

# A Retrospective Look At College Football In The Late BCS Era – A Case Study In Sports Analytics, Sports Management, And Sports Economics

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## ABSTRACT

*This case study presents game-play statistics to explore their relationships between winning, conference affiliation, and styles of play. Statistics from games from 2005 to 2011 are compiled and explored using descriptive statistics, ANOVA, and Pearson's Correlations. Bowl Championship Series automatic-qualifiers serve as variables in this study. ANOVA analysis indicates that the style of play from 2005 to 2011 has changed as total offensive production and scoring have increased. This study also finds marked differences in game-play for the various conferences, and presents the statistics that carry the greatest correlation to winning in each of the conferences. This case study is intended for use in sports management and administration courses, where users must make determinations on the differences in play, and their impact on sports administrative decisions.*

**Keywords:** Sports Management; Sports Economics; College Football; Bowl Championship Series; Case Study; Athletic Directors; Sports Analytics

## THE BOWL CHAMPIONSHIP SERIES (BCS) AND THE BCS CONFERENCES

The BCS was established in 1998 as a conglomerate of bowl games with the sole purpose of pitting the top two teams in the BCS standings to play for the BCS National Championship (BCS, 2012). The BCS was “an event managed” by the Bowl Subdivision Conferences and the University of Notre Dame. The bowl games included in the series were the Rose, Fiesta, Sugar, and Orange, with an additional game at one of these venues to determine the national champion. Formerly, the BCS was divided into automatic qualifying (AQ) and non-automatic (non-AQ) conferences; however, provisions in 2012 have been made to eliminate those distinctions moving forward.

The revenue impact of the BCS was staggering. In 2011, the BCS distributed \$142.5 million dollars to the different schools in the agreement (SBJ, 2011). These payouts, however, were not equally distributed amongst the conferences, as there are provisions for participation and BCS automatic qualification status. Distribution aside, the BCS opened a revenue stream that allowed many athletic programs to prosper since the series' inception.

Participating in a BCS game created varied opportunities for an athletic program and the university. Aside from the financial payout, the university benefited from the marketing, branding, and publicity that the games and the series created. The conference champions from the AQ conferences (Big East, Big 10, Big 12, SEC, Pac-10, and the ACC) automatically gained a place in one of the bowl games. Conference champions from the non-AQ conferences (Conference USA, Mid-American, Mountain West, Sun Belt, and the Western Athletic) were eligible should they meet the following criteria: be ranked in the top 12 of the final BCS standings or be ranked in the top 16 if that ranking is ahead of the ranking of any of the AQ conference champions (BCS, 2012). Only one of the non-AQ teams could gain an automatic berth to the BCS this way; however, a second team would become eligible should it be ranked in the top 12 of the final BCS standings.

## **Winning And Revenue**

The money generated from football plays many roles in athletic departments. Primarily, the money funds non-revenue sports within the department; in addition, the money is used to upgrade facilities, secure coaches to long-term, high dollar salaries, and in some instances, provide money back to the university general fund (Caro & Benton, 2012). Successful athletic programs also have an impact on alumni donations (Brooker & Klasorin, 1981; Baade & Sunderberg, 1996; Rhoads & Gerking, 2000) and increased giving through athletic funds McCormick & Tinsley, 1990).

Fulks (2010) reported that college football revenue accounted for nearly 46% of an athletic department's total revenue. With such a heavy reliance on football revenue, winning is of utmost importance. Padilla and Baumer (1994) indicated that success and television have led to greater profitability for football programs. Caro and Benton (2012) reported a strong, positive relationship between winning, conference membership, and revenue; however, differences in the ability of programs to create football-related revenue have caused great discrepancies between the AQ and non-AQ conferences and within universities in respective conferences.

The argument can be made that revenue distribution and revenue inequity has challenged the competitive balance on the field. Groza (2010) concluded that teams fare better when they can align themselves with stronger conferences. It was, perhaps, this belief that triggered conference realignment in 2010. The University of Nebraska left the Big 12 in 2010 for the Big Ten, and in the process severed relationships with Oklahoma and Texas, two of their premier, traditional rivals. From 2003 to 2009 the average revenue for teams in the Big 12 was roughly \$27.2 million; the average revenue for Big Ten teams was nearly \$33.4 million dollars (Caro & Benton, 2012). Nebraska (\$36.2 million) ranked fourth in the Big 12, was eclipsed almost two-fold by the University of Texas (\$68.6 million). While Nebraska called the move to the Big Ten a search for stability and said that they were more "aligned" with the academics, culture, and athletics of the Big Ten (ESPN, 2010), it was hard to ignore the underlying increase in revenue and potential future earnings. Missouri and Texas A&M made similar departures from the Big 12 in 2011.

Perhaps no conference was hit as hard as the now defunct Big East. West Virginia, Louisville, Syracuse, and Texas Christian (TCU) all departed from the Big East - TCU doing so without ever playing a game in their new conference. Utah departed the Mountain West for the Pac-12. These realignments triggered a race for stability, longevity, and in some instances, survival, as universities sought to establish relationships with conferences that could provide financial security and competitive balance. This recent round of realignment was also a reminder that revenue is of great importance to athletic programs as it provides an opportunity to create a competitive advantage over traditional rivals and the rest of college football. Through this realignment, however, programs never stopped to wonder if their style of play would fit within their new conferences. The question was never asked, "can we fit in and be competitive on the field."

## **Winning And Recruiting**

The impact that recruiting has on winning cannot be minimized. It stands to reason that teams with a collection of better athletes may have a competitive advantage on the field against a team with inferior talent. While this is not always the case, recruiting plays a pivotal role in on-the-field success. Dumond, Lynch, and Platania (2008) reported a connection between recruiting success and winning: successful teams were recruiting at a higher rate than those who were experiencing a downturn. Caro (2012) supported the findings of Dumond et al. (2008), by reporting a positive relationship between recruiting and revenue. The relationship was explained through the extra recruiting budgets, better facilities, and increased athletic and academic support for the athlete once they arrive on campus. Year in and year out, the top programs in the country tend to land some of the best recruiting classes. Caro and Benton (2012) quantified this relationship through regression and reported that recruiting classes can explain 63% to 80% of the variance in winning percentages when other factors are controlled for.

