Analysis of Defensive Statistics in the Football Bowl Subdivision

By

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Abstract

The purpose of this study was to investigate the relationship between the significance of specific defensive football statistics in Division I college football (Football Bowl Subdivision). The top twenty-five FBS teams in each category were compared to the corresponding bottom twenty-five FBS teams in the same category.

This study used a two – sample t test assuming equal variances to analyze the data with a .05 significance level. Wins and losses were not weighted in this study. The defensive statistics that were analyzed were defensive points allowed per game, rushing yards allowed per game, passing yards allowed per game, turnovers gained, defensive 3rd down efficiency, defensive redzone efficiency, defensive big play allowed percentage, and penalties per game.

This study found that the order of importance for defensive statistics during the 2015 FBS season which were significant are as follows: defensive points allowed per game, rushing yards allowed per game, total turnovers gained, defensive big plays percentage allowed, defensive 3rd down efficiency, and passing yards allowed per game. While these were significant for wining a football game, they are not the only statistics needed to win a football game and the investigation suggested other opportunities in further analytics.

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Chapter 1

Introduction

Overview

In 2014, the Southeastern Conference (SEC) generated a staggering $476 million in payouts from bowl games, the National Collegiate Athletic Association (NCAA) Men's Basketball Tournament, and television contracts with Columbia Broadcasting System (CBS) and Entertainment and Sports Programming Network (ESPN) (Forbes, 2015). Every member school of the SEC received an equal allotment of that money to the tune of $34 million dollars each. The SEC is the king of college football at the moment, both on the field, and at the bank. However, the Big Ten conference is not far behind in earnings due to crowning a national champion in 2014, as well as raking in $392 million during that year. College football is in a financial arms race to see who can generate the most money. The race for money does not stop just at the institutions. Companies that are not even in the field of sports are looking to cash in on athletics. In the 1995-96 season there were 18 post season bowl games. Fast forward 20 years to the 2015-16 season, where there were 42 post season bowl games (Duggan, 2015). The total money generated from bowl games in the 2013-14 was $309.9 million dollars. College football is becoming big business. Coaches, administrators, and athletic departments aren't the only ones benefitting.

Decades ago, there was a foreshadowing of the importance of wining and winning on television. In 1984, in Miami's famed Orange Bowl, an incredible football game was played between the Boston College Eagles and the Miami Hurricanes. The game was played the day after Thanksgiving in front of a national audience on CBS. It was a battle

of two ranked teams; and numerous offensive records were set on both sides. On the last play of the game, Boston College had the ball on the Hurricanes' 48 yard line. Down 45-41, Boston College Quarterback Doug Flutie threw a Hail Mary. A Boston College player caught the pass in the end zone, stunning the Hurricanes 47-45 as time expired. It has been ranked one of the greatest games in college football history. The impact of that game did not just end that season. The biggest impact may have happened off the field a couple of years later. Undergraduate applications at Boston College increased 30% over the next two years. The press and sport researchers have dubbed this phenomenon the, "Flutie Effect" (Chung, 2013). The Flutie Effect is a phenomenon of having a successful sports team provide widespread exposure for the college. This is not the lone example of a winning program acting as a school advertisement. A more recent example took place in 2007 in Glendale, Arizona. The 2007 Tostitos Fiesta Bowl pitted national power Oklahoma, and the obscure Boise State Broncos. Very few gave the Broncos a chance. The game was one of epic proportions with incredible swings of momentum and trick plays. Boise State prevailed in overtime with a 2-point conversion to topple the Sooners, 43-42. That following fall, Boise State saw a jump of 18% in undergraduate applications (Chung, 2013). College football is big business, and *everyone* is cashing in.

The growth of college football is undeniable. The time to capitalize on its growth is also hard to argue against. The most effective way a college can utilize football as a marketing tool is to win, and win big. The 10 programs that topped the NCAA in revenue in 2014 accounted for $1.5 billion dollars collectively (USA Today, 2015). These programs also had a combined record of 108-36 in the 2015 season. They also performed well in the post-season in front of national audiences with 5 bowl victories (two of the

teams played one another). The Alabama Crimson Tide, who ranked 4th nationally in revenue, won the 2015 College Football Playoff. Colleges are pumping an incredible amount of money into resources for these programs. Not one person is deemed more accountable and responsible for seeing these financial commitments turn into wins on the field than the Head Football Coach of their team.

In 2015, 121 of the 128 Division I Football Bowl Subdivision (FBS) schools released their financial compensation for their head football coaches. Those 121 head coaches averaged an annual salary of $1.9 million dollars (USA Today, 2015). These coaches are making a very handsome salary in return for delivering a quality product on the football field. The increase in salaries has also created a decrease in patience. With the advent of social media, television, and the internet; it has become even harder for a head coach to turn a losing program into a winning program. There is constant pressure on administrators from fans and boosters who can voice their frustrations more publically than ever before. Head coaches at the FBS level have seen an average yearly turnover rate of 12.34% over the last 6 seasons (Winthrop, 2014). Coaches need to find the key to winning on the field, and need to find it quickly after they become the head coach.

Statement of Problem

College football coaches have come under incredible stress and scrutiny in order to justify their large salaries. Coaches have always sought to find the winning edge, or an advantage over their opponent. With the turn of the 21st century and advancements in technology, there has been a niche created in sport analytics. Coaches are habitually conservative and traditionalists. They tend to not step outside of the box, in fear of failure and public humiliation.

Sport analytics first became popular in baseball; most notably in the movie, Money Ball. Sport analytics have begun to be utilized in all professional sports. The 2016 Super Bowl Champion Denver Broncos employed a Director of Analytics. The Nebraska Cornhuskers also have a Director of Analytics on their staff. College football is slowly investing in sport information resources. The Ball State University football program utilizes a data analytic program for college football called, Coaches: By the Numbers. Most coaches understand the necessary statistics needed to win football games. Analytics have dove deeper into statistics and found tendencies and trends that are not found in the game box score.

College football and football in general has seen a trend of increased offensive play. The evolution of the Quarterback position, spread offenses, and changes in rules has helped promote offensive play. In 2001, the average offensive points per game were 27.1 points per game (PPG). In the 2015 season that number grew to 29.3 PPG (Coaches by the Numbers, 2016). The passing game has also seen greater emphasis than in years past. In 2001, the average passing yards per game (PYPG) was 213.8 PYPG. In 2015, that number rose to 231.7 PYPG. Head coaches know that in order to be successful you must at least have a quality offensive unit. However, there has been as much emphasis on stopping offenses as there is to have them flourish. This has created a demand to hire competent and revolutionary defensive coordinators. These coaches need to know the tendencies of offenses and what they are seeking to achieve statistically each game. Defensively, it is necessary to stop offenses from achieving these goals. Identifying, game planning against, and executing plans to stop these offenses is the responsibility of

the defensive coordinator. Being successful defensively on Saturday's (or Tuesdays, Wednesdays, Thursdays, and Fridays) is called "the winning formula".

Purpose Statement

Using the power of sport analytics, the keys to being a successful defensive football unit help determine the success of the team as a whole. This study analyzed eight (8) statistics from the 2015 NCAA DI FBS college football season. Seven (7) of these statistics are defensive. These statistics are; scoring defense, rushing yards allowed per game, passing yards allowed per game, total turnovers gained, defensive 3rd down efficiency, red zone defense, and defensive big play percentage allowed. Penalties per game were also analyzed; it is important to note that a team may be penalized while on defense, offense, or special teams. This researcher examined the top 25 teams and bottom 25 teams nationally for each statistic. Tests were then used to investigate the relationship between ranking well or poorly in these statistics and winning or losing football games.

Guiding Questions

This study sought to answer questions regarding the impact of good defensive football and winning football games. Does allowing fewer points directly impact wins and losses? With such an offensive game, it may be more important to score then to stop scoring. Did allowing less rushing yards give a team a better chance to win than allowing less passing yards? Finding an answer to this question could help defensive coordinators zero in on what exactly to game plan against. Defensive coordinators could be more efficient with their time trying to stop the run as opposed to stopping the pass. Turnovers have long been thought to be a key contributor to winning. Would this hold true with this study of variables?

Regarding 3rd down efficiency, did getting the offense off the field on 3rd down lead to more wins? This study also sought to answer the, "bend but don't break" philosophy. This can be reflected in red zone defense. Allowing a team to accumulate yardage by driving down the field but not allowing scores could be a precursor to a successful defense. Another question that arises, does allowing big plays give you a higher chance of losing? Is it more important for an offense to grind it out as opposed to getting big plays? The last question is do least penalized teams really win more games?

Hypotheses

The following eight sets of hypotheses based on these guiding questions were studied;

Null One: The twenty-five Division I FBS teams with the least points allowed per game will win less or an equal number of football games than the twenty-five Division I FBS teams with the most points allowed per game.

Research One: The twenty-five Division I FBS teams with the least points allowed per game will win more football games than the twenty-five Division I FBS teams with the most points allowed per game.

