in Table 1.

Table 3: Standard Deviations and Standard Deviation Ratios of Winning Percentage Imbalance in Big 8 Conference

Year	Standard Deviation	Standard Deviation Ratio
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1986	.3498	1.851
1987	.3498	1.851
1988	.3498	1.851
1989	.3498	1.851
1990	.2725	1.442
1991	.3415	1.807
1992	.2321	1.228
1993	.3171	1.678
1994	.3479	1.841
1995	.3238	1.731

Mean	.3234	1.711
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Source: Authors' calculations according to formulas in text from data in Table 2.

Table 4: Standard Deviations and Standard Deviation Ratios of Winning Percentage Imbalance in Big 12 Conference

Year	Standard Deviation	Standard Deviation Ratio
1996	.2968	1.679
1997	.2919	1.651
1998	.2919	1.651
1999	.2968	1.679
2000	.3153	1.783
2001	.2968	1.679
2002	.2770	1.567
2003	.2968	1.679
2004	.2556	1.446
2005	.2500	1.414
Mean	.2869	1.623

The data indicate that overall competitive balance increased with the merger of the Big 8 into the Big 12. After adjusting, the mean of the standard deviation ratio was 1.711 for the Big 8 (see Table 3 - mean standard deviation ratio) and 1.623 (see Table 4 - mean standard deviation ratio) for the Big 12. This was a difference of 5.4%.

If we eliminate the lowest standard deviation ratio for the Big 8 - 1.228 - which would appear to be an outlier as it was well below the mean, the mean for the Big 8 would rise to 1.767, which would raise the percentage differential between the Big 8 and Big 12 to 8.9%.

Championship Imbalance

Using the HHI to measure competitive balance in the Big 8, we find that over the ten-year period, three teams achieved a first place finish: Nebraska 6, Oklahoma 2, and Colorado 2. If we give one point for each first place finish squared, we find:

$$HHI = 6^2 + 2^2 + 2^2 = 44/10 = 4.4$$

Since the Big 12 is divided into two divisions, the first place finishers in each division play each other to determine the championship. We find that over the ten-year period, six different teams won the championship: Oklahoma 3, Texas 2, Nebraska 2, Colorado 1, Texas A&M 1, and Kansas State 1. Applying the HHI to this data, we find:

$$HHI = 3^2 + 2^2 + 2^2 + 1^2 + 1^2 + 1^2 = 20/10 = 2$$

Here, the numbers are particularly revealing. We see twice as many institutions won the championship in the first ten years of the Big 12 than had won in the previous ten years with the Big 8. These results, though, need be mitigated by the fact that one would expect there to be more difference in teams achieving the championship with twelve competitors than with eight. Nevertheless, in the case of the Big 8, three teams out of a possible eight (37.5%) won the championship, whereas in the case of the Big 12, six out of a possible twelve teams won the championship (50%). While this does lessen the difference, the Big 12 still remains considerably more competitively balanced.

If we arbitrarily set .500 plus or minus .100 as a range, which would suggest a high degree of competitive balance over the ten-year period, we find significantly more competitive balance in the Big 12 than in the Big 8.

The mean winning percentages displayed for each team in Table 1 (Big 8) suggest that when using such an approach, no teams fell within this .400-.600 range. There were obvious winners and losers, but not many in the middle. (Nebraska, Colorado, and Oklahoma were the winners, and the remaining five institutions were the losers.)

On the other hand, the mean winning percentages displayed for each team in Table 2 (Big 12) indicates that four institutions (33% of the league total) - Colorado, Missouri, Texas A&M, and Texas Tech - fell within the specified range. Texas, Nebraska, Oklahoma, and Kansas State exceeded the range. Oklahoma State, Iowa State, Kansas, and Baylor fell below the range, with the latter two institutions never having a winning season.

When looking at the range between the top and bottom winning percentages, we find that in the Big 8 the range is .636 (Nebraska .893 and Missouri .257), whereas it is actually larger for the Big 12 at .675 (Texas .775 and Baylor .100). Baylor has not had a winning season since joining the Big 12, and only once in the ten-year period has it won as many as two conference games. Therefore, if we were to exclude Baylor as an outlier, we find the range drops to .525 (Texas .775, and Kansas .250). This would make the range approximately 20% lower in the Big 12 than in the Big 8.

Conclusions:

Previous research had suggested that one reason for conference realignment was to achieve greater competitive balance in sports among the various member institutions (Rhoads, 2004). This appeared to be particularly true in football, one of the very high revenue sports in major athletic conferences. With this in mind, we investigated whether there was an increase in competitive balance in the sport of football after the Big 8 Conference merged with four members of the Southwest Conference to form the Big 12 Conference. The data for this study came from the conference standings in football for the Big 8 for the ten years prior to the merger and the standings for the Big 12 ten years subsequent to the merger.

Using the standard deviation to measure the winning percentage imbalance, and the Hirfindahl-Hirschman Index to measure championship imbalance, we concluded that each of the above measures indicated an increase in competitive balance after the merger. In the case of the range of winning percentages, the results suggested a slightly greater competitive balance for the Big 8, although once the least successful team in the Big 12 was dropped as an outlier, there was considerably more competitive balance in the Big 12. Given the fact that conferences often realign in an attempt to achieve greater competitive balance (Rhoads, 2004), these findings would support the decision to realign.

Achieving greater levels of competitive balance in a single sport is not the only justification for conference realignment. There are numerous ways in which the Big 8-Southwest Conference merger has impacted its member institutions and the overall landscape of college athletics. However, since competitive balance is recognized as being generally appealing to consumers and football is among the conference's most marketable sports, the implications of these findings must be deemed important if not surprising.

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