Recruiting is also a product of style of play. There is a perception that is driven by the major recruiting pundits that players will often select schools based on the offensive or defensive philosophies of the head coach. Players tend to consider how they will fit within the specific scheme and game plans, as well as their immediate

contribution to the roster. Equally, there is evidence to suggest that players will select a school based upon the conference's reputation, level of competition, and style of play. Traditionally schools in the Pac-12 and Big 12 run a spread offense with a heavier emphasis on the passing game. The Pac-12 and the Big 12 have established a reputation for high-scoring offenses and yielding top-rated National Football League (NFL) prospects at the quarterback, wide receiver, and other offensive skill positions. This is not to discount the defensive prospects produced by Southern California, Oklahoma and Texas, or the offensive approach of Stanford; however, the reputation of teams from these conferences is one of a high-octane, finesse style offenses. To some degree, many teams from these conferences believe that they can outscore you to win a game. Thus, it can be expected that teams in these conferences may have a recruiting advantage with respect to the offensive skill positions. A national recruit may see the opportunity to play at Oregon or Oklahoma State and know that he will have an opportunity to play in an offense that inflates their statistics and provides a greater opportunity to play in the NFL.

Conversely, the Big Ten and the SEC have established a "four yards and a cloud of dust" reputation. These conferences are known for physical line play, more traditional offensive formations, a heavy emphasis on running the football, and stout defenses. While some teams in these conferences have adopted a spread offense, many rely on traditional offensive sets with a heavier emphasis on the running game. Offensively, the SEC and Big Ten are known to produce top running back and offensive line prospects to the NFL. The SEC is largely regarded as the best defensive conference, largely on the reputation of Alabama and Louisiana State. Still, the reputation of playing defense in the SEC can be enough to attract a defensive prospect to one of the other member schools. These are examples of anecdotal evidence and are not supported by research or the literature.

While the existing literature has established connections between winning and revenue (Caro & Benton, 2012; Brooker & Klastorin, 1981; Baade & Sundberg, 1996; Rhoads & Gerking, 2000; McCormick & Tinsley, 1990), and separately, winning and recruiting (Caro, 2012), examining the statistical attributes of conferences and successful teams has been largely ignored. First, this study presents conference statistics to help support or quell some of the anecdotal evidence offered through the media. Included in this case are trends in the sport with respect to the three major facets of the game: offense, defense, and the kicking game. This case will present the relationship between statistics and winning percentages, and the relationship between on-the-field statistics and successful programs by exploring the attributes of successful (defined separately as bowl-eligibility) teams.

## **METHODS**

This study combined statistics on nearly 80 game-play categories for teams from the AQ BCS conferences (Big East, Big 10, Big 12, SEC, Pac-10, and the ACC) from 2005 to 2011. The year 2005 was selected to control the size of the data set. The list of statistics and their respective definition are found in Appendix A. Statistics were taken from the National Collegiate Athletic Association (NCAA) archive as officially recorded through each game and reported to the NCAA. Each conference was assigned a conference code (SEC, 1; Pac-12, 2; Big 10, 3; Big 12, 4; ACC, 5; Big East 6). Descriptive statistics were formulated for each of the variables in the study. Descriptive statistics and analysis of variance (ANOVA) were used to determine and present any significant differences that existed from year to year. The Games-Howell post-hoc test was used to ascertain in which years these differences existed. Games-Howell was selected as it does not assume equal variances, is appropriate when the assumption of homogeneity of variance is violated, and is recognized as a robust measure when the assumptions of ANOVA are violated (Games & Howell, 1976; Jaccard, Becker, & Wood, 1984; Sullivan, Riccio & Reynolds, 2008). Pearson's product-moment correlation was used to determine the correlation of the continuous measures analyzed in the data set. Teams were then coded "1" for bowl-eligibility and "0" for non-eligibility; ANOVA was conducted along these measures. The findings and subsequent questions are presented below.

The statistics (Table 1) selected for this study were taken from the NCAA archive for games played between 2005 and 2011. The reader will note that statistics on efficiencies such as red zone scoring percentage, third down conversions, fourth down conversions, are missing from the file. This is due to the fact that the data was not available at the NCAA website. These could be potential limitations for this study.

Table 1: Definition of Variables

Variable	Definition
POPatt	Passing offense pass attempts.
POPcomp	Passing offense pass completions.
POInt	Passing offense interceptions.
POPaPct	Passing offense completion percentage.
POYds	Total passing yards.
POYdsatt	Passing yards per attempt.
POTds	Offensive passing touchdowns.
POYdsGm	Passing offense yards per game.
POIntPct	Passing offense interception percentage (interceptions per attempt).
POYdsCmp	Passing offense yards per completion.
PDPcomp	Passing defense completions allowed.
PDPaPct	Passing defense completion of passes allowed.
PDYdsCmp	Passing defense yards per completion allowed.
PDInt	Passing defense interceptions.
PDIntPct	Passing defense interception percentage (interceptions per attempt).
PDYds	Passing defense total yards allowed.
PDYdsatt	Passing defense yards per attempt allowed.
PDTds	Passing defense touchdowns allowed.
PDYdsGm	Passing defense yards per game allowed.
ROCarries	Rushing offense carries.
RONet	Rushing offense total net yards.
ROAvg	Rushing offense yards per carry.
ROTds	Rushing offense touchdowns scored.
ROYdsGm	Rushing offense yards per game.
RDCarries	Rushing defense carries faced.
RDNet	Rushing defense net yards allowed.
RDAvg	Rushing defense yards per carry allowed.
RDTds	Rushing defense touchdowns allowed.
RDYdsGm	Rushing defense total rushing yards allowed.
SDPoints	Scoring defense total points allowed.
SDPtsGm	Scoring defense points per game allowed.
SDTds	Scoring defense total touchdowns allowed.
SDFG	Scoring defense total field goals allowed.
SOYds	Scoring offense total yards.
SOTds	Scoring offense total touchdowns.
SOPoints	Scoring offense total point scored.
SOAvg	Scoring offense average points per game.
SOFG	Scoring offense field goals scored.
TDAvg	Total defense yards per play allowed.
TDPlays	Total defense total plays faced.
TDYds	Total defense total yards allowed.
TDTds	Total defense total touchdowns allowed.
TDYdsGm	Total defense total yards per game allowed.
TOPlays	Total offense total plays.
TOYds	Total offense total yards.
TOAvg	Total offense yards per play.
TOTds	Total offense touchdowns scored.
TOYdsGm	Total offense yards per game.
TMFumGn	Total fumbles gained.
TMIntGn	Total interceptions gained.
TMGtotal	Total turnovers gained.
TMFumls	Total fumbles lost.
TMIntls	Total interceptions lost.
TMLtotal	Total turnovers lost.

