COMPETITIVE BALANCE AND THE BIG 12

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INTRODUCTION

One of the differences between sports teams and other enterprises is the issue of competitive balance. While competition in any endeavor leads to overall efficiency, from the perspective of the individual enterprise, there is rarely a preference for increased competition. On the other hand, in the case of sports, a lack of competition would make the playing of games extremely boring. It is likely that aside from those teams with a long-time tradition in a given sport, even some fans of a guaranteed winner would no doubt eventually lose interest, to say nothing about the interest of those fans for the losing team. In other words, unless there is some degree of uncertainty concerning the games' outcome, there would be minimal fan interest and significantly lower revenues (Fort, 2006).

One of the causes of competitive imbalance is revenue imbalance. In professional sports, some teams, frequently those in large markets, normally receive more revenue and can thus sign the better players and win more frequently. Efforts to alleviate this problem have included salary caps, luxury taxes, revenue sharing and reverse order of finish drafts.

Similarly in intercollegiate sports some institutions tend to have larger revenue sources, or other advantages, and thus, all things being equal, are more likely to have an advantage in recruiting better student-athletes. Efforts in this case to alleviate potential competitive imbalance often are undertaken by the NCAA or the various intercollegiate athletic conferences. While the NCAA attempts to create a "level playing field" through its various rules and regulations (NCAA, 2006), the very large and varied financial resources of its membership make overall competitive balance difficult. On the other hand, the organization of teams into individual conferences can alleviate some this imbalance by including only teams with similar resources and athletic commitments. Indeed, one reason for conference realignment is potential disparity among institutions that can take place over time and thus create problems of competitive imbalance (Rhoads, 2004).

The purpose of this paper is to attempt to measure the change in competitive balance as a conference changes its membership. Does the change in membership bring about the desired increase in competitive balance? In order to answer this question the researchers surveyed the changes in competitive balance as the Big 8 Conference merged with four members of the Southwest Conference to become the Big 12. More specifically, the researchers compared levels of competitive balance in men's basketball in the ten years before the merger with the ten years after. While other sports could have been surveyed, the fact that from 2000-1 through 2004-5 the Big 12 received nearly $46 million just from its participation in the NCAA postseason men's basketball tournament (National Collegiate Athletics Association, 2005) would appear to make competitive balance in men's basketball a particularly important reason for conference realignment. Further, unlike football the other high revenue sport, basketball was not broken into divisions within the Big 12, which made it a bit more straightforward to measure.

THE BIG 12 CONFERENCE

Established in 1995, the Big 12 Conference administers ten men's and 11 women's sports championships (Big 12, 2006). Conference members are Baylor University, University of

Colorado, Iowa State University, University of Kansas, Kansas State University, University of Missouri, University of Nebraska, University of Oklahoma, Oklahoma State University, University of Texas, Texas A&M University, and Texas Tech University. Member institutions compete at the level of NCAA Division I-A. Depending on the sport, the teams may be split into two six-team divisions—the North and the South.

The 12 institutions comprising the conference are formerly members of the Big 8 or the Southwest Conference. These institutions merged into a single conference in response to market developments primarily relating to the packaging of television distribution agreements (Michaelis, 1996; Thompson, 2000). For many years, the NCAA assumed responsibility for negotiating television deals for its member institutions. However, in the early 1980s the University of Georgia and the University of Oklahoma filed suit in an effort to gain the right to negotiate their own television deals (*NCAA v. Board of Regents of Univ. of Okla.,* 1984). The Supreme Court ruled in favor of the plaintiffs. By 1994, the University of Notre Dame as well as the Southeastern Conference and the Atlantic Coast Conference had negotiated their own television agreements. University officials at Big 8 and Southwest Conference schools realized that by merging, their geographic coverage area would represent 16 percent of the nation's television households, thus increasing the value of their television packages (Michaelis, 1996; Thompson, 2000; Waldman, 1995). The new conference included all the members of the Big 8 and four of the final eight members of the Southwest Conference.

Since that time, more than 24 Big 12 teams and 200 Big 12 student-athletes have won NCAA titles (Big 12, 2006). The conference has excelled in marquee sports such as football (nine teams have advanced to Bowl Championship Series games), and men's and women's basketball (eight teams respectively have qualified for the Final Four since 2000). The league has also demonstrated considerable economic clout, distributing more than $105 million in revenue to its member institutions in 2005 (Barfknecht, 2005).