Null Two: The twenty-five Division I FBS teams with the least rushing yards allowed per game will win less or an equal number of football games than the twenty-five Division I FBS teams with the most rushing yards allowed per game.

Research Two: The twenty-five Division I FBS teams with the least rushing yards allowed per game will win more football games than the twenty-five Division I FBS teams with the most rushing yards allowed per game.

Null Three: The twenty-five Division I FBS teams with the least passing yards allowed per game will win less or an equal number of football games than the twenty-five Division I FBS teams with the most passing yards allowed per game.

Research Three: The twenty-five Division I FBS teams with the least passing yards allowed per game will win more football games than the twenty-five Division I FBS teams with the most passing yards allowed per game.

Null Four: The twenty-five Division I FBS teams with the most total turnovers gained will win less or an equal number of football games than the twenty-five Division I FBS teams with the least total turnovers gained.

Research Four: The twenty-five Division I FBS teams with the most total turnovers gained will win more football games than the twenty-five Division I FBS teams with the least total turnovers gained.

Null Five: The twenty-five Division I FBS teams with the highest defensive 3rd down efficiency will win less or an equal number of football games than the twenty-five Division I FBS teams with the lowest defensive 3rd down efficiency.

Research Five: The twenty-five Division I FBS teams with the highest defensive 3rd down efficiency will win more football games than the twenty-five Division I FBS teams with the lowest defensive 3rd down efficiency.

Null Six: The twenty-five Division I FBS teams with the highest defensive red zone efficiency will win less or an equal number of football games than the twenty-five Division I FBS teams with the lowest defensive red zone efficiency.

Research Six: The twenty-five Division I FBS teams with the highest defensive red zone efficiency will win more football games than the twenty-five Division I FBS teams with the lowest defensive red zone efficiency.

Null Seven: The twenty-five Division I FBS teams with the lowest defensive big play allowed percentage will win less or an equal number of football games than the twenty-five Division I FBS teams with the highest defensive big play allowed percentage.

Research Seven: The twenty-five Division I FBS teams with the lowest defensive big play allowed percentage will win more football games than the twenty-five Division I FBS teams with the highest defensive big play allowed percentage.

Null Eight: The twenty-five Division I FBS teams with the lowest penalties per game average will win less or an equal number of football games than the twenty-five Division I FBS teams with the highest penalties per game average.

Research Eight: The twenty-five Division I FBS teams with the lowest penalties per game average will win more football games than the twenty-five Division I FBS teams with the highest penalties per game average.

Definition of Terms

The following key terms are used throughout this study:

Scoring Defense: Average number of points allowed per game.

Rush: An attempt to advance the football beyond the line of scrimmage by running with the football.

Rushing Defense: Average number of defensive rushing yards allowed per game.

Pass: An attempt to advance the football beyond the line of scrimmage by throwing the football in the air.

Passing Defense: Average number of defensive passing yards allowed per game.

Turnovers Gained: Total number of interceptions and recovered fumbles by the defense for the duration of the entire season.

Defensive 3rd Down Efficiency: Percentage of defensive third downs that were **NOT** converted for first downs (including touchdowns).

Red Zone: An area defined between the opponents 20 and 1 yard lines.

Red Zone Scoring %: Percentage of defensive red zone attempts allowed that resulted in either a touchdown or field goal. A red zone drive is defined as any drive that has a play inside of the opponent's 20 yard line.

Big Play: An explosive offensive gain, 12+ yards for a rushing attempt and 20+ yards for a passing attempt.

Big Play Percentage: Number of big plays defense gave up compared to total number of plays.

Penalty: Sanction called against a team for a violation of the rules.

Penalties per Game: Average number of penalties a team commits per game.

Chapter One Summary

Wins and losses in the game of college football have never been more important than they are now. It is not just fans and players that are affected by wins and losses, but multi-million dollar television contracts, bowl sponsors, and university enrollment as well. Understanding what needs to be done in a football game to be the winner is necessary. Playing good defensive football is critical to winning a football game. This study investigated exactly which, if not all, defensive statistics are most important for winning.

Chapter 2

Review of Related Literature

Background

There are approximately 128 institutions that sponsor a football team at the Football Bowl Subdivision (FBS) level. Every school has the same number of full-time positions for their football staff. Each program is allotted one head football coach and nine full-time assistant football coaches (NCAA, 2015). Because of the sheer number of coaches and the yearly cycle of college football; there is ample research done on the defensive statistics of winning football games. After every season data is collected to be broken down and analyzed. It is in the off-season that coaches analyze this data paired with film and study the past seasons results. Following this period (typically 1 month), adjustments are made in techniques and schemes to help prepare for the upcoming season. This information is then typically implemented in spring practice. Each FBS school is allotted 15 practices to take place in the spring preceding each football season. Of these 15 sessions only 8 are allowed to involve live contact; three (3) of these sessions may include live contact for greater than 50% of the practice time. These 3 practices are typically divided up into two (2) scrimmages and one (1) spring game. The data broken down and analyzed in the off-season is necessary to help prepare the coaches and players for many major or minor adjustments during spring practice.

Defensive Points Allowed Per Game

An old maxim heard in every sport, “Offense wins game, defense wins championships”. The iconic quote was spoken by National Basketball Association (NBA) legend, Michael Jordan. Jordan uttered the words while cradling the Larry O’Brien

trophy after the Bulls had won their first NBA championship (Moskowitz & Wertheim, 2012). Not only is it important to have strong defense in the game of football but basketball as well. A study was conducted on defensive points allowed per game in the NBA. Analyzing the past 35 NBA champions since the 1980 season, the study found that each champion scored an average of 5.26 in defensive points allowed per game. Comparatively, offenses scored an average of 5.52 (NBA-Reference). There is a slight advantage given to the defensive points allowed per game ranking in the NBA.

College football's professional counterpart, the National Football League (NFL), has an even greater influence of defensive-led champions. From the 1st Super Bowl in 1966 to the 2005 Super Bowl the wining team had an average rank 4.18 in defensive points allowed per game. Conversely, on offense those teams had an average rank of 5.5 in offensive points scored per game (Pro-Football Reference). This is a striking difference. The last decade has brought on this trend in the NFL. From 2006 to 2016, Super Bowl champions ranked an average of 12.1 in defensive points allowed per game. On offense, these teams ranked an average of 9.8 in offensive points scored per game. The last 10 years have seen a dramatic decrease in offensive and defensive prowess. Teams are now winning with a better offense than defense in the NFL. This is important to think about when analyzing the data for college football at the FBS level. However, 2015 showed that in order to even make the playoffs, it is best that you do have a top 10 defense. Of the top 10 defenses that led the NFL in scoring defense, 9 of them made the playoffs (NFL Stats, 2016). This shows that defense still has some indication of winning football games. The data analysis in this study will investigate whether the same trend is happening in FBS that the NFL has seen during the last 10 years.

Stopping the Run

In the early days of football, rushing the football was the only way to advance the ball. Football games resembled rugby scrums. Twenty-two (22) men all together within a 5 yard radius, with many stacked on top one another. Football those days was much different than the one typically seen played in America today. In 1905, in response to a large number of fatalities while playing football, the forward pass was legalized (Morrison, 2010). Many of the game's coaches did not believe in the forward pass. There were also incredible restrictions placed on the use of the forward pass. The rules stated that an incomplete pass resulted in a 15-yard penalty. An incomplete pass that hit the ground without being touched by the offensive team resulted in a *turnover*. It is hard to imagine the game of football being played that way today. By 1912, the restrictions of the forward pass were lifted (AP, 2013). However, it still took a couple of decades for the forward pass to catch on to the popularity it has become today. Offenses were still primarily based on the rushing the football. The most common offensive scheme was the "triple option". In this offense, the quarterback has 3 different options while running the ball. He may either: hand the ball to the fullback, keep it himself, or pitch it to the running back. While the offense may seem complicated to the defense, it was easy to run for the offense. This offense also helped inferior teams compete with stronger teams due to its deception and trickery.

Despite the growing evolution of the passing game, the game of football is still firmly planted in its running roots. Stopping the run still remains to this day one of the top goals for defensive coordinators across the country. Jack Giambrone, former defensive coordinator at Wilmington College (OH), once wrote, "Good defenses control

the run; great defenses stop the run. That has to be the No. 1 objective on defense" (Giambrone, 2005).

This was his number one goal while coaching defense in college. Offenses look to establish the run in every game. Offenses that can successfully run the ball create an advantage over the defense. They do not have to resort to exclusively throwing the ball to advance the football down the field. This played into Coach Giambrone's next philosophy, "Defenses that can control the run will make offenses more predictable. Once you force the offense to throw the ball, you will be able to hurry the passing game with stunts and blitzes and make bad things happen" (Giambrone, 2005).