(Table 1 continued)

Variable	Definition
TMMargin	Turnover margin
TFLPG	Average tackles for loss per game.
KRKret	Total kick-off returns.
KRYds	Total kick-off return yards.
KRTds	Total kick-off return touchdowns scored.
KRAvg	Kick-off return average yards per return.
NPPunts	Total punts.
NPAvg	Punt distance average.
NPPuntRet	Punts returned on offensive punts.
NPRetYds	Return yards on offensive punts.
NPTouchbacks	Touchbacks on offensive punts.
NPNetAvg	Total net punt average.
PRRet	Punt returns.
PRYds	Punt return total yards.
PRTds	Punt return touchdowns scored.
PRAvg	Punt return average yards per return.
OPassPlayPCT	Percentage of offensive passing plays.
ORunPlayPCT	Percentage of offensive rushing plays.
OPassYdPCT	Percentage of passing yards as a function of total yards.
ORunYdPCT	Percentage of rushing yards as a function of total yards.

## RESULTS

### Conference Trends from 2005 to 2011

ANOVA was conducted to determine if differences existed in the statistics at the conference level for games played from 2005 to 2011; Games-Howell post-hoc tests followed to determine where the significant differences existed. The data is summarized in Table 2. The data indicate a significant difference in passing offense pass attempts, with the Big 12 ( $\bar{X} = 433.26$ ) attempting the most passes and the SEC ( $\bar{X} = 367.90$ ) the least. Offensive passing yards per game statistics indicate that the Big 12 ( $\bar{X} = 248.07$ ) and the Pac 12 ( $\bar{X} = 235.73$ ) led the conference. Alternatively, the Big 10 ( $\bar{X} = 168.84$ ) and the SEC ( $\bar{X} = 157.68$ ) led in rushing yards per game. The Big 12 ( $\bar{X} = 906.10$ ) and the Big 10 ( $\bar{X} = 872.28$ ) had the most total offensive plays, and the Pac 12 ( $\bar{X} = 375.73$ ) and the Big 12 ( $\bar{X} = 373.39$ ) led in total offensive yards per game. The Big 12 ( $\bar{X} = 369.98$ ) and the Pac 12 ( $\bar{X} = 358.83$ ) led in total offensive points and in scoring points per game at ( $\bar{X} = 31.06$ ) and ( $\bar{X} = 28.49$ ) respectively. Offenses in the SEC and the Big 10 ( $\bar{X} = .56$ ) had the highest percentage of run plays while the Pac 12 ( $\bar{X} = .52$ ) reported the lowest.

**Table 2:** ANOVA for Mean Differences for AQ-BCS Football Conferences by Year for 2005 to 2011.

Variable	F	Sig.	Variable	F	Sig.	Variable	F	Sig.
POPatt*	8.254	.000	RD Net	.691	.657	TM Gtotal	1.123	.347
PO Pcomp*	10.102	.000	RD Avg	1.580	.151	TM Fumls*	2.628	.016
PO Int	1.143	.336	RD Tds*	2.692	.014	TM Intls	1.143	.336
PO PaPct*	5.338	.000	RD YdsGm	.692	.656	TM Ltotal	1.331	.242
PO Yds*	6.891	.000	SD Points*	6.696	.000	TM Margin	.158	.987
PO Ydsatt	.485	.819	SD PtsGm*	6.060	.000	TFLPG*	4.227	.000
PO Tds*	6.765	.000	SD Tds*	6.877	.000	KR Kret	1.226	.291
PO YdsGm*	7.715	.000	SD FG*	3.063	.006	KR Yds	1.483	.182
PO IntPct*	4.082	.001	SO Yds*	6.910	.000	KR Tds	1.165	.324
PO YdsCmp	1.445	.196	SO Tds*	6.040	.000	KR Avg	2.021	.062
PD Pcomp*	15.771	.000	SO Points*	5.105	.000	NP Punts*	2.819	.011
PD PaPct*	7.387	.000	SO Avg*	6.292	.000	NP Avg*	2.829	.010
PD YdsCmp	1.091	.367	SO FG	.934	.470	NP PuntRet	1.730	.112
PD Int	.886	.505	TD Avg*	4.100	.001	NP RetYds	1.206	.302
PD IntPct*	3.684	.001	TD Plays*	6.604	.000	NP Touchbacks	.521	.792
PD Yds*	14.441	.000	TD Yds*	8.428	.000	NP NetAvg	1.133	.342
PD Ydsatt*	2.467	.023	TD Tds*	6.877	.000	PR Ret	1.642	.134
PD Tds*	6.992	.000	TD YdsGm*	8.146	.000	PR Yds	1.729	.113
PD YdsGm*	16.000	.000	TO Plays*	7.670	.000	PR Tds	.913	.485
RO Carries	1.924	.075	TO Yds*	6.910	.000	PR Avg	1.511	.173
RO Net*	2.567	.019	TO Avg*	4.051	.001	OPassPlayPct*	4.605	.000
RO Avg*	4.217	.000	TO Tds*	6.040	.000	ORunPlayPct*	5.061	.000
RO Tds*	3.216	.004	TO YdsGm*	9.564	.000	OPassYdPct*	3.360	.003
RO YdsGm*	3.147	.005	TM FumGn*	3.167	.005	ORushYdPct*	3.682	.001
RD Carries	.614	.719	TM IntGn	.886	.505			

\*ANOVA significant at the  $\alpha=.05$  level.

Defenses in the SEC ( $\bar{X} = 272.48$ ), the Big East ( $\bar{X} = 282.33$ ), and the ACC ( $\bar{X} = 268.221$ ) allowed the fewest total points in the season and points per game. The Big East ( $\bar{X} = 135.66$ ), the ACC ( $\bar{X} = 136.10$ ), and the SEC ( $\bar{X} = 137.42$ ) also allowed the fewest rushing yards per game. The conferences with the fewest passing yards allowed were the SEC ( $\bar{X} = 192.94$ ) and the ACC ( $\bar{X} = 205.49$ ).

Correlations to winning percentages were then computed for each conference individually for the period of the study. Notable positive correlations in the SEC (Table 3) were passing offense completion percentage ( $r = .678$ ), passing yards per attempt ( $r = .662$ ), rushing offense net yards ( $r = .591$ ), and turnover margin ( $r = .545$ ). Notable negative correlations in the SEC were rushing yards per game allowed ( $r = -.629$ ), rushing yards allowed per carry ( $r = -.578$ ), and passing defense yards per attempt ( $r = -.536$ ).