Accordingly, the Big 12 is commonly described as a "super conference," and as such, the league is sometimes considered to be part of the problem relating to competitive balance in college athletics. Sanderson and Siegfried (2003) have observed that competitive balance has been lacking in college football and men's basketball at least as far back as 1981. And a recent Knight Commission report (2001) decried the financial "arms race" at the highest levels of college athletics. It noted that "competitive balance is crumbling as the gap between the haves and the have-nots widens" (p. 17).

Concerns regarding competitive balance within the Big 12 Conference have also been expressed. Football teams from the North have struggled to compete with teams in the South—particularly Oklahoma and Texas—in recent years. One coach has argued that those two programs, along with Nebraska and Texas A&M, outspend others in the conference (Barfknecht, 2005). And at least one media commentator has argued that South Division programs enjoy significant competitive advantages in spring sports such as baseball and softball as a result of reputations as perennial powers and their warmer climates (Woodling, 2004). The validity of that claim has not been systematically tested, however.

The ultimate value of competitive balance is somewhat elusive. As Sanderson and Seigfried (2003) note, people are often conflicted on the subject. On the one hand, many advocate the underdog, but fan interest in perennial powers at the professional and collegiate levels is usually significant. However, evidence indicates that competitive balance or the lack thereof, impacts the financial health and organizational structure of college athletics. For example, one analysis has indicated that, at least in regard to college football, competitive balance may positively impact attendance (Depken & Wilson, under review). Another analysis has

demonstrated that competitive imbalance in football can lead to churning in conference memberships (Fort & Quirk, 1999). Conversely, an analysis of the Western Athletic Conference has found that churning among members has not significantly impacted competitive balance in men's basketball (Rhoads, 2004).

MEASURING COMPETITIVE BALANCE

There are several methods used in measuring competitive balance. The most appropriate of these methods often depends on what the researcher is attempting to specifically measure (Humphreys, 2002). Among the more popular 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, and the range of winning percentages.

Winning Percentage Imbalance-The Standard Deviation

One popular measure of competitive balance is to calculate each team's winning percentage in the conference in a given season. 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, of course, be .500.

In order to get some idea of competitive balance it is necessary to measure the dispersion of winning percentages around this average. To do this the standard deviation can be measured. This statistic measures the average distance that observations lie from the mean of the observations in the data set.

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

The larger the standard deviation, the greater is the dispersion of winning percentages around the mean, and thus the less the competitive balance. (If all teams had a winning percentage 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 does present 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 14 and the number of league games played in the Big 12 was 16, there is a need to adjust for these differences. This adjustment entails finding the ideal competitive balance in which each team has a 50 percent chance of winning each game. This ideal can be measured as

$$\sigma = \sqrt{\frac{.5}{n}}$$

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

In the Big 8 the ideal standard deviation ratio would be $\sqrt{\frac{.5}{14}} = .1336,$

and for the Big 12 it would be $\sqrt{\frac{.5}{16}} = .125.$

To then measure competitive balance within a given season it is necessary to 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.

Champion Imbalance-The Hirfindahl-Hirschman Index
While using the standard deviation as a measure of competitive balance provides a good picture of the variation within a given season, it really doesn't indicate whether it is the same teams winning every season, or if there is considerable "churning" 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 and von Allmen, 2005). Whereas the standard deviation was used to measure winning percentage imbalance, the HHI is used to measure champion imbalance---how the championship is spread amongst the various teams. Using the first place finish as the champion, the HHI can be calculated by measuring the time each team finished first, 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 (Leeds & VonAllmen, 2005).

Range of Winning Percentage Imbalance-Winning Percentages
While the standard deviation can tell us about variation around the mean, it does not specifically reveal if it is the same teams winning or losing from season to season. Likewise, although the HHI gives us some perspective on the number of teams that finish first 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 some insight into the movement in the standings of all teams over time is to get the mean percentage wins for each team over the ten-year period. The closer each team is to .500 the greater would be 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 over time there was not strong competitive balance, but that it was the same teams winning and the same teams losing, year after year.

RESULTS
The researchers employed each of three measures of competitive balance in our analysis of men's basketball results for the Big 8 and Big 12 conferences. Findings are offered in the following sections.

Winning Percentage Imbalance-The Standard Deviation
Tables 1 and 2 display the annual winning percentages for men's basketball teams in the Big 8 and Big 12 conferences respectively. Tables 3 and 4 display the annual standard deviations and standard deviation ratios as well as the mean for the 10 years of data for the Big 8 and Big 12 conferences respectively.