Once the defense has stopped the running game, the offense must rely on the passing game. This one-dimensional attack makes it easier for defenses to predict what the offense will do. The lack of a running game will create more 2nd & long and 3rd & long situations. Defenses are more apt to blitz in these situations, creating havoc for the offense.

Nick Saban, Head Football Coach of the Alabama Crimson Tide, is widely regarded as one of the best defensive coaches in college football. Saban has won 4 national championships in the past 9 seasons. His teams have done so with dominating defense, especially against the run. Cumulatively in those 4 national championship seasons the Tide ranked 1st in rushing defense. Saban's defense gave up a paltry 75.6 yards rushing per game average in those 4 seasons. Looking back at the last seven seasons individually according to Football Outsider's S&P+ Rankings, Alabama has finished 3rd, 3rd, 14th, 2nd, 1st, 3rd, and 1st (Football Outsider, 2016). Not only could

teams not run the football, they had a hard time carrying it across the goal line as well. Alabama only allowed an average of 0.44 rushing touchdowns per game during those 4 seasons. The University of Alabama is a small sample size for the importance of stopping the run. This study analyzes defensive statistics to potentially generalize this concept to all of FBS college football.

Stopping the Pass

As mentioned in the previous section, the passing game has grown in both college football and the NFL. Far from the bright lights and sold out stadiums is high school football in the state of Maine. Not known for its football power, high school coaches are just beginning to see the evolution of the pass. “Especially in Northern Maine, we still don’t see a lot of passing — we don’t focus on the pass a lot,” Old Town coach Lance Cowan said. “It’s something that’s kind of working its way up (Clark, 2015). While it is still important to stop the run first, a greater emphasis has been put on defending the pass as well. Stopping the pass involves a two-fold solution. Most importantly and often over looked is the ability to rush the passer. This concept is even utilized at the high school level. Old Town High School coach Lance Cowan also agrees, “Putting pressure on the quarterback is definitely the biggest way to defend the pass” (Clark, 2015). On all passing plays, the quarterback will drop back to throw. Having the ability to disrupt the quarterback will cause him to err in his throws. This pressure then makes it easier for the defensive backs to defend the pass. That leads to the second part of defending the pass, defensive back play. The defensive backs must aligned and be in the proper coverage technique. Anytime there is a coverage breakdown or poor technique played, it can lead to big offensive passing plays.

The 2016 Super Bowl Champion Denver Broncos illustrated the need to rush the passer as a viable solution to the stopping the pass. The Broncos led the NFL in sacks (Pro-Football Reference, 2016). A sack is when the opposing team tackles the quarterback on a passing play behind the line of scrimmage. This results in a loss of yardage. The Broncos sack number of 52 paced the NFL. The Bronco's pass rush was showcased in the Super Bowl against the Carolina Panthers. The Broncos sacked Panther quarterback, Cam Newton, 7 times. This was more than double their season average of 3.25 sacks per game. Newton was flustered all game long and did not come anywhere close to season averages in the air with his passing game.

Not only did the Broncos stop teams in the air with their sack totals, they also had great defensive back play. The Broncos led the NFL in defensive passing yards allowed per game with an average of 199.6 yards per game. In the defensive secondary, 6 players ranked in the top 100 in the NFL for passes defended. Passes defended are completed passes negated by the defensive player.

The Broncos ran a specific defense that helped lead them to this type of dominance. The Broncos instituted a 3-4 defensive scheme (Boyd, 2015). In this scheme, there are 3 down defensive lineman and 4 linebackers. The linebackers on the outside can be utilized in the pass rushing game or in coverage. In this defense, a safety will also play closer to the line of scrimmage. This type of defense utilized the Broncos best players in the most appropriate way possible. At the outside linebacker position, Von Miller recorded 11 sacks this season (8^{th} Best) and Demarcus Ware recorded 7.5 (27^{th} Best) (Pro-Football Reference, 2016). With these two players creating havoc for the quarterback, the defensive secondary was able to make plays on many errant passes.

Back in the college game, Michigan State rose to prominence behind their suffocating defense. Defensive Coordinator, Pat Narduzzi, implemented a system that made it harder to both throw and run the ball (Boyd, 2013). The basis of Narduzzi's defense is to get the safeties in to help stop the run. Offensive plays aren't typically designed to have a blocker for the safety. It is imperative that the safeties get into the action of the run game. On the outside, the wide receivers are pressed by the corners. This makes it harder to make quick completions, allowing the pass rush to get to the quarterback.

Penalties

From a young age, players are coached to be disciplined and to not commit penalties. Teams with few penalties are seen as well-coached and successful. However, there is a new argument being created by sport statisticians. Recent NFL seasons have seen teams with higher penalty rates with better records. From the 2009-2013 NFL seasons, no correlation was found between penalties and offensive, defensive, or team performance (NFLPenalties.com, 2016). The 2012 and 2013 Super Bowl Champions (Ravens, Seahawks) both led the league in penalties and penalty yardage per game (Fischer-Baum, 2014). Not only was this found in the NFL but also in high school as well. A 2003 study found that the team with more penalty yards in a game won 67% of the time (Reese, 2003). It would be interesting to investigate whether this same phenomenon exists in FBS college football.

Chapter Two Summary

There is an abundance of literature that helped prescribe the reasons why good defenses win games and championships. These statistics have been not only shown to be prevalent in college football but in high school and professional football as well. Using the literature available, it would be beneficial to a defensive coordinator to use these successful strategies while constructing their defensive scheme. The literature reviewed coupled with the results of this investigation will create another source of information for those planning to study the importance of defensive statistics in college football.

Chapter 3

Methodology

Purpose

The purpose of this study was to determine if there is a significant relationship between selective defensive football statistics and winning football games at the Football Bowl Subdivision (FBS) level of college football. If these analyses do demonstrate a positive relationship, this finding would lead to further research. The data used in this study was collected from two different sources. One source is available to the public and another is provided through a pay for use subscription. The data was collected during the 2015 college football season.

Data Sources

The data was collected from two different sources. The statistical categories; Scoring Defense, Rushing Defense, Passing Defense, Turnovers, and 3rd Down Defense were collected from the National Collegiate Athletic Association Football Bowl Subdivision football public statistics website. The statistical categories; Redzone Defense, Big Play Percentage, and Penalties were collected from the analytical database Coaches By The Numbers (CBTN). This website can only be accessed through a subscription. The website only provides statistics for the FBS level of all college football. Also, statistics only go back as far as the 2003 football season.

Procedures

First, the investigator had to determine what defensive statistics should be used in this study. Many defensive statistics are readily available and historically fluctuate from

game to game. However, it is not hard to see trends with the statistics chosen. Second, parameters had to be set to analyze the data. The top 25 and bottom 25 teams in the FBS were chosen to be studied in each category.

The data was then collected from two sources. The data was entered into an excel database which could be easily sorted (See Appendix A-H). The data collected was analyzed using student t tests using a .05 level of significance. This study sought to answer the question, "What defensive statistics correlate best to winning football games?" This study was submitted to the sponsoring college's IRB committee and was found to be exempt from full Internal Review Board review.

Data Analysis

A two sample – t test assuming equal variances was used to analyze the data along with regression analysis. Wins and losses were not weighted in this study. The highest number of possible wins for each team was 15 and the lowest is 0. Teams can play a different number of games depending on conference championship games, bowl games, and national playoff games. In the 2015 college football season, no team finished with 15 wins. Alabama won the national championship with a record of 14-1. They defeated the Clemson Tigers who also finished the season 14-1.

Chapter Three Summary

All data gathered for this study came from two different sources. There were no human subject identifiers. The data was categorized into a top 25 for each ranking and a bottom 25 ranking for each. A two sample – t test was used to find a relationship between which statistical categories had the most influence on wins and losses.

Chapter 4

Results

Purpose of the Study

The goal of this study was to investigate the relationship between a selected group of defensive statistics from the Division I Football Bowl Subdivision in the 2015 season and winning football games. The information gathered and analyzed for this study can be beneficial to college coaches. Defensive coaches can use this information when game planning against their team's opponent.

Data Analysis Results

Below are the data analysis results for the eight sets of hypotheses studied. A **ρ** value of .05 significance was used when analyzing each hypothesis tested.

Null Hypothesis One: Table 1 below provides the data analysis results for null hypothesis one.

Table 1 Analysis of Defensive Points Allowed Per Game

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{01} \leq \overline{X}_w$ $H_{11} > \overline{X}_w$	t = 8.37	t = 2.01	6.01×10^{-11}	Reject H_{01} Accept H_{11}

The top twenty-five FBS teams with the most defensive points allowed per game will win less or an equal number of football games than the bottom twenty-five FBS teams with the least defensive points allowed per game. The researcher found a t value of 8.37, when a t critical value of 2.01 was needed. The **ρ** value was 6.01×10^{-11}. When analyzing the results for null hypothesis one, the researcher found that null hypothesis

one should be rejected and research hypothesis one should be accepted. This means that the FBS teams with the least defensive points allowed per game will win significantly more football games.

