Factors Affecting the Winning Percentages of Division III Football Teams

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I. Abstract

We study factors affecting the winning percentages of Division III football teams. Using data from the NCAA for the 2014 through 2016 seasons, we find that both offensive and defensive outcomes equally affect winning percentages. Our results suggest that when it comes to winning, there is no statistically significant difference between the impact of having a more prolific offense or having a solid defense.

II. Empirical Model and Variables

We specify a team’s winning percentage, \( WP \), as a function of the following variables:

### Offense Variables

- \( DPY \): The average number of yards per game gained by the offense by rushing the football or passing yards per game.
- \( ORY \): The average number of yards per game gained by the offense running the football; rushing yards per game.
- \( OCONV \): The percentage of the time that on third down the offense reaches the line to gain for a first down; third down conversion percentage.
- \( OSCK \): The number of times per game that the quarterback is tackled for a loss; sacks per game.
- \( OTRN \): The number of times that the offense turns the football over to the defense by either fumbling the football or throwing an interception; turnovers lost per game.

### Defense Variables

- \( DPY \): The average number of yards per game given up by the defense by rushing the football or passing yards per game.
- \( DRY \): The average number of yards per game given up by the defense running the football; rushing yards allowed per game.
- \( DCONV \): The percentage of the time that on third down the opposing offense reaches the line to gain for a first down; third down conversion percentage.
- \( DSCK \): The average number of times per game that the defense tackles the quarterback; sacks per game.
- \( OTRN \): The number of times that the offense turns the football over to the defense by either fumbling the football or throwing an interception; turnovers lost per game.
- \( OCONV \): The percentage of the time that on third down the opposing offense reaches the line to gain for a first down; third down conversion percentage.

WP = \( f(DPY, DRY, DSCK, DTRN, DCONV, OPY, ORY, OSCK, OTRN, OCONV) \)

III. Theory and Hypotheses

The marginal effects of \( DPY \) and \( DRY \) were both hypothesized to be negative because a defense allows the offense to run and pass for more yards, the more likely it is the defense is allowing the opposing offense to score points.

The marginal effect of \( DSCK \) was hypothesized to be positive because it increases the ability of the quarterback to extend plays and gain positive yardage. It can also demoralize a team and allow momentum to swing in favor of the team who sacks the quarterback.

The marginal effect of \( DCONV \) was hypothesized to be negative because allowing the opposing offense to earn the first down on third down gives the opposing offense  additional opportunities to score.

The marginal effect of \( OCONV \) was hypothesized to be positive because allowing the defense to convert on third down allows the offense to gain more yardage and score points.

IV. Data

Panel data set of 243 NCAA Division III Football Teams from the 2014 through 2016 seasons

Sample size: 730

Our data came from the NCAA website in Excel spreadsheet form. We were able to find data for all 243 teams Division III for the 2014 through 2016 seasons.

V. Empirical Results

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VI. Conclusions

- We found evidence that supports the theory that both defensive and offensive variables affect winning percentage. More balanced teams are more likely to have higher winning percentages.
- All estimated coefficients were statistically significant at the one-percent level, and all coefficients had the expected signs.
- A Wald test indicates that the marginal effects of the explanatory variables were not jointly equal to zero and that they helped to explain variation in winning percentage.
- Considering the marginal effects of defense versus offense on winning percentage, we found no statistical difference between the two.