In the Pac-12 (Table 4), total offensive yards ( $r = .750$ ), turnover margin ( $r = .705$ ), rushing yards per carry ( $r = .676$ ) were positively related to winning percentage. Passing yards per game ( $r = .273$ ), despite the Pac-12 total passing yards, were only moderately, positively related to winning percentage. Notable negative relationships to winning percentage were rushing yards per game allowed ( $r = -.712$ ), rushing yards per carry allowed ( $r = -.613$ ), net rushing yards allowed ( $r = -.575$ ), and pass yards per attempt allowed ( $r = -.568$ ). The Big 10 (Table 5) indicated strong positive relationships to total punt return yards ( $r = .631$ ), the number of punt returns ( $r = .620$ ), pass defense interception percentage ( $r = .612$ ), pass offense yards per attempt ( $r = .597$ ), and turnover margin ( $r = .576$ ). Those statistics negatively related to winning percentages in the Big 10 were pass defense yards per attempt allowed ( $r = -.724$ ), rushing yards per game allowed ( $r = -.697$ ), pass defense completion percentage ( $r = -.591$ ), and the number of kick-off returns ( $r = -.415$ ).

The Big 12 (Table 6) indicated strong positive relationships between total offensive yards ( $r = .695$ ), rushing touchdowns ( $r = .618$ ), passing yards per attempt ( $r = .612$ ), and turnover margin ( $r = .590$ ) and a team's winning percentage. Those factors negatively associated with winning percentages were passing yards per attempt allowed ( $r = -.598$ ), passing defense completion percentage allowed ( $r = -.507$ ), and rushing defense yards per game allowed ( $r = -.490$ ). The ACC (Table 7) indicated strong positive relationships on turnover margin ( $r = .584$ ),

turnovers gained ( $r = .551$ ), total offensive plays ( $r = .534$ ), scoring offense field goals scored ( $r = .501$ ), rushing offense carries ( $r = .492$ ), and passing yards per attempt ( $r = .466$ ). Those statistics negatively correlated to winning percentage in the ACC were rushing yards allowed per game ( $r = -.656$ ), passing yards allowed per attempt ( $r = -.643$ ), average rushing yards allowed per carry ( $r = -.543$ ), and kick-off return total yards ( $r = -.459$ ). In the Big East (Table 8) total offensive yards ( $r = .728$ ), total offensive plays ( $r = .555$ ), rushing offense net yards ( $r = .555$ ), and tackles for a loss ( $r = .506$ ) were positively correlated to winning. Rushing yards allowed per game ( $r = -.580$ ), rushing yards allowed per carry ( $r = -.514$ ), and passing yards per attempt allowed ( $r = -.477$ ) were negatively related to winning.

**Table 3:** Significant Pearson's Correlations for Variables to Winning Percentage for the SEC Conference from 2005-2011.

Variable	Correlation	Variable	Correlation	Variable	Correlation
SO Points	.781	TM IntGn	.480	TM Ltotal	-.332
SO Tds	.749	SO FG	.456	KR Kret	-.345
TO Tds	.749	PO Yds	.450	PO Int	-.359
SO Avg	.744	PO YdsCmp	.444	TM Intls	-.359
SO Yds	.721	TM Gtotal	.437	PD YdsCmp	-.360
TO Yds	.721	NP NetAvg	.320	PO IntPct	-.376
PO PaPct	.678	PO Pcomp	.317	PD PaPct	-.431
RO Tds	.673	ORunPlayPct	.308	NP RetYds	-.448
PO Ydsatt	.662	PO YdsGm	.301	NP Punts	-.464
TO Avg	.657	PD Pcomp	.280	NP PuntRet	-.477
TO YdsGm	.615	PD IntPct	.278	RD Net	-.487
RO Net	.591	TD Plays	.273	SD Tds	-.499
RO Carries	.556	PR Tds	.265	TD Tds	-.499
TO Plays	.553	TFLPG	.244	RD Tds	-.503
TM Margin	.545	PR Avg	.238	SD Points	-.522
RO Avg	.539	RD Carries	-.221	PD Ydsatt	-.536
PO Tds	.527	PD YdsGm	-.236	TD YdsGm	-.568
RO YdsGm	.490	PD Tds	-.241	RD Avg	-.578
PR Yds	.487	KR Yds	-.261	TD Avg	-.579
PR Ret	.480	TD Yds	-.284	RD YdsGm	-.629
PD Int	.480	OPassPlayPct	-.308	SD PtsGm	-.664

\*\*Pearson's Correlation significant at the  $\alpha=0.05$  level.

**Table 4:** Significant Pearson's Correlations for Variables to Winning Percentage for the Pac-12 Conference from 2005-2011.

Variable	Correlation	Variable	Correlation	Variable	Correlation
SO Points	.845	PO PaPct	.538	TM Ltotal	-.382
SO Avg	.823	TFLPG	.406	PO Int	-.392
SO Tds	.808	PO Yds	.405	TM Intls	-.392
TO Tds	.808	ORushYdPct	.401	NP RetYds	-.392
SO Yds	.750	PR Avg	.383	TD Yds	-.401
TO Yds	.750	PD IntPct	.369	OPassYdPct	-.401
TO Avg	.710	PR Tds	.358	PO IntPct	-.456
TM Margin	.705	TM FumGn	.352	NP PuntRet	-.458
TO YdsGm	.682	SO FG	.314	NP Punts	-.477
RO Avg	.676	PO Pcomp	.308	PD PaPct	-.529
RO Net	.673	KR Avg	.302	RD Tds	-.533
RO YdsGm	.652	TD Plays	.294	TD YdsGm	-.562
RO Tds	.644	ORunPlayPct	.275	PD Ydsatt	-.568
PO Tds	.640	PO YdsGm	.273	RD Net	-.575
TO Plays	.614	PD Pcomp	.268	SD Tds	-.604
TM Gtotal	.599	KR Tds	.255	TD Tds	-.604
PR Yds	.583	RD Carries	-.239	RD Avg	-.613
RO Carries	.578	NP Avg	-.267	SD Points	-.623
PR Ret	.569	OPassPlayPct	-.275	TD Avg	-.626
PO Ydsatt	.559	PD YdsCmp	-.318	RD YdsGm	-.655
PD Int	.545	PD Tds	-.353	SD PtsGm	-.712
TM IntGn	.545	KR Kret	-.381	**Pearson's Correlation significant at the $\alpha=0.05$ level.	

**Table 5:** Significant Pearson's Correlations for Variables to Winning Percentage for the Big Ten Conference from 2005-2011.