Null Hypothesis Two: Table 2 below provides the data analysis results for null hypothesis two.

Table 2 Analysis of Rushing Yards Allowed Per Game

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{02} \leq \overline{X}_w$ $H_{12} > \overline{X}_w$	t = 7.43	t = 2.01	1.57×10^{-9}	Reject H_{02} Accept H_{12}

The top twenty-five FBS teams with the least rushing yards allowed per game will win less or an equal number of football games than the bottom twenty-five FBS teams with the most rushing yards allowed per game. The researchers found a t value of 7.43, when a critical t value of 2.01 was needed. The **ρ** value was 1.57×10^{-9}. When analzysing the results for null hypothesis two, the researcher found that null hypothesis two should be rejected and research hypothesis two should be accepted. This means that the FBS teams with the least rushing yards allowed per game will win significantly more football games.

Null Hypothesis Three: Table 3 below provides the data analysis for null hypothesis three.

Table 3 Analysis of Passing Yards Allowed Per Game

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{03} \leq \overline{X}_w$ $H_{13} > \overline{X}_w$	t = 3.11	t = 2.01	.003	Reject H_{03} Accept H_{13}

The top twenty-five FBS teams with the least passing yards allowed per game will win less or an equal number of football games than the bottom twenty-five FBS teams with the most passing yards allowed per game. The researcher found a t value of 3.11, when a t critical value of 2.01 was needed. The **ρ** value was .003. When analyzing the results for null hypothesis three, the researcher found that null hypothesis three should be rejected and research hypothesis three should be accepted. This means that the FBS teams with the least amount of passing yards allowed per game will win significantly more football games.

Null Hypothesis Four: Table four below provides the data analysis results for null hypothesis four.

Table 4 Analysis of Total Turnovers Gained

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{04} \leq \overline{X}_w$ $H_{14} > \overline{X}_w$	t = 6.89	t = 2.06	3.97×10^{-7}	Reject H_{04} Accept H_{14}

The top twenty-five FBS teams with the most total turnovers gained will win less or an equal number of football games than the bottom twenty-five FBS teams with the least amount of total turnovers gained. The researcher found a t value of 6.89, while a t

critical value of 2.06 was needed. The **ρ** value was 3.97 x 10^{-7}. When analyzing the results for null hypothesis four, the researcher found that null hypothesis four should be rejected and research hypothesis four should be accepted. This means FBS teams with the most total turnovers gained with win significantly more games.

Null Hypothesis Five: Table 5 below provides the data analysis results for null hypothesis five.

Table 5 Analysis of Defensive 3rd Down Efficiency

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{05} \leq \overline{X}_w$ $H_{15} > \overline{X}_w$	t = 5.55	t = 2.06	1.01 x 10^{-5}	Reject H_{05} Accept H_{15}

The top twenty-five FBS teams with the highest defensive 3rd down efficiency will win less or an equal number of football games than the bottom twenty-five FBS teams with the lowest 3rd down efficiency. The researcher found a t value of 5.55, when a t critical value of 2.06 was needed. The **ρ** value was 1.01 x 10^{-5}. When analyzing the results for null hypothesis five, the researcher found that null hypothesis five should be rejected and research hypothesis five should be accepted. This means that FBS teams with the highest 3rd down efficiency will win significantly more football games.

Null Hypothesis Six: Table 6 below provides the data analysis results for null hypothesis six.

Table 6 Analysis of Defensive Redzone Efficiency

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{06} \leq \overline{X}_w$ $H_{16} > \overline{X}_w$	t = 1.71	t = 2.01	.093	Accept H_{06}

The top twenty-five FBS teams with the highest defensive redzone efficiency will win less or an equal amount of football games than the bottom twenty-five FBS teams with the lowest defensive redzone efficiency. The researcher found a t value of 1.71, when a t critical value of 2.01 was needed. The **ρ** value was .093. When analyzing the results for null hypothesis six, the researcher found that null hypothesis six should be accepted.

Null Hypothesis Seven: Table 7 below provides the data analysis results for null hypothesis seven.

Table 7 Analysis of Defensive Big Play Percentage Allowed

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{07} \leq \overline{X}_w$ $H_{17} > \overline{X}_w$	t = 6.15	t = 2.01	1.43×10^{-7}	Reject H_{07} Accept H_{17}

The top twenty-five FBS teams with the lowest defensive big play percentage allowed will win less or an equal number of football games than the bottom twenty-five FBS teams with the highest defensive big play percentage allowed. The researcher found a t value of 6.15, when a t critical value of 2.01 was needed. The **ρ** value was 1.43×10^{-7}. When analyzing the results for null hypothesis seven, the researcher found that null

hypothesis seven should be rejected and research hypothesis seven should be accepted. This means that the FBS teams with the lowest defensive big play percentage allowed will win significantly more football games.

Null Hypothesis Eight: Table 7 below provides the data analysis results for null hypothesis seven.

Table 8 Analysis of Penalties Per Game

Hypothesis	t Value	Critical Value	**ρ** Value	Decision
$H_{08} \leq \overline{X}_w$ $H_{18} > \overline{X}_w$	t = -.71	t = 2.01	0.477	Accept H_{08}

The top twenty-five FBS teams with the least penalties per game will win less of an equal number of football games than the bottom twenty-five FBS teams with the most penalties per game. The researcher found a t value of -.71, when a t critical value of 2.01 was needed. The **ρ** value was 0.477. When analyzing the results for null hypothesis eight, the researcher found that null hypothesis eight should be accepted.

Chapter Summary

After all the data was analyzed the researcher found that null hypotheses one, two, three, four, five, and seven can be rejected and the corresponding research hypotheses can be accepted. The researcher found that null hypotheses six and eight should be accepted. The six research hypotheses; defensive points allowed per game, rushing yards allowed per game, passing yards allowed per game, total turnovers gained, defensive 3rd down efficiency, and defensive big plays allowed percentage are all important factors for

winning FBS football games. The null hypotheses; defensive redzone efficiency and penalties per game were not significant at a .05 level to winning football games.

Chapter 5

Discussion, Implications, Conclusions

Purpose of the Study

The purpose of this study was to investigate the relationship between the importance of eight specific defensive statistics between the top twenty-five FBS football teams and the bottom twenty-five teams for each variable studied. The defensive statistics used were; defensive points allowed per game, rushing yards allowed per game, passing yards allowed per game, turnovers gained, defensive 3rd down efficiency, defensive redzone efficiency, defensive big play allowed percentage, and penalties per game.

Discussion of Results

The data analysis for null hypothesis one found a significant difference in wins between the top twenty-five FBS teams with the lowest defensive points allowed per game and the bottom twenty-five FBS teams with the highest defensive points allowed per game. Due to this finding, the researcher rejected null hypothesis one and accepted research hypothesis one. Defensive points allowed per game was found to have the greatest significance of all the hypotheses studied. This would support the maxim, "Defense wins championships". While there are other statistics that contribute to a victory, defensively, none was found to be more significant than defensive points allowed per game. This finding is already widely supported by most defensive football coaches.

The data analysis for null hypothesis two found a significant difference between the top twenty-five FBS football teams with the lowest rushing yards allowed per game average and the bottom twenty-five FBS teams with the highest rushing yards allowed per game. Thus null hypothesis two was rejected and the corresponding research

hypothesis two was accepted. Rushing yards allowed per game was found to be the 2nd most significant statistic attributed to winning football games in this study. This data supports several statements made earlier in the study. Coach Jack Giambrone, of Wilmington College, stated that the top priority of a defense each game is to stop the run. By stopping the run, the offense becomes one-dimensional. Forcing the offenses hand to attempt passes greatly benefits the defense. This will allow the defensive coordinator to call plays that are conducive to stopping the pass. (Giambrone, 2005)

The data analysis for null hypothesis three found a significant difference between the top twenty-five FBS teams with the least passing yards allowed per game and the bottom twenty-five FBS teams the most passing yards allowed per game. Thus null hypothesis three was rejected and the research hypothesis three was accepted. Passing yards allowed per game was not as significant as rushing yards allowed per game. To win football games, however this result means it is important to stop both the run and the pass.

The data analysis for null hypothesis four found a significant difference between the top twenty-five FBS teams with the most total turnovers gained and the bottom twenty-five FBS teams with the least total turnovers gained. Thus null hypothesis four was rejected and the research hypothesis four was accepted. Total turnovers gained was found to be the 3rd most significant defensive statistic studied. This does reflect the majority coaches' consensus in the literature on the importance of turnovers. Defenses that can obtain turnovers not only stop the opposing team's offense from scoring but give their own offense another possession. This also limits the number of plays the opposing team's offense can run, limiting their opportunities to score.