The data indicate that overall competitive balance decreased with the merger of the Big 8 into the Big 12. After adjusting, the mean of the standard deviation ratio was 1.625 for the Big 8 (see Table 3 - mean of standard deviation ratio) and 1.843 (see Table 4 - mean of standard deviation ratio) for the Big 12. This is a 13.5% difference. Not only was the overall competitive balance lessened with the addition of the four institutions to the Big 8, but in eight out of the ten years studied the standard deviation ratio was higher for the Big 12 than for the Big 8.

This overall decrease in competitive balance could also be seen in the range of statistics of the ten-year periods studied. In the case of the Big 8 the lowest standard deviation ratio (most competitive balance) was 1.213 (see Table 3 standard deviation ratio for 1991-92) and the highest was 2.100 (see Table 3 standard deviation ratio for 1989-90). Both of these ratios were higher for the Big 12--the lowest standard ratio for the Big 12 being 1.554 (see Table 4 standard deviation ratio for 2005-06) and the highest being 2.216 (see Table 4 standard deviation ratio for 1999-2000). In percentage terms over the ten-year period the lowest ratio for the Big 8 was 28.1% lower than for the Big 12, and the highest ratio for the Big 8 was 5.5% lower than for the Big 12. [Interestingly enough, over the last two years the Big 12 registered its lowest standard deviation ratio for the ten-year period. Whether this is a trend or just a "blip" remains to be seen.]

The decrease in competitive balance with the advent of the Big 12 can also be seen by the fact that over the ten years since the merger, the former members of the SWC, on average, finished in the bottom of the Big 12, 63% of the time. Indeed, if one excluded the University of Texas, the one former SWC school that was frequently a contender for the top spot, the additions to the Big 8 consisting of the other three schools, Texas A&M, Texas Tech, and Baylor finished in the bottom half of the conference 80% of the time, and in the bottom quarter, 57% of the time.

Champion Imbalance-The Hirfindahl-Hirschman Index

Using the HHI to measure competitive balance in the Big 8 the researchers find that over the ten-year period, three teams achieved an outright first place finish (Kansas 4, Missouri 3, and Oklahoma 2). In one year there was a tie for first place (Oklahoma State and Kansas in 1990-91). If one point is given for each outright first-place finish and .5 point for each two-way tie, the following results:

$$HHI = 4.5^2 + 3^2 + 2^2 + .5^2 = 33.5/10 = 3.35$$

For the Big 12 the researchers find that over the ten-year period four teams achieved an outright first place finish (Kansas 4, Iowa State 2, Texas 1, and Oklahoma State 1). In two years there was a tie for first place (2004-05 Oklahoma and Kansas, and 2005-06 Texas and Kansas). Using the same point distribution as above the finding is:

$$HHI = 5^2 + 2^2 + 1.5^2 + 1^2 + .5^2 = 32.5/10 = 3.25$$

From the numbers alone the HHI would suggest that there is slightly more competitive balance in the Big 12 than in the Big 8. However, the HHI will decrease as the number of teams involved increases (Depkin, 1999). This follows since there is a greater likelihood that more teams will be champions if there are twelve teams competing, than if there are only eight competitors. Consequently the slightly lower HHI for the Big 12 may be misleading. Indeed, if adjustments are made for the number of teams in the league the finding is that 3.5 (.5 for a team that tied for first place) different teams achieved a first place finish in the Big 8 which is 43.8% of the teams participating. In the case of the Big 12, 4.5 different teams participated as first place finishers, which is 37.5% of those possible. Given the increased number of teams eligible to win the conference title it seems reasonable to conclude that there appeared to be a greater

degree of competitive balance before the merger than after. The fact that Kansas, the most successful team, was more dominant with twelve teams than with eight lends weight to this conclusion.

Range of Winning Percentage Imbalance-Winning Percentages
If .500 plus or minus .100 is arbitrarily set as a range which would suggest a high degree of competitive balance over the ten-year period, the researchers find considerably more competitive balance in the Big 8 than in the Big 12.

Table 1 (Big 8) suggests that using this approach, four teams (50%) fit this range. Those teams are Kansas State, Nebraska, Iowa State, and Oklahoma State. Among the others Kansas, Missouri, and Oklahoma appeared to be the more consistently strong winners, with Kansas being the leader with a winning percentage of .707. In fact, in the ten-year period it had only one losing season. The only team falling below this range was Colorado which tended to be a consistent loser, never achieving a winning season over the period studied. The range of winning percentages over the period varied from .707 (Kansas) to .221 (Colorado). This was a range of .486. If one viewed Colorado as an outlier the range would be .707 (Kansas) to .407 (Nebraska) a range of .300.