Variable	Correlation	Variable	Correlation	Variable	Correlation
SO Points	.687	PO Tds	.379	RD Carries	-.392
PR Yds	.631	ORunPlayPct	.375	KR Yds	-.415
SO Avg	.623	PO PaPct	.356	KR Kret	-.465
PR Ret	.620	PR Avg	.335	PD YdsGm	-.466
SO Tds	.620	RO YdsGm	.329	PD Tds	-.548
TO Tds	.620	TO Plays	.324	TD Yds	-.563
PD Int	.612	TO YdsGm	.312	PD YdsCmp	-.573
TM IntGn	.612	PR Tds	.298	PD PaPct	-.591
PO Ydsatt	.597	NP NetAvg	.293	RD Avg	-.607
TM Margin	.576	NP Avg	.292	RD Net	-.611
PD IntPct	.525	TFLPG	.287	RD Tds	-.651
SO Yds	.514	RO Avg	.262	RD YdsGm	-.697
TO Yds	.514	PO IntPct	-.241	TD Avg	-.702
TM Gtotal	.513	PD Yds	-.276	TD YdsGm	-.704
RO Tds	.506	TM Ltotal	-.288	PD Ydsatt	-.724
RO Carries	.495	SD FG	-.311	SD Tds	-.757
TO Avg	.471	PO Int	-.333	TD Tds	-.757
PO YdsCmp	.450	TM Intls	-.333	SD Points	-.780
SO FG	.448	NP Punts	-.362	SD PtsGm	-.827
RO Net	.437	OPassPlayPct	-.375	**Pearson's Correlation significant at the $\alpha=0.05$ level.	

**Table 6:** Significant Pearson's Correlations for Variables to Winning Percentage for the Big 12 Conference from 2005-2011.

Variable	Correlation	Variable	Correlation	Variable	Correlation
SO Points	.788	TFLPG	.404	TM Intls	-.272
SO Tds	.757	PO Yds	.398	NP Punts	-.290
TO Tds	.757	TD Plays	.389	PD Tds	-.342
SO Avg	.753	RO Carries	.373	PO IntPct	-.355
SO Yds	.695	PR Ret	.356	KR Kret	-.356
TO Yds	.695	SO FG	.355	PD YdsCmp	-.363
TO Avg	.630	PO YdsCmp	.316	NP PuntRet	-.374
RO Tds	.618	PR Yds	.316	NP RetYds	-.378
TO YdsGm	.614	KR Avg	.298	RD Net	-.379
PO Ydsatt	.612	PO YdsGm	.298	RD Tds	-.457
PD Int	.590	PO Pcomp	.292	RD Avg	-.460
TM IntGn	.590	PR Tds	.250	RD YdsGm	-.490
PO PaPct	.583	PR Avg	.250	TD YdsGm	-.493
TM Gtotal	.583	TM FumGn	.231	PD PaPct	-.507
TO Plays	.548	PD Pcomp	.230	SD Tds	-.521
TM Margin	.547	PD YdsGm	-.213	TD Tds	-.521
PO Tds	.497	KR Yds	-.217	SD Points	-.539
RO Net	.444	TM Ltotal	-.232	TD Avg	-.584
PD IntPct	.444	TD Yds	-.250	PD Ydsatt	-.598
RO Avg	.427	PO Int	-.272	SD PtsGm	-.651
RO YdsGm	.420	**Pearson's Correlation significant at the $\alpha=0.05$ level.			

**Table 7:** Significant Pearson's Correlations for Variables to Winning Percentage for the ACC Conference from 2005-2011

Variable	Correlation	Variable	Correlation	Variable	Correlation
SO Points	.708	RO Avg	.378	OPassPlayPct	-.282
SO Tds	.649	PD IntPct	.376	PD Tds	-.295
TO Tds	.649	NP Touchbacks	.365	PD YdsGm	-.303
SO Avg	.639	PR Tds	.364	TD Yds	-.343
SO Yds	.603	RO YdsGm	.352	PD PaPct	-.383
TO Yds	.603	TD Plays	.351	PD YdsCmp	-.431
TM Margin	.584	PR Ret	.326	KR Yds	-.459
TM Gtotal	.551	PO Tds	.319	KR Kret	-.484
TO Plays	.534	PO YdsCmp	.302	RD Net	-.509
PD Int	.510	TFLPG	.289	RD Avg	-.543
TM IntGn	.510	ORunPlayPct	.282	TD Avg	-.603
SO FG	.501	PD Pcomp	.281	SD Tds	-.632
RO Tds	.494	TM FumGn	.248	TD Tds	-.632
RO Carries	.492	ORushYdPct	.236	TD YdsGm	-.639
TO Avg	.474	PO Yds	.232	PD Ydsatt	-.643
PO Ydsatt	.466	NP Avg	.223	SD Points	-.654
RO Net	.436	OPassYdPct	-.236	RD YdsGm	-.656
PR Yds	.428	PO Int	-.253	RD Tds	-.664
TO YdsGm	.426	TM Intls	-.253	SD PtsGm	-.775
PR Avg	.404	PO IntPct	-.263	**Pearson's Correlation significant at the $\alpha=0.05$ level.	

**Table 8:** Significant Pearson's Correlations for Variables to Winning Percentage for the Big East Conference from 2005-2011.

Variable	Correlation	Variable	Correlation	Variable	Correlation
BE	PC	PD Int	.454	PD Tds	-.328
SO Points	.830	TM IntGn	.454	NP PuntRet	-.346
SO Tds	.789	TM Gtotal	.448	KR Kret	-.372
TO Tds	.789	SO FG	.441	PD PaPct	-.392
SO Avg	.752	PO PaPct	.431	RD Net	-.438
SO Yds	.728	RO YdsGm	.426	PD Ydsatt	-.477
TO Yds	.728	TD Plays	.425	RD Avg	-.514
RO Tds	.672	RO Carries	.424	NP Punts	-.534
TO Avg	.648	PO Tds	.418	TD YdsGm	-.542
TO YdsGm	.578	TM Margin	.410	RD Tds	-.553
TO Plays	.555	PO Pcomp	.402	RD YdsGm	-.580
PO Ydsatt	.555	PO YdsCmp	.399	TD Avg	-.586
RO Net	.555	PO YdsGm	.380	SD Points	-.616
PO Yds	.522	PR Ret	.324	SD Tds	-.634
RO Avg	.509	POPaa	.302	TD Tds	-.634
TFLPG	.506	PR Yds	.292	SD PtsGm	-.731

\*\*Pearson's Correlation significant at the  $\alpha=0.05$  level.