The data analysis for null hypothesis five found a sigfnicant difference between the top twenty-five FBS teams with the highest defensive 3rd down efficiency and the bottom twenty-five FBS teams with the lowest defensive 3rd down efficiency. Thus null hypothesis five was rejected and the research hypothesis five was accepted. 3rd down stops are significant to a defense's success. Getting the opposing team's offense off the field limits their chances to score. When a defense cannot get a stop on 3rd down it can hurt the unit's morale and give the opponents four more opportunities to score. Defensive players get tired without getting a break and the will of the offense imposes on their spirits.

The data analysis for null hypothesis six did not find a significant difference between the top twenty-five FBS teams with the highest defensive redzone efficiency and the bottom twenty-five FBS teams with the lowest defensive redzone efficiency. Thus null hypothesis six was accepted. The data gathered did not support that successful defensive redzone defenses contribute to winning football games. This could be due to significance of turnovers in a football game. When a team's offense turns the ball over it is possible that the opposing team's offense could start inside the 20 yard line. This is automatically becomes a redzone opportunity through no fault of that team's defense. Some offensive statistics can affect defensive statistics more than others. The researcher would like to note that it was positively trending and at a .10 level it would be significant.

The data analysis for null hypothesis seven found a significant difference between the top twenty-five FBS teams with the lowest defensive big play percentage allowed and the bottom twenty-five FBS teams with the highest defensive big play percentage allowed. Thus null hypothesis seven was rejected and research hypothesis seven was

accepted. Big plays for the offense often end in touchdowns being scored. If they do not score on that given play, their field position greatly improves. This also improves their chances of scoring. These plays can also give confidence to the offense that they have the ability to gain a great amount of yardage. A smaller sample size study from the NFL also supports this finding. In 2010, of the bottom ten teams with the most big plays allowed, only two made the playoffs. One of those teams, the Seattle Seahawks, did so with a sub-.500 record (Iyer, 2011).

The data analysis for null hypothesis eight also did not find a significant difference between the top twenty-five FBS teams with the least penalties per game and the bottom twenty-five FBS teams with the most penalties per game. Thus null hypothesis eight was accepted. The majority of coaches preach that a high number of penalties means a team is undisciplined. That may be the case, but it does not significantly affect winning a football game. This is perhaps the most interesting finding of the study. Most people would, at first glance, say the teams with the least amount of penalties win the most games.

Implications

The purpose of this study was to determine which, if any, specific defensive statistics were most important to winning a FBS football game. The study found that there are some statistics that are significant to winning football games. The researcher found that the order of importance for defensive statistics during the 2015 FBS season are as follows: defensive points allowed per game, rushing yards allowed per game, total turnovers gained, defensive big plays percentage allowed, defensive 3rd down efficiency, and passing yards allowed per game. Defensive redzone efficiency and penalties per

game were not as significant in winning football games although defensive redzone efficiency is trending towards significance at a **ρ**-velocity of .09. The researcher came to these conclusions based on the t score analysis results for each hypothesis.

Finding that rushing defense was more significant than passing defense could help defensive coordinators better prepare their defensive plan for games. In order to be more efficient in practice preparation, this study would support spending more time on game planning against the run as opposed to the pass. Practice periods that have a stopping the run emphasis could be more beneficial. Furthermore, during the recruitment of players, it would be important to recruit players that are better suited for stopping the run. This will provide your defense players who are better at stopping the run, which is found to be more important than stopping the pass.

Telling your team to not commit penalties may lead them to play more conservatively. The current idea that fewer penalties lead to more wins could be misleading. This study does not support that idea. Coaches could tell their players to play, with no repercussions from committing penalties particularly if it stops an opportunity for scoring.

Suggestions for Future Research

Future research should be done on more defensive statistics. This study only analyzed eight different statistics. There are many more basic and advanced analytical data that can be obtained. The Football Bowl Subdivision is the most popular level of college football; there are many people who conduct research of the game. Taking a statistic that was used in this study, defensive redzone efficiency can be broken down even further. Defensive redzone efficiency measures how often a defense limits an

offense to 0 points when they have position from the 20 yard line or less. Is there a difference between defensive redzone field goal percentage and defensive redzone touchdown percentage? A further study on penalties using every FBS team (128) from the 2015 could provide more information. A study using these same statistical categories could be done in the NFL to see if the same results are repeated.

Strengths and Limitations of the Study

The strength of this defensive analysis study was the clear and concise findings. The data analyzed is easily available to all defensive college football coaches. The statistics used are already accessible to all college football coaches. This study will help link this information with the coach's desired results. Future studies can help create more depth and information on the statistics used in this study. For FBS coaches, this study looked at all schools in the top and bottom twenty-five of each category. The results in this study provide a generalization of key defensive statistics at the FBS level which are essential for football analytics.

One limitation of this study was the data used was from only one season, 2015. The results in this study may not be reflected in the study of a different year. Using a 5 year time frame could provide more generalized relevant results.

Another limitation of this study was the possibility that some of the statistics were skewed. Each game is its own entity. Weather can greatly affect a football game statistically. Defenses see more runs than passes in inclement weather. This can skew their rushing yards allowed. Also, strength of schedule can affect statistics. There may be a very good team that continually plays lesser teams. Their defensive statistics may be inflated. Defensive statistics can also be skewed if their offense is not very good. This

will give the defense more defensive plays a game, more opportunities for the opposing team's offense to gain rushing yards, passing yards, and points.

Chapter Five Summary

The purpose of this study was to investigate the relationship between the importance of eight specific defensive statistics between the top twenty-five FBS football teams and the bottom twenty-five teams for each variable studied. The defensive statistics used were; defensive points allowed per game, rushing yards allowed per game, passing yards allowed per game, turnovers gained, defensive 3rd down efficiency, defensive redzone efficiency, defensive big play allowed percentage, and penalties per game. The researcher found that the order of importance for defensive statistics during the 2015 FBS season are as follows: defensive points allowed per game, rushing yards allowed per game, total turnovers gained, defensive big plays percentage allowed, defensive 3rd down efficiency, and passing yards allowed per game. Defensive redzone efficiency and penalties per game were not as significant in winning football games. The researcher came to the conclusions based on the t score values for each hypothesis using a .05 significance level. FBS football teams that were successful in those six statistical categories were more likely to win more football games than those that did not. Further research needs to done with these statistics and numerous others.

References

[2015 Football Bowl Subdivsion Statistics]. (2015, March). Unpublished raw data. Coaches By The Numbers (CBTN)

100 Years Ago Today: Rockne & the forward pass change Notre Dame football forever. (2013, November 1). Retrieved April 10, 2016, from http://www.wndu.com/home/headlines/100-Years-Ago-Today-Rockne-the forward-pass-change-Notre-Dame-football-forever-230157501.html

Berkowitz, S. (n.d.). USA TODAY Sports. Retrieved April 10, 2016, from http://sports.usatoday.com/ncaa/finances

Boyd, I. (2015, February 25). The rule of three: Why defenses need three good coverage men on the field at all times. Retrieved April 10, 2016, from http://www.footballstudyhall.com/2015/2/25/8109391/the-rule-of-three-modern-pass-defense-coverage-spread-offense

Chung, D. J. (2013, April 30). The Dynamic Advertising Effect of Collegiate Athletics final. Retrieved April 10, 2016, from http://www.hbs.edu/faculty/Publication Files/13-067_99c551d6-c484-4245-9e49-964d2283cd98.pdf

Clark, E. (2015, November 4). Pass defense a challenging key to high school football success. Retrieved April 10, 2016, from http://bangordailynews.com/2015/11/04/sports/pass-defense-a-challenging-key-to-high-school-football-success/

Dan Duggan | NJ Advance Media for NJ.com. (2015, May 6). With continued expansion, bowl games are nearing participation trophy status | Opinion. Retrieved April 10, 2016, from http://www.nj.com/rutgersfootball/index.ssf/2015/05/with_continued_expansion_bowl_games_are_nearing_pa.html

Division-I Coaching Turnover Trends – Winthrop Intelligence. (2013). Retrieved April 10, 2016, from http://winthropintelligence.com/2013/09/02/coaching-turnover-trends/

Fischer-Baum, R. (2014, January 7). Is "Discipline" Overrated In The NFL? Retrieved April 10, 2016, from http://regressing.deadspin.com/is-discipline-overrated-in-the-nfl-1496283805

Football Outsiders. (n.d.). Retrieved April 10, 2016, from http://www.footballoutsiders.com/stats/ncaadef

Iyer, V. (2011, July 15). Underrated NFL stats: Big plays allowed. Retrieved April 10, 2016, from http://www.sportingnews.com/nfl-news/191984-underrated-nfl-stats-big-plays-allowed

Morrison, J. (2010, December 28). The Early History of Football. Retrieved April 10, 2016, from http://www.smithsonianmag.com/history/the-early-history-of-footballs-forward-pass-78015237/?no-ist=

Moskowitz, T. J., & Wertheim, L. J. (2011). *Scorecasting: The hidden influences behind how sports are played and games are won*. New York: Crown Archetype.