On the other hand Table 2 (Big 12) indicates that five teams (42%) fit in this range. These would include Colorado, Iowa State, Texas Tech, Nebraska, and Missouri. Among the others Kansas, Texas, Oklahoma, and Oklahoma State appeared to be the more consistent winners, while Baylor, Texas A and M, and Kansas State brought up the rear, with Baylor having the lowest winning percentage with only a .256. Of these three teams, Baylor and Kansas State had no winning seasons, and Texas A&M only one winning season, 2005-06. On the other hand Kansas and Oklahoma never had a losing season, with Texas having only one losing season, and Oklahoma State two losing seasons. The overall range for the ten-year period was a high of .819 (Kansas) and a low of .256 (Baylor) for a range of .563. This range is 15.8% higher than for the Big 8, and if one were to exclude Colorado from the calculations it is 87.6% higher.

By utilizing the overall win percentage as the measure of competitive balance, it can be concluded that there exists considerably less competitive balance in the Big 12 than in the Big 8.

CONCLUSIONS
Previous research (Rhoads, 2004) had suggested that one reason for conference realignment was to achieve greater competitive balance among the various member institutions. With this in mind, the purpose of this study was to investigate whether there was an increase in competitive balance 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 standing in men's basketball for the Big 8 for ten years prior to the merger, and the standings for the Big 12 ten years subsequent to the merger. Men's basketball was specifically chosen since it is a major source of revenue for most institutions.

Using the standard deviation to measure the winning percentage imbalance, the Hirfindahl-Hirschman Index to measure champion imbalance, and the range of winning percentages to measure the range of winning percentage imbalance, it was concluded that each of the above measures indicated a decrease in competitive balance after the merger. Given the fact that conferences often realign to achieve greater competitive balance, these finding were somewhat unexpected.

Of course there are reasons for conferences to realign their membership other than competitive balance in men's basketball. Certainly there are other sports for which a conference would be interested in competitive balance. This might be particularly true of football, the other high revenue sport. Indeed there could be reasons for the specific realignment besides attempts to achieve greater competitive balance in any sport. This may have been particularly true with the merger which created the Big 12, as many believe that the inclusion of both Baylor and Texas Tech was based on the political influence of alumni in key offices within Texas state government (Thompson, 2000; Waldman, 1995).

Nevertheless, given the large amount of revenue received from men's basketball, one would have expected competitive balance in this sport to be a major consideration in conference realignment. The fact that these results were the opposite of such expectations was indeed surprising.

REFERENCES

Barfknect, L. (2005, August 28). The Big 12 Conference turns 10: Still lookin' good. *Omaha World-Herald*, 12fb.

Big 12. (2006). *The Big 12 Conference—Celebrating its 10th season*. Carlsbad, CA: CSTV Networks, Inc. Retrieved from http://www.big12sports.com/aboutbig12/big12-aboutbig12.html.

Big 12 Conference (2005). *2005-06 Men's Basketball Media Guide*. Dallas: Author.

Big 12. (2006). *The Big 12 Conference*. Carlsbad, CA: CSTV Networks, Inc. Retrieved from http://www.big12sports.com/sports/m-baskbl/big12-m-baskbl-body.html.

Depken, C.A. (1999). *Free-Agency and the Competitiveness of Major League Baseball*. Review of Industrial Organization, *14*, 205-217.

Depken, C.A., & Wilson, D. (under review, revision requested). The uncertainty outcome hypothesis in college football. *Managerial and Decision Economics*.

Fort, R. (2006). *Sports Economics*. Upper Saddle River, N.J.: Pearson-Prentice Hall.

Fort, R., & Quirk, J. (1999). The college football industry In Fizel, J., Gustafson, E., & Hadley, L. (Eds.). *Sport economics: Current research* (pp. 11-25). Westport, CT: Praeger.

Humpreys, B. (2002). Alternative measures of competitive balance. *Journal of Sports Economics, 3*, (2), 133-148.

Knight Foundation Commission on Intercollegiate Athletics. (2001). *A call to action*. Washington, D.C.: Author. Retrieved from http://www.knightcommission.org/about/reports/category/A%20Call%20to%20Action/.

Leeds, M. and von Allmen, P. (2005). *The Economics of Sports*. Boston: Pearson-Addison Wesley.

Michaelis, V. (1996, June 30). Big time: Big Eight, SWC get the message. *The Denver Post*, 2D.

NCAA v. Board of Regents of Univ. of Okla., 468 U.S. 85 (1984).