### Differences among Teams

Teams were then separated into two cohorts: bowl-eligible teams (defined as six wins or more) and non-bowl eligible teams. ANOVA was conducted to determine if differences existed in the statistics for teams in these two cohorts. ANOVA results (Table 9) indicate that these cohorts were different on every statistic except: offensive passing attempts, rushing defense total carries faced, scoring defense field goals allowed, fumbles lost, kick-off return touchdowns allowed, net punting average, and net punting touchbacks. Passing yards per game for bowl teams ( $\bar{X} = 228.35$ ) was higher than for non-bowl teams ( $\bar{X} = 210.58$ ), as was rushing yards per game ( $\bar{X} = 166.39$  v.  $129.92$ ), total yards per game ( $\bar{X} = 389.77$  v.  $338.74$ ), points per game ( $\bar{X} = 30.18$  v.  $22.18$ ), and total plays ( $\bar{X} = 891.34$  v.  $801.21$ ). Bowl teams allowed fewer total yardage ( $\bar{X} = 338.74$  v.  $389.77$ ), fewer points per game ( $\bar{X} = 21.48$  v.  $29.16$ ), and allowed fewer rushing yards per game ( $\bar{X} = 128.45$  v.  $165.97$ ). Bowl teams also indicated a positive turnover margin ( $\bar{X} = .26$  v.  $-.34$ ), gained more turnovers ( $\bar{X} = 25.29$  v.  $19.52$ ), and lost fewer turnovers over the course of the season ( $\bar{X} = 21.90$  v.  $23.60$ ).

Statistics most strongly related to winning percentage for bowl teams (Table 9) were passing yards per attempt ( $r = .435$ ), rushing offensive touchdowns ( $r = .435$ ), and scoring offense points ( $r = .610$ ). Scoring defense points allowed per game ( $r = -.504$ ), rushing yards per game allowed ( $r = -.436$ ), and passing yards allowed per attempt ( $r = -.427$ ) were most notably negatively correlated to winning percentage.

**Table 9:** Significant Pearson's Correlations for Variables to Winning Percentage for AQ-BCS Conference Bowl-Eligible Teams from 2005-2011.

Variable	Correlation	Variable	Correlation	Variable	Correlation
SO Points	.610	RO YdsGm	.247	NP PuntRet	-.241
SO Avg	.584	PD IntPct	.239	PO IntPct	-.253
SO Tds	.575	TO Plays	.223	PO Int	-.260
TO Tds	.575	TFLPG	.208	TM Intls	-.260
PO Ydsatt	.435	PO Yds	.205	PD Tds	-.278
RO Tds	.435	RO Carries	.199	PD YdsCmp	-.289
TO Avg	.433	PR Avg	.199	PD PaPct	-.313
SO Yds	.432	PO YdsCmp	.174	TD Yds	-.313
TO Yds	.432	PO YdsGm	.158	NP Punts	-.315
TM Margin	.378	SO FG	.147	KR Kret	-.335
TO YdsGm	.371	KR Avg	.146	RD Net	-.382
PO PaPct	.368	PO Pcomp	.117	RD Tds	-.396
PD Int	.345	ORunPlayPct	.095	RD Avg	-.399
TM IntGn	.345	OPassPlayPct	-.099	TD YdsGm	-.409
PR Yds	.338	PD Yds	-.103	SD Tds	-.423
PO Tds	.321	NP RetYds	-.152	TD Tds	-.423
PR Ret	.307	SD FG	-.152	PD Ydsatt	-.427
RO Avg	.300	PD YdsGm	-.189	RD YdsGm	-.436
TM Gtotal	.291	RD Carries	-.224	TD Avg	-.449
RO Net	.277	KR Yds	-.238	SD Points	-.450
PR Tds	.274	TM Ltotal	-.238	SD PtsGm	-.504

\*\*Pearson's Correlation significant at the  $\alpha=0.05$  level.

The sample was then separated into two new cohorts: those teams that won ten or more games and those that did not. ANOVA was conducted to determine if differences existed in the statistics for these two cohorts. ANOVA results (Table 10) indicate that these cohorts were different on every statistic except: offensive passing attempts, pass defense yards allowed, fumbles gained, fumbles lost, kick-off return touchdowns, and net punting touchbacks. Passing yards per game for ten-win teams ( $\bar{X} = 236.85$ ) was higher than for non-ten win teams ( $\bar{X} = 219.00$ ), as was rushing yards per game ( $\bar{X} = 184.59$  v.  $146.99$ ), total yards per game ( $\bar{X} = 421.44$  v.  $366.40$ ), points per game ( $\bar{X} = 34.69$  v.  $25.78$ ), and total plays ( $\bar{X} = 910.18$  v.  $850.97$ ). Ten-win teams allowed less total yardage ( $\bar{X} = 319.34$  v.  $364.12$ ), fewer points per game ( $\bar{X} = 18.96$  v.  $25.18$ ), and fewer rushing yards per game ( $\bar{X} = 115.23$  v.  $146.81$ ) than the non-ten win cohort. Ten-win teams also indicated a positive turnover margin ( $\bar{X} = .58$  v.  $-.07$ ), gained more turnovers ( $\bar{X} = 27.40$  v.  $22.44$ ), and lost fewer turnovers over the course of the season ( $\bar{X} = 19.66$  v.  $23.21$ ). Correlation statistics (Table 11) were calculated for the ten-win cohort. The variables most strongly related to winning percentages for this cohort were scoring offense average points per game ( $r = .379$ ), rushing offense touchdowns ( $r = .306$ ), and punt returns ( $r = .299$ ). Those negatively associated with winning percentage were scoring defense points allowed ( $r = -.430$ ), kick-off kick returns ( $r = -.422$ ), and pass defense yards per attempt allowed ( $r = -.410$ ).