NCAA Publications. (n.d.). Retrieved April 10, 2016, from https://www.ncaapublications.com/

NFL Penalties – 2015 League Penalty Stats – View by Total. (n.d.). Retrieved April 10, 2016, from http://www.nflpenalties.com/index.php

Reese, J. (2003, December 12). Penalties in Football – Good or Bad? – Compusports Media Exchange. Retrieved April 10, 2016, from http://compusportsmedia.com/penalties-in-football-good-or-bad/

Smith, C. (2015, June 20). The SEC Is Finally The Most Valuable Conference In College Sports. Retrieved April 10, 2016, from http://www.forbes.com/sites/chrissmith/2015/07/20/the-sec-is-finally-the-most-valuable-conference-in-college-sports/#58386934349e

Statistics. (n.d.). Retrieved April 10, 2016, from http://www.nfl.com/stats/categorystats?seasonType=REG

Appendices

Appendix A

FBS SCORING DEFENSE				
RANK	Team	W	L	SCORING DEFENSE
1	Wisconsin	10	3	13.69
2	Ohio St.	12	1	15.08
3	Alabama	14	1	15.13
4	Boston College	3	9	15.25
5	Missouri	5	7	16.17
6	Michigan	10	3	16.38
7	San Diego St.	11	3	16.43
8	Georgia	10	3	16.92
9	Florida St.	10	3	17.46
10	Marshall	10	3	17.77
11	Florida	10	4	18.29
12	Northwestern	10	3	18.62
13	Washington	7	6	18.77
14	Appalachian St.	11	2	19.08
15	Connecticut	6	7	19.46
16	Tennessee	9	4	20
17	Temple	10	4	20.07
18	Boise St.	9	4	20.23
19	Iowa	12	2	20.36
20	Houston	13	1	20.71
21	Toledo	10	2	20.75
22	Vanderbilt	4	8	21
23	Akron	8	5	21.46
24	Clemson	14	1	21.67
25	Michigan St.	12	2	21.71
104	Rutgers	4	8	34.92
105	Hawaii	3	10	35.62
106	Old Dominion	5	7	35.75
107	Arizona	7	6	35.77
108	Ball St.	3	9	35.83
109	Rice	5	7	35.83
110	Charlotte	2	10	36.25
111	Tulane	3	9	36.25
112	Purdue	2	10	36.5
113	La.-Monroe	2	11	36.54
114	Oregon St.	2	10	37
115	South Ala.	5	7	37.25
116	Oregon	9	4	37.54
117	Indiana	6	7	37.62
118	UCF	0	12	37.67
119	Fresno St.	3	9	38.08
120	Texas St.	3	9	39.17
121	Tulsa	6	7	39.85
122	North Texas	1	11	41.25
123	Idaho	4	8	42.08
124	Eastern Mich.	1	11	42.08
125	Texas Tech	7	6	43.62
126	New Mexico St.	3	9	45
127	SMU	2	10	45.67
128	Kansas	0	12	46.08

Appendix B

FBS RUSHING DEFENSE								
RANK	TEAM	W	L	OPP RUSH	OPP RUSH YDS	YDS/RUSH	RUSH TDS	YPG
1	Alabama	14	1	468	1136	2.43	7	75.7
2	Boston College	3	9	416	994	2.39	6	82.8
3	Akron	8	5	410	1208	2.95	12	92.9
4	Wisconsin	10	3	396	1240	3.13	13	95.4
5	Boise St.	9	4	440	1407	3.2	14	108.2
6	Utah	10	3	430	1412	3.28	11	108.6
7	San Diego St.	11	3	482	1522	3.16	14	108.7
8	Houston	13	1	480	1524	3.18	16	108.9
9	Nebraska	6	7	379	1428	3.77	18	109.8
10	Toledo	10	2	413	1382	3.35	11	115.2
11	Michigan St.	12	2	449	1624	3.62	16	116
12	Arkansas	8	5	403	1514	3.76	25	116.5
13	Louisiana Tech	9	4	440	1551	3.53	13	119.3
14	Louisville	8	5	477	1563	3.28	11	120.2
15	Iowa	12	2	469	1700	3.62	11	121.4
16	Michigan	10	3	437	1589	3.64	12	122.2
17	LSU	9	3	387	1475	3.81	14	122.9
18	Clemson	14	1	531	1879	3.54	18	125.3
19	Washington	7	6	495	1629	3.29	15	125.3
20	Arizona St.	6	7	450	1637	3.64	16	125.9
21	Northwestern	10	3	463	1640	3.54	21	126.2
22	Ohio St.	12	1	488	1649	3.38	10	126.8
23	Ole Miss	10	3	496	1652	3.33	9	127.1
24	Temple	10	4	470	1790	3.81	16	127.9
25	Florida	10	4	508	1793	3.53	12	128.1
103	Old Dominion	5	7	522	2440	4.67	30	203.3
104	La.-Monroe	2	11	638	2704	4.24	27	208
105	California	8	5	565	2727	4.83	24	209.8
106	Colorado St.	7	6	553	2773	5.01	27	213.3
107	Texas A&M	8	5	555	2778	5.01	19	213.7
108	Purdue	2	10	504	2579	5.12	28	214.9
109	South Carolina	3	9	509	2609	5.13	26	217.4
110	UNLV	3	9	462	2610	5.65	32	217.5
111	Texas	5	7	583	2630	4.51	21	219.2
112	South Ala.	5	7	493	2652	5.38	34	221
113	Wyoming	2	10	512	2702	5.28	28	225.2
114	Oregon St.	2	10	526	2706	5.14	28	225.5
-	Ball St.	3	9	512	2706	5.29	29	225.5
116	Fresno St.	3	9	563	2816	5	32	234.7
117	Tulsa	6	7	592	3116	5.26	37	239.7
118	Hawaii	3	10	686	3118	4.55	33	239.8
119	North Texas	1	11	531	2879	5.42	38	239.9
120	New Mexico St.	7	6	521	2907	5.58	35	242.3
121	North Carolina	11	3	675	3463	5.13	28	247.4
122	Texas St.	3	9	542	3096	5.71	31	258
123	SMU	2	10	542	3134	5.78	40	261.2
124	Kansas	0	12	565	3206	5.67	39	267.2
125	Idaho	4	8	517	3279	6.34	39	273.3
126	Texas Tech	7	6	590	3639	6.17	49	279.9
127	Eastern Mich.	1	11	588	3798	6.46	44	316.5

Appendix C

FBS PASSING DEFENSE										
RANK	TEAM	W	L	OPP CPL	OPP PASS ATT	OPP PASS YDS	TDS	YDS/ATT	YDS/COMP	YPG
1	Georgia	10	3	178	344	2034	11	5.91	11.43	156.5
2	San Jose St.	6	7	175	319	2051	16	6.43	11.72	157.8
3	Michigan	10	3	181	381	2060	8	5.41	11.38	158.5
4	Texas A&M	8	5	207	357	2162	10	6.06	10.44	166.3
5	Missouri	5	7	219	354	2031	10	5.74	9.27	169.3
6	Boston College	3	9	173	334	2058	9	6.16	11.9	171.5
7	Wisconsin	10	3	194	395	2251	7	5.7	11.6	173.2
8	Penn St.	7	6	214	373	2255	14	6.05	10.54	173.5
9	Colorado St.	7	6	175	324	2309	12	7.13	13.19	177.6
10	San Diego St.	11	3	204	381	2500	14	6.56	12.25	178.6
11	Minnesota	6	7	227	394	2334	13	5.92	10.28	179.5
12	Utah St.	6	7	183	339	2347	16	6.92	12.83	180.5
13	Florida	10	4	231	425	2550	17	6	11.04	182.1
14	Appalachian St.	11	2	223	374	2378	10	6.36	10.66	182.9
15	Illinois	5	7	224	392	2213	17	5.65	9.88	184.4
16	Ohio St.	12	1	207	411	2398	14	5.83	11.58	184.5
17	Clemson	14	1	212	437	2816	19	6.44	13.28	187.7
18	North Carolina	11	3	237	435	2640	16	6.07	11.14	188.6
19	Virginia Tech	7	6	175	353	2459	18	6.97	14.05	189.2
20	UConn	6	7	235	401	2461	14	6.14	10.47	189.3
21	Florida St.	10	3	252	443	2491	14	5.62	9.88	191.6
22	Marshall	10	3	224	450	2495	15	5.54	11.14	191.9
23	Northwestern	10	3	244	452	2506	5	5.54	10.27	192.8
24	Central Mich.	7	6	226	388	2509	17	6.47	11.1	193
25	South Ala.	5	7	203	337	2340	19	6.94	11.53	195
103	Maryland	3	9	222	385	3101	27	8.05	13.97	258.4
104	Ole Miss	10	3	319	533	3364	23	6.31	10.55	258.8
105	Toledo	10	2	278	475	3116	15	6.56	11.21	259.7
106	Memphis	9	4	242	419	3382	22	8.07	13.98	260.2
107	North Texas	1	11	256	373	3152	24	8.45	12.31	262.7
108	Texas St.	3	9	228	351	3166	28	9.02	13.89	263.8
109	UCF	0	12	233	356	3179	31	8.93	13.64	264.9
110	UTEP	5	7	203	359	3180	26	8.86	15.67	265
111	Iowa St.	3	9	247	404	3202	28	7.93	12.96	266.8
112	Texas Tech	7	6	270	441	3481	25	7.89	12.89	267.8
-	Arkansas St.	9	4	266	493	3481	26	7.06	13.09	267.8
114	Arizona	7	6	276	443	3487	28	7.87	12.63	268.2
115	Houston	13	1	278	500	3846	20	7.69	13.83	274.7
116	Arkansas	8	5	280	436	3577	18	8.2	12.78	275.2
117	UTSA	3	9	245	410	3302	22	8.05	13.48	275.2
118	Rutgers	4	8	235	367	3311	22	9.02	14.09	275.9
119	New Mexico St.	3	9	251	402	3360	30	8.36	13.39	280
120	Kansas St.	6	7	290	451	3712	25	8.23	12.8	285.5
121	Nebraska	6	7	293	506	3777	25	7.46	12.89	290.5
122	Ball St.	3	9	289	408	3510	26	8.6	12.15	292.5
123	Kansas	0	12	267	402	3524	27	8.77	13.2	293.7
124	Tulsa	6	7	289	467	3860	27	8.27	13.36	296.9
125	Oregon	9	4	348	555	3985	35	7.18	11.45	306.5
126	Indiana	6	7	328	551	4079	32	7.4	12.44	313.8
127	Arizona St.	6	7	294	516	4392	35	8.51	14.94	337.8