National Collegiate Athletic Association (2006). Manual 2006-07 NCAA Division I Manual. Indianapolis, IN.

National Collegiate Athletic Association. (2005). *Division I basketball fund*. Indianapolis, IN: Author. Retrieved from http://www1.ncaa.org/finance/5-yr_conf_summaries/basketball.

Rhoads, T.A. (2004). *Competitive balance and conference realignment in the NCAA*. Paper presented at the 74th Annual Meeting of Southern Economic Association, New Orleans, LA.

Sanderson, A.R., & Siegfried, J.J. (2003). *Thinking about competitive balance*. Unpublished manuscript. Vanderbilt University.

Thompson, A. (2000, July 1). No piece of cake: 'Pandemonium' prevailed during Big 12's creation; Planning paid off in the end. *The Denver Post*, D09.

Waldman, A. (1995). A death in the family. *Sport, 86* (6), 78-83.

Woodling, C. (2004, May 27). Expansion could help Big 12. *Lawrence Journal-World*. Lawrence, KS: Author. Retrieved from http://6news.kusports.com/news/columns/story/110630.

TABLE 1

Winning Percentages Big 8 Conference

Year	MO	KU	OU	KSU	NU	ISU	OSU	CU	
1986-87	.786	.643	.643	.571	.500	.357	.286	.214	
1987-88	.500	.643	.857	.786	.286	.429	.286	.214	
1988-89	.714	.429	.857	.571	.286	.500	.500	.143	
1989-90	.857	.786	.786	.500	.214	.286	.429	.143	
1990-91	.571	.714	.357	.214	.643	.429	.714	.357	
1991-92	.571	.786	.571	.357	.500	.357	.571	.286	
1992-93	.357	.786	.500	.500	.571	.571	.571	.143	
1993-94	1.000	.643	.429	.286	.500	.286	.714	.143	
1994-95	.571	.786	.643	.214	.286	.429	.714	.357	
1995-96	.429	.857	.571	.500	.286	.643	.500	.214	
Mean	.636	.707	.621	.450	.407	.429	.529	.221	**.500**

Source: Information provided by Big 12 Conference office.

TABLE 2

Winning Percentages Big 12 Conference

Year	KU	CU	UT	ISU	TTU	OU	NU	OSU	BU	MU	TAMU	KSU
1996-97	.938	.688	.625	.625	.625	.563	.438	.438	.375	.313	.188	.188
1997-98	.938	.438	.375	.313	.438	.688	.625	.618	.500	.500	.063	.438
1998-99	.688	.438	.813	.375	.313	.688	.625	.625	.000	.688	.313	.438
1999-00	.688	.438	.813	.875	.188	.750	.250	.750	.250	.625	.250	.125
2000-01	.750	.313	.750	.813	.188	.750	.438	.625	.375	.563	.188	.250
2001-02	1.000	.313	.625	.250	.625	.813	.375	.625	.250	.563	.188	.375
2002-03	.875	.563	.813	.313	.375	.750	.187	.625	.313	.563	.375	.250
2003-04	.750	.625	.750	.438	.563	.500	.375	.875	.188	.563	.000	.375
2004-05	.750	.250	.563	.563	.625	.750	.438	.688	.063	.438	.500	.375
2005-06	.813	.563	.813	.313	.375	.688	.438	.375	.250	.313	.625	.375
Mean	.819	.462	.694	.488	.431	.694	.419	.631	.256	.513	.269	.319

Source: 2005-06 Big 12 Men's Basketball Media Guide contained data for 1996-97-2004-05, Big 12 Conference Website contained data for 2005-06.

TABLE 3

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

Year	Standard Deviation	Standard Deviation Ratio
1986-87	.1985	1.486
1987-88	.2415	1.808
1988-89	.2257	1.689
1989-90	.2806	2.100
1990-91	.1870	1.400
1991-92	.1620	1.213
1992-93	.1870	1.400
1993-94	.2779	2.080
1994-95	.2092	1.566
1995-96	.2020	1.512
Mean	.2171	1.625

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

TABLE 4

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

Year	Standard Deviation	Standard Deviation Ratio
1996-97	.2198	1.758
1997-98	.2198	1.758
1998-99	.2295	1.836
1999-00	.2770	2.216
2000-01	.2368	1.894
2001-02	.2500	2.000
2002-03	.2310	1.848
2003-04	.2417	1.934
2004-05	.2046	1.637
2005-06	.1942	1.554
Mean	.2304	1.843

Source: Authors calculations according to formula in text from data in Table 2.