**Table 10:** ANOVA Comparing Ten-Win Teams to non-Ten Win Teams from AQ-BCS Conferences for 2005 to 2011.

Variable	F	Sig.	Variable	F	Sig.	Variable	F	Sig.
POPatt	.152	.697	RD Net*	42.846	.000	TM Gtotal*	66.813	.000
PO Pcomp*	6.040	.014	RD Avg*	50.301	.000	TM Fumls	3.509	.062
PO Int*	46.019	.000	RD Tds*	50.564	.000	TM Intls*	46.019	.000
PO PaPct*	66.164	.000	RD YdsGm*	70.307	.000	TM Ltotal*	40.843	.000
PO Yds*	27.467	.000	SD Points*	69.478	.000	TM Margin*	114.460	.000
PO Ydsatt*	123.416	.000	SD PtsGm*	101.826	.000	TFLPG*	8.535	.004
PO Tds*	70.839	.000	SD Tds*	57.108	.000	KR Kret*	33.335	.000
PO YdsGm*	9.003	.003	SD FG*	13.391	.000	KR Yds*	15.861	.000
PO IntPct*	40.390	.000	SO Yds*	132.450	.000	KR Tds	1.889	.170
PO YdsCmp*	33.327	.000	SO Tds*	212.050	.000	KR Avg*	6.785	.009
PD Pcomp*	8.885	.003	SO Points*	234.127	.000	NP Punts*	46.227	.000
PD PaPct*	33.711	.000	SO Avg*	186.020	.000	NP Avg*	4.108	.043
PD YdsCmp*	29.153	.000	SO FG*	25.886	.000	NP PuntRet*	29.817	.000
PD Int*	84.857	.000	TD Avg*	62.812	.000	NP RetYds*	14.930	.000
PD IntPct*	41.687	.000	TD Plays*	11.712	.001	NP Touchbacks	.000	.985
PD Yds	.001	.972	TD Yds*	18.415	.000	NP NetAvg*	4.588	.033
PD Ydsatt*	66.666	.000	TD Tds*	57.108	.000	PR Ret*	28.771	.000
PD Tds*	17.427	.000	TD YdsGm*	62.065	.000	PR Yds*	38.115	.000
PD YdsGm*	11.797	.001	TO Plays*	50.259	.000	PR Tds*	30.091	.000
RO Carries*	62.762	.000	TO Yds*	132.450	.000	PR Avg*	19.360	.000
RO Net*	85.849	.000	TO Avg*	118.365	.000	OPassPlayPct*	19.066	.000
RO Avg*	68.781	.000	TO Tds*	212.050	.000	ORunPlayPct*	18.082	.000
RO Tds*	136.005	.000	TO YdsGm*	76.318	.000	OPassYdPct*	12.188	.001
RO YdsGm*	62.182	.000	TM FumGn	3.052	.081	ORushYdPct*	10.955	.001
RD Carries*	10.879	.001	TM IntGn*	84.857	.000			

\*ANOVA significant at the  $\alpha=.05$  level.

**Table 11:** Significant Pearson's Correlations for Variables to Winning Percentage for Ten-Win AQ-BCS Conference Teams from 2005-2011.

Variable	Correlation	Variable	Correlation	Variable	Correlation
SO Avg	.379	RO Net	.162	PD Yds	-.312
SO Points	.311	PD PaPct	-.183	RD Tds	-.324
SO Tds	.307	NP RetYds	-.206	RD Net	-.337
TO Tds	.307	PO IntPct	-.209	TD YdsGm	-.340
RO Tds	.306	SD FG	-.210	RD Carries	-.345
PR Ret	.299	NP PuntRet	-.223	PD Tds	-.360
PO PaPct	.287	PO Int	-.258	TD Avg	-.381
TM Margin	.287	TM Intls	-.258	TD Yds	-.388
PR Yds	.269	RD Avg	-.260	SD PtsGm	-.399
TO Avg	.261	PD YdsGm	-.261	SD Tds	-.407
RO YdsGm	.251	TD Plays	-.268	TD Tds	-.407
RO Avg	.245	KR Yds	-.290	PD YdsCmp	-.407
TO YdsGm	.229	TM Ltotal	-.296	PD Ydsatt	-.410
KR Avg	.216	RD YdsGm	-.299	KR Kret	-.422
PO Ydsatt	.205	NP Punts	-.307	SD Points	-.430
TFLPG	.190	**Pearson's Correlation significant at the $\alpha=0.05$ level.			

## DISCUSSION

### Conference Trends from 2005 to 2011

The results indicate that differences exist among the AQ-BCS conferences with respect to style of play, scoring, and correlations to winning percentages. Many of the passing statistics, such as passing attempts, passing yards, and passing offense touchdowns, were led by the Big 12 and the Pac-12 conferences. These two conferences also led in total scoring and scoring points per game. Furthermore, passing plays accounted for a greater percentage of their total plays and total yards. The Big 12 led in total offensive plays, slightly ahead of the Pac-12.

The data indicates that the Big 12 led, or was in the top three, in rushing statistics. This could be an indication that the league may be more offensively balanced than perceived. While the Big Ten led in total rushing yards per game and rushing yards per carry, the Big 12 was ahead of the SEC to round out the top three. This is interesting as the Big Ten and the SEC are traditionally regarded as running leagues with power backs and power formations. The SEC and the Big Ten led in percentage of run plays as a function of total plays and in percentage of rushing yards as a function of total yards, indicating again, that rushing offenses may be more prevalent in these conferences.

Total defensive points allowed and defensive points per game, a category of strength of defensive play, was led by the SEC, the Big East, and the ACC. The figures from the ACC and the Big East may be influenced by the fact that the ACC and Big East were the least productive offenses, respectively. The SEC is largely regarded as the best defensive conference in the country, and there is now quantitative statistics from 2005 to 2011 to support those claims. Teams from the SEC allow the fewest passing yards per game, are third in rushing yards allowed per game, allow the fewest total yards per game, and have the lowest turnover margin of any conference.

The ACC and the Big East were largely balanced offenses, with a slight lean towards running the football. These conferences collectively, however, scored the least total points and averaged the fewest points per game. While teams like West Virginia and Cincinnati in the Big East and Florida State, Clemson, and Georgia Tech in the ACC can keep pace nationally in scoring, the conference average was plagued by teams who are not able to score at a pace consistent with the national average.

Correlations to winning percentage help to further illustrate the differences amongst the conferences. The relationship between scoring offense and winning percentage was strongest in the Pac 12 ( $r = .845$ ), the Big East ( $r = .830$ ) and the Big 12 ( $r = .788$ ), while the strength of the negative relationship between scoring points allowed and winning percentage was greatest in the Big Ten ( $r = -.827$ ), the ACC ( $r = -.775$ ), and the Big East ( $r = -.731$ ). The Big Ten and the ACC were the only conferences where the magnitude of the relationship between defense points allowed and winning percentage was greater than that of the scoring offense.

The SEC had a surprisingly low relationship between defensive points per game ( $r = -.664$ ) and winning. This may be an indication of defensive balance in the league, thus raising the importance of having an explosive offense. The SEC correlations indicate that an efficient passing game, rushing touchdowns, and net rushing yards are positively related to winning, while rushing yards per game allowed, rushing yards per carry allowed, and passing yards per attempt allowed are negatively related to winning percentage.

The factors in the Pac-12 are slightly different than those of the SEC. Aside from a stronger relationship between scoring offense points, turnover margin and rushing yards per game were positively related to winning. The results indicated that the Pac-12 was behind the Big 12 in passing yards per game; however, passing yards per game was only moderately correlated to winning ( $r = .273$ ). Moreover, despite the potent passing teams in the conference, pass defense yards per game allowed was not significantly related to winning percentages. Instead, rushing yards per game allowed ( $r = -.655$ ) and average yards per carry allowed ( $r = -.613$ ) were negatively related to winning, while offensive rushing yards per game ( $r = .652$ ) indicated a strong, positive relationship to winning.