Appendix D

FBS TURNOVERS GAINED						
RANK	TEAM	W	L	FUM REC	OPP INT	TURN GAIN
1	Houston	13	1	14	21	35
2	Utah	10	3	12	22	34
-	Arkansas St.	9	4	8	26	34
-	San Diego St.	11	3	11	23	34
5	West Virginia	8	5	8	23	31
-	Western Ky.	12	2	14	17	31
-	Boise St.	9	4	9	22	31
8	Northern Ill.	8	6	7	22	29
9	Akron	8	5	14	14	28
-	Marshall	10	3	13	15	28
-	Michigan St.	12	2	13	15	28
-	Oklahoma St.	10	3	11	17	28
13	California	8	5	12	15	27
-	Oklahoma	11	2	7	20	27
-	Iowa	12	2	8	19	27
-	Washington	7	6	12	15	27
-	Navy	11	2	15	12	27
-	Alabama	14	1	8	19	27
-	Ga. Southern	9	4	10	17	27
-	Bowling Green	10	4	7	20	27
21	Baylor	10	3	12	14	26
-	North Carolina	11	3	9	17	26
-	Louisville	8	5	9	17	26
24	UConn	6	7	7	18	25
-	Florida	10	4	11	14	25
-	Kansas St.	6	7	11	5	16
104	Florida St.	10	3	7	8	15
-	Colorado St.	7	6	7	8	15
-	Nebraska	6	7	5	10	15
-	Virginia	4	8	11	4	15
-	SMU	2	10	5	10	15
109	La.-Monroe	2	11	9	5	14
-	Cincinnati	7	6	5	9	14
-	Mississippi St.	9	4	1	13	14
-	Texas St.	3	9	11	3	14
-	Stanford	12	2	6	8	14
-	Notre Dame	10	3	5	9	14
115	Iowa St.	3	9	8	5	13
-	UCF	0	12	9	4	13
117	Eastern Mich.	1	11	8	4	12
-	Oregon St.	2	10	4	8	12
-	Michigan	10	3	2	10	12
-	UTEP	5	7	7	5	12
-	San Jose St.	6	7	3	9	12
122	Hawaii	3	10	8	3	11
-	Army West Point	2	10	5	6	11
-	Wake Forest	3	9	5	6	11
-	La.-Lafayette	4	8	6	5	11
126	Wyoming	2	10	5	5	10
-	Rice	5	7	8	2	10

Appendix E

3RD DOWN CONVERSION PCT DEFENSE						
RANK	TEAM	W	L	OPP 3RD CONV	OPP 3RD ATT	EFF PCT
1	Boston College	3	9	42	174	75.9%
2	Tennessee	9	4	53	192	72.4%
3	Michigan	10	3	50	181	72.4%
4	Clemson	14	1	61	220	72.3%
5	TCU	11	2	58	209	72.2%
6	Vanderbilt	4	8	49	174	71.8%
7	Alabama	14	1	65	227	71.4%
8	Georgia	10	3	57	197	71.1%
9	San Diego St.	11	3	55	190	71.1%
10	Boise St.	9	4	60	194	69.1%
11	Wisconsin	10	3	59	189	68.8%
12	Illinois	5	7	58	185	68.6%
13	West Virginia	8	5	65	205	68.3%
14	Temple	10	4	65	204	68.1%
15	Northwestern	10	3	69	212	67.5%
16	Texas A&M	8	5	65	197	67.0%
17	Ohio	8	5	58	175	66.9%
18	Florida	10	4	70	209	66.5%
19	Arkansas St.	9	4	65	194	66.5%
20	Virginia Tech	7	6	63	188	66.5%
21	Utah St.	6	7	66	195	66.2%
22	Appalachian St.	11	2	66	194	66.0%
-	Kent St.	3	9	66	194	66.0%
24	Nebraska	6	7	64	188	66.0%
25	Marshall	10	3	73	213	65.7%
103	North Carolina	11	3	99	224	55.8%
104	Texas	5	7	84	190	55.8%
105	Rice	5	7	66	149	55.7%
106	Washington St.	9	4	85	191	55.5%
107	Rutgers	4	8	69	155	55.5%
108	Tulsa	6	7	93	208	55.3%
109	Auburn	7	6	89	198	55.1%
110	Kansas	0	12	73	161	54.7%
111	Oregon St.	2	10	76	167	54.5%
112	Wyoming	2	10	68	149	54.4%
113	Arizona	7	6	96	209	54.1%
114	Tulane	3	9	83	179	53.6%
115	SMU	2	10	77	166	53.6%
116	Fresno St.	3	9	84	181	53.6%
117	Navy	11	2	80	171	53.2%
118	Old Dominion	5	7	89	190	53.2%
119	Iowa St.	3	9	82	175	53.1%
120	Massachusetts	3	9	93	198	53.0%
121	South Carolina	3	9	78	166	53.0%
122	UCF	0	12	84	177	52.5%
123	Texas St.	3	9	85	173	50.9%
124	Texas Tech	7	6	96	193	50.3%
125	Ball St.	3	9	95	185	48.6%
126	Eastern Mich.	1	11	86	167	48.5%
127	North Texas	1	11	88	168	47.6%

Appendix F

RED ZONE DEFENSE						
RANK	TEAM	W	L	OPP RZATT	OPP RZSCORES	PCT
1	Appalachian St.	11	2	44	28	36.4%
2	Toledo	10	2	40	27	32.5%
3	Georgia	10	3	34	23	32.4%
4	Middle Tenn.	7	6	49	34	30.6%
-	New Mexico	7	6	49	34	30.6%
6	Vanderbilt	4	8	49	35	28.6%
7	UConn	6	7	44	32	27.3%
8	Marshall	10	3	41	30	26.8%
9	Mississippi St.	9	4	45	33	26.7%
-	Boston College	3	9	30	22	26.7%
11	Boise St.	9	4	34	25	26.5%
12	Navy	11	2	38	28	26.3%
13	Fla. Atlantic	3	9	39	29	25.6%
14	Kentucky	5	7	52	39	25.0%
15	Auburn	7	6	53	40	24.5%
16	FIU	5	7	45	34	24.4%
17	Tennessee	9	4	41	31	24.4%
-	La.-Lafayette	4	8	41	31	24.4%
19	Wisconsin	10	3	25	19	24.0%
20	Central Mich.	7	6	42	32	23.8%
21	New Mexico St.	3	9	55	42	23.6%
22	Nevada	7	6	52	40	23.1%
23	BYU	9	4	44	34	22.7%
24	Western Ky.	12	2	49	38	22.4%
25	Kent St.	3	9	45	35	22.2%
-	West Virginia	8	5	43	38	11.6%
104	Southern California	8	6	53	47	11.3%
105	Minnesota	6	7	45	40	11.1%
106	Massachusetts	3	9	55	49	10.9%
107	Wyoming	2	10	47	42	10.6%
108	Arizona St.	6	7	48	43	10.4%
109	Buffalo	5	7	39	35	10.3%
110	Miami (FL)	8	5	50	45	10.0%
111	Syracuse	4	8	51	46	9.8%
112	Idaho	4	8	63	57	9.5%
-	Baylor	10	3	42	38	9.5%
114	UCF	0	12	53	48	9.4%
115	Maryland	3	9	54	49	9.3%
116	Oregon	9	4	66	60	9.1%
117	Ga. Southern	9	4	34	31	8.8%
118	UNLV	3	9	46	42	8.7%
119	Penn St.	7	6	35	32	8.6%
-	Houston	13	1	35	32	8.6%
121	Texas	5	7	51	47	7.8%
122	California	8	5	52	48	7.7%
123	SMU	2	10	55	51	7.3%
124	Army West Point	2	10	43	40	7.0%
125	Arizona	7	6	58	54	6.9%
126	South Ala.	5	7	51	49	3.9%
127	Pittsburgh	8	5	38	37	2.6%

