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:

**Offensive Variables**
- DPY: The average number of yards per game gained by the offense running the football, 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.

**Defensive Variables**
- 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.
- DRY: The average number of yards per game given up by allowing the opposing offense to pass the ball; rushing yards allowed per game.
- DRY: The average number of yards per game given up by allowing the opposing offense to pass the ball; rushing yards allowed per game.
- DTRN: The average number of times per game that the defense turns the football over to the offense by either fumbling the football or throwing an interception; turnover lost 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; turnover lost per game.
- OSCK: The number of times per game that the defense tackles the Quarterback; sacks 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.
- OCOV: 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.

III. Theory and Hypotheses

We hypothesize that both defensive and offensive outcomes affect winning percentages. More balanced teams are likely to have higher winning percentages.

**Hypotheses**
- The marginal effect of DPY was hypothesized to be negative because allowing the offense to pass and gain yardage increases the chance of the defense allowing the opposing offense to score points.
- The marginal effect of DCONV was hypothesized to be positive, as allowing the opposing offense to convert on third down can result in negative yardage and give the offense an opportunity to score.
- The marginal effect of OSCK was hypothesized to be negative because allowing the defense to sack the quarterback can demoralize the offense and prevent the offense from scoring points.
- The marginal effect of OTRN was hypothesized to be negative because allowing the offense to turn the ball over to the offense gives the opposing team an opportunity to score.
- The marginal effect of OCOV was hypothesized to be positive because allowing the opposing offense to convert on third down can result in negative yardage and give the offense an opportunity to score.

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>51.08330</td>
<td>6.14854</td>
<td>8.310478</td>
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<tr>
<td>DPY</td>
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<tr>
<td>DRY</td>
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<tr>
<td>DTRN</td>
<td>1.954424</td>
<td>0.571805</td>
<td>3.307744</td>
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<tr>
<td>DCONV</td>
<td>-0.132240</td>
<td>0.067818</td>
<td>-1.928167</td>
<td>0.055</td>
</tr>
<tr>
<td>OTRN</td>
<td>-0.144519</td>
<td>0.015775</td>
<td>-9.170703</td>
<td>0.000</td>
</tr>
<tr>
<td>OTRN</td>
<td>-0.132240</td>
<td>0.067818</td>
<td>-1.928167</td>
<td>0.055</td>
</tr>
</tbody>
</table>

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.