In the Big Ten, there were eight categories of defensive statistics that were more strongly related to winning percentage than offensive points scored. This helps to stress the importance of defense in the Big Ten. Defensive rushing statistics such as yards per game allowed, rushing touchdowns allowed, net rushing yards allowed, and rushing yards per carry allowed, all had strong relationships with winning percentages. Coupled with the fact that the Big Ten led all conferences in offensive rushing yards per game and rushing yards per carry, the data indicates that stopping the run is of utmost importance in the conference. Field position and forcing your opponent to punt the ball are also important in the Big Ten.

The importance of offense in the Big 12 was highlighted by this study. Aside from leading in total yards, total yards per game, total points scored, and points per game, these statistics are also strongly related to winning percentage. Total offensive yards ( $r = .695$ ) measures a stronger relationship to winning percentage than points per game allowed ( $r = -.651$ ), which points to the importance of offensive production in the conference. Limiting

interceptions and creating interceptions are also related to winning mainly because of the inflated passing attempts of the conference. Possessing the ball (total plays,  $r = .548$ ) and turnover margin ( $r = .548$ ) are also important. For success in the Big 12, it appears as though teams must have the ability to score points. In 2011, Oklahoma State, Baylor, and Oklahoma, who led the conference in scoring offense, all won ten games or more; these teams also led the conference in total yards.

Scoring defense points per game allowed ( $r = -.775$ ) was the most strongly related variable to winning percentage in the ACC, indicating the importance of defense in the conference. Specifically, the ability to stop the run, limit the number of rushing touchdowns, and limit passing yards per attempt allowed are critical. Defenses that can create turnovers, and offenses that can turnovers, are also strongly linked to winning. The ACC leans slightly to being a running conference, with 55% of the total plays being rushing plays. Field position and field goal scoring, like the Big Ten, is also important in the ACC.

The Big East, statistically was very similar to the ACC. Scoring points, however, is at a premium in the Big East. This may be the reason that scoring offense was so strongly associated with winning percentage in the conference. In 2011, the league fielded two ten-win teams, both of whom led the conference in scoring, and were in the top three in total offense. These findings do not undermine the importance of defense in the league; however, at 26.38 points per game, the Big East was below the AQ-BCS scoring average of 27.78. This decreased production in scoring can be an indication that teams from the Big East field strong, championship-caliber defenses, thus helping them win out of conference games. The conference records in those out of conference games, however, does not support this as the Big East went 3-12 in 15 games versus other BCS schools in 2010 (NCAA, 2012). Statistically, the conference appeared to be the weakest offensively in the BCS.

### **Differences among Teams**

The results of the ANOVA indicate that there are significant differences amongst bowl-eligible and non-bowl-eligible teams. The bowl-eligible cohort outperformed the non-bowl eligible cohort in nearly every offensive and defensive statistic. The expectation for bowl-eligible teams to outperform the non-eligible cohort was expected; however, the magnitude of the deviation for these cohorts was significant. The correlations indicate the importance of being able to stop the run, limit the big play ability of their opponent, and increase scoring. Bowl eligible teams outscored their opponents by an average of 30.18 to 21.48; those who were not bowl-eligible were outscored by an average of 22.18 to 29.16. The ability to stop the run has also been a consistent predictor of success amongst all conferences. There was a marked difference between these two cohorts on this statistic at 128.45 to 165.97.

The results for the ten-win cohort in comparison to the non-ten win team cohort are equally, if not more pronounced. These two cohorts were different on each of the variables except passing attempts, pass defense yards, fumbles gained, fumbles lost, kick-off return touchdowns, and punt touchdowns. Again, as with the bowl eligible cohorts, scoring was a major distinction between these groups. Ten win teams beat their opponents by an average score of 34.69 to 18.96; the margin for the non-ten win cohort was a leaner 25.78 to 25.18. Defensive rush yards allowed was also a significant marker for these teams as the ten-win cohort allowed an average of 115.23, while the non-ten win cohort allowed 146.81 yards per game.

### **CASE QUESTIONS**

1. The results of this study lead to the conclusion that there have been significant changes in game play from 2005 to 2011. Nationally, the most evident patterns in the data are the increase in offensive production, the rise in scoring, and the reliance of efficiency at the quarterback position. Further, the national statistics indicate the importance of stopping the run and limiting big plays in the passing game. What are the implications of these trends on a recruiting front for teams from the various conferences? How would that impact decisions for coaches as they formulate their respecting recruiting plans?
2. The results of this study indicate that there is statistical evidence to conclude that there exist different styles and pace of play through the different conferences. There are also differences in the variables that correlate to success for each conference. Given these relationships, assess the status of realignment in Division One

- football. What are your expectations on where teams landed in conference play? If there were an opportunity to restructure these conference alignments, which ones would make most sense?
3. It can be concluded that there are differences among the various cohorts at the different levels of success. What are the implications of these differences for coaches and for athletic directors? What impact should this have on future scheduling decisions and the types of teams that coaches are willing to play?
  4. Coaches now have statistical evidence to support their preparation for conference games. They also have statistical relationships that can guide their style of play. Further, the results of this study help to signal important positions of emphasis in recruiting, and helps establish performance benchmarks to assist coaches in assessing the current state of their program. Design a series of benchmarks for any one of the conferences included in the study. What are the goals that a specific team in that particular conference should aspire to in order to secure a winning season? Further, what are the impact of these on game attendance and the possibility of generating added revenue?
  5. Athletic directors now have a benchmark for building successful programs. At a time when great changes continue to occur off the field, athletic directors can now understand the national football landscape. They are also armed with statistical data to inform decisions on scheduling out-of-conference games and understand the important connection between recruiting, revenue, and winning. What are the changes that athletic directors can undertake to help their programs be more attractive for recruits? There is evidence to support an “arms race” in college football. What are the implications of this “arms race” and how can athletic directors structure their programs to be more successful in the future?
  6. As football continues to evolve, and the money continues to grow, it is paramount for athletic directors to use every advantage that is within the rules and guidelines of the NCAA. This study provides another such avenue by illuminating the importance of style of play, the relationship between game-play statistics and success, and the factors that differentiate success at different levels of definition. Still, more research is needed to continue to understand the dynamics of college football. Design an in-depth analysis plan to help athletic directors learn more about their program, its strengths and weaknesses, and their needs moving forward. Then, design a change management plan to implement these changes over a realistic period of time.

#### **AUTHOR INFORMATION**

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