Appendix G

DEFENSIVE BIG PLAY %						
RANK	Team	W	L	Plays	BIG PLAYS	BIG PLAY %
1	Wisconsin	10	3	791	53	6.70%
2	Akron	8	5	889	60	6.75%
3	Mississippi	10	3	1033	74	7.16%
4	Boise St.	9	4	852	63	7.39%
5	LSU	9	3	806	60	7.44%
6	Ohio St.	12	1	899	67	7.45%
7	Missouri	5	7	840	63	7.50%
8	Marshall	10	3	997	76	7.62%
9	Illinois	5	7	861	66	7.67%
10	Florida St.	10	3	937	72	7.68%
11	Appalachian St.	11	2	871	67	7.69%
12	Central Mich.	7	6	842	65	7.72%
13	San Diego St.	11	3	865	67	7.75%
14	Mississippi St.	9	4	955	74	7.75%
15	Temple	10	4	938	73	7.78%
16	Utah	10	3	922	72	7.81%
17	Georgia St.	6	7	996	78	7.83%
18	Utah St.	6	7	892	70	7.85%
19	Minnesota	6	7	917	73	7.96%
20	Iowa	12	2	964	77	7.99%
21	Toledo	10	2	890	72	8.09%
22	UCLA	8	5	1044	85	8.14%
23	Alabama	14	1	966	79	8.18%
24	Kent St.	3	9	865	71	8.21%
25	Northern Ill.	8	6	1130	93	8.23%
104	California	8	5	967	114	11.79%
105	Texas Tech	7	6	1032	122	11.82%
106	Syracuse	4	8	847	101	11.92%
107	Tulane	3	9	852	102	11.97%
108	South Ala.	5	7	830	100	12.05%
109	Georgia Tech	3	9	762	92	12.07%
110	UTEP	5	7	753	92	12.22%
111	Oregon St.	2	10	900	110	12.22%
112	Virginia	4	8	793	97	12.23%
113	Tulsa	6	7	1059	131	12.37%
114	Virginia Tech	7	6	868	108	12.44%
115	Western Ky.	12	2	999	125	12.51%
116	New Mexico St.	3	9	926	118	12.74%
117	Ball St.	3	9	922	118	12.80%
118	Purdue	2	10	898	115	12.81%
119	North Texas	1	11	904	116	12.83%
120	Western Mich.	8	5	853	110	12.90%
121	UCF	0	12	851	111	13.04%
122	Texas St.	3	9	894	118	13.20%
123	Kansas	0	12	968	129	13.33%
124	Rutgers	4	8	810	108	13.33%
125	Eastern Mich.	1	11	889	125	14.06%
126	Rice	5	7	753	106	14.08%
127	SMU	2	10	854	121	14.17%
128	Idaho	4	8	839	119	14.18%

Appendix H

PENALTIES PER GAME					
RANK	TEAM	W	L	PENALTIES	PPG
1	Navy	11	2	40	3.08
2	Georgia Tech	3	9	38	3.17
3	Ball St.	3	9	44	3.67
4	Air Force	8	6	53	3.79
5	Army West Point	2	10	48	4
6	Mississippi St.	9	4	53	4.08
7	Old Dominion	5	7	49	4.08
8	Arkansas	8	5	55	4.23
9	San Jose St.	6	7	57	4.38
10	Northwestern	10	3	58	4.46
11	Idaho	4	8	54	4.5
12	Arizona St.	6	7	60	4.62
13	UNLV	3	9	57	4.75
-	UTEP	5	7	57	4.75
15	Auburn	7	6	62	4.77
-	Middle Tenn.	7	6	62	4.77
17	Iowa St.	3	9	59	4.92
-	Fresno St.	3	9	59	4.92
19	Pittsburgh	8	5	65	5
-	South Carolina	3	9	60	5
21	Kansas St.	6	7	66	5.08
-	Tennessee	9	4	66	5.08
23	Wake Forest	3	9	61	5.08
24	Ga. Southern	9	4	67	5.15
-	Georgia	10	3	67	5.15
103	Maryland	3	9	85	7.08
-	La.-Lafayette	4	8	85	7.08
105	Nebraska	6	7	94	7.23
-	TCU	11	2	94	7.23
107	La.-Monroe	2	11	95	7.31
108	Southern California	8	6	103	7.36
109	Virginia Tech	7	6	96	7.38
110	Miami (OH)	3	9	89	7.42
-	Massachusetts	3	9	89	7.42
-	East Carolina	5	7	89	7.42
113	Colorado St.	7	6	97	7.46
-	Louisville	8	5	97	7.46
115	Virginia	4	8	91	7.58
116	Akron	8	5	99	7.62
-	Memphis	9	4	99	7.62
118	Kent St.	3	9	93	7.75
119	Cincinnati	7	6	104	8
-	LSU	9	3	96	8
-	Toledo	10	2	96	8
122	Hawaii	3	10	107	8.23
123	UCLA	8	5	108	8.31
124	Arkansas St.	9	4	109	8.38
125	Bowling Green	10	4	123	8.79
126	Baylor	10	3	118	9.08
127	Miami (FL)	8	5	121	9.31

Appendix I

Scoring Defense

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	9.6	3.52
Variance	8	5.176667
Observations	25	25
Pooled Variance	6.588333	
Hypothesized Mean Difference	0	
df	48	
t Stat	8.37473	
P(T<=t) one-tail	3.01E-11	
t Critical one-tail	1.677224	
P(T<=t) two-tail	6.01E-11	
t Critical two-tail	2.010635	

Rushing Yards Allowed Per Game

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	9.64	4.12
Variance	6.49	7.2766667
Observations	25	25
Pooled Variance	6.883333	
Hypothesized Mean Difference	0	
df	48	
t Stat	7.43866	
P(T<=t) one-tail	7.84E-10	
t Critical one-tail	1.677224	
P(T<=t) two-tail	1.57E-09	
t Critical two-tail	2.010635	

Passing Yards Allowed Per Game

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	8.28	5.6
Variance	7.376666667	11.08333333
Observations	25	25
Pooled Variance	9.23	
Hypothesized Mean Difference	0	
df	48	
t Stat	3.11881023	
P(T<=t) one-tail	0.001533838	
t Critical one-tail	1.677224196	
P(T<=t) two-tail	0.003067676	
t Critical two-tail	2.010634758	

Total Turnovers Gained

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	9.88	4.96
Variance	3.693333333	10.62333333
Observations	25	25
Pearson Correlation	0.125588852	
Hypothesized Mean Difference	0	
df	24	
t Stat	6.891179865	
P(T<=t) one-tail	1.9894E-07	
t Critical one-tail	1.71088208	
P(T<=t) two-tail	3.9788E-07	
t Critical two-tail	2.063898562	

Defensive 3rd Down Efficiency

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	8.64	4.24
Variance	8.49	9.356666667
Observations	25	25
Pearson Correlation	0.12229595	
Hypothesized Mean Difference	0	
df	24	
t Stat	5.558202679	
P(T<=t) one-tail	5.0956E-06	
t Critical one-tail	1.71088208	
P(T<=t) two-tail	1.01912E-05	
t Critical two-tail	2.063898562	

Redzone Defense Efficiency

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	7.24	5.8
Variance	8.273333	9.416667
Observations	25	25
Pooled Variance	8.845	
Hypothesized Mean Difference	0	
df	48	
t Stat	1.711861	
P(T<=t) one-tail	0.046689	
t Critical one-tail	1.677224	
P(T<=t) two-tail	0.093377	
t Critical two-tail	2.010635	

Big Plays Allowed Percentage

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	8.76	4.08
Variance	6.606667	7.826667
Observations	25	25
Pooled Variance	7.216667	
Hypothesized Mean Difference	0	
df	48	
t Stat	6.159317	
P(T<=t) one-tail	7.16E-08	
t Critical one-tail	1.677224	
P(T<=t) two-tail	1.43E-07	
t Critical two-tail	2.010635	

Penalties Per Game

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	6.04	6.6
Variance	7.623333333	7.666667
Observations	25	25
Pooled Variance	7.645	
Hypothesized Mean Difference	0	
df	48	
	-	
t Stat	0.716068037	
P(T<=t) one-tail	0.238709362	
t Critical one-tail	1.677224197	
P(T<=t) two-tail	0.477418724	
t Critical two-tail	2.010634722	