Salary Distribution in the NFL

Max Ernst
Pittsburg State University

Michael Davidsson
Pittsburg State University

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INTRODUCTION

• The effect of Salary Distribution in the NFL on a team’s winning percentage
  • Positional Spending
  • Superstar Effect
PURPOSE & CONTRIBUTION OF THE STUDY

• Determine if there is an ‘optimal’ strategy for General Managers to construct their lineups
• Are certain positions over/under valued?
• Is there a “Superstar Effect” in the NFL
LITERATURE REVIEW

- Positional Spending is broken down into the following variables:
  - QBS, RBS, FBS, WRS, TES, OLS, DLS, LBS, DBS, STS
  - According to Winsberg 2014, overspending on offensive line has a negative correlation with team performance, and paying more than the league average on quarterback also has negative effects on team performance

- The Current NFL Salary Cap is $167 Million

Example of an NFL Contract

<table>
<thead>
<tr>
<th>Year</th>
<th>Base Salary</th>
<th>Signing Bonus</th>
<th>Miscellaneous</th>
<th>Cap Hit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>$600,000</td>
<td>$2,000,000</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$2,600,000</td>
<td></td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>2014</td>
<td>$1,600,000</td>
<td>$2,000,000</td>
<td>$500,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$4,100,000</td>
<td></td>
<td></td>
<td>$500,000</td>
</tr>
<tr>
<td>2015</td>
<td>$2,600,000</td>
<td>$2,000,000</td>
<td>$500,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$5,100,000</td>
<td></td>
<td></td>
<td>$500,000</td>
</tr>
<tr>
<td>2016</td>
<td>$3,600,000</td>
<td>$2,000,000</td>
<td>$500,000</td>
<td></td>
</tr>
</tbody>
</table>
Superstar Effect is measured using a Lorenz Curve & with the Gini Coefficient.

A 2014 Study by Philippe Cyrene looked at the superstar effect using the Gini Coefficient on winning percentage in the NHL.

- He found that teams generally do better when they pay one player a higher percentage of team income.
Empirical Model

\[ W = f(GINI, \text{SALARY, QBS, RBS, FBS, WRS, TES, OLS, DLS, LBS, DBS, STS}) \]

-where GINI = gini coefficient, SALARY = total salary spent on active roster, QBS, RBS….. STS = Total active dollars spent on Quarterbacks, Running Backs…. and Special Team’s players

- This study uses a pooled cross-sectional time series data set and Pooled Least Squares (PLS) regression model.
DATA

- Data from Spotrac ⇒ Excel ⇒ Eviews
- Sample from all 32 NFL Teams for 5 seasons (2013-2014 through 2017-2018)
- Gini Calculated by:
  \[ \Sigma(C \times (P + 2 \times R)) \]
  
  Where
  
  - C = Player’s cap hit %
  - P = Player’s weight as % of total population
  - R = % Richer than
# 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>8.397685</td>
<td>0.588387</td>
<td>14.27237</td>
<td>0.0000</td>
</tr>
<tr>
<td>GINI</td>
<td>-13.73730</td>
<td>0.901886</td>
<td>-15.23175</td>
<td>0.0000</td>
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<tr>
<td>SALARY</td>
<td>9.86E-08</td>
<td>2.22E-09</td>
<td>44.49882</td>
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<tr>
<td>QBS</td>
<td>7.10E-09</td>
<td>4.93E-09</td>
<td>1.439574</td>
<td>0.1500</td>
</tr>
<tr>
<td>RBS</td>
<td>-8.72E-08</td>
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<td>-8.171933</td>
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<tr>
<td>FBS</td>
<td>-4.52E-08</td>
<td>3.95E-08</td>
<td>-1.142986</td>
<td>0.2531</td>
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<tr>
<td>WRS</td>
<td>1.23E-08</td>
<td>5.77E-09</td>
<td>2.124523</td>
<td>0.0337</td>
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<td>TES</td>
<td>-2.62E-08</td>
<td>1.12E-08</td>
<td>-2.335040</td>
<td>0.0196</td>
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<tr>
<td>OLS</td>
<td>-7.91E-08</td>
<td>5.92E-09</td>
<td>-13.35363</td>
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</tr>
<tr>
<td>DLS</td>
<td>1.64E-08</td>
<td>4.21E-09</td>
<td>3.899507</td>
<td>0.0001</td>
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<tr>
<td>LBS</td>
<td>5.23E-09</td>
<td>5.94E-09</td>
<td>0.881970</td>
<td>0.3778</td>
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<tr>
<td>DBS</td>
<td>-4.82E-08</td>
<td>5.15E-09</td>
<td>-9.368872</td>
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<tr>
<td>STS</td>
<td>-1.35E-07</td>
<td>2.21E-08</td>
<td>-6.075180</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared: 0.360884
Adjusted R-squared: 0.359383
S.E. of regression: 2.480066
Sum squared resid: 31411.77
Log likelihood: -11908.88
F-statistic: 240.3107
Prob(F-statistic): 0.000000

Mean dependent var: 7.975000
S.D. dependent var: 3.098588
Akaike info criterion: 4.656983
Schwarz criterion: 4.673591
Hannan-Quinn criterion: 4.662797
Durbin-Watson stat: 1.419671
THE EMPIRICAL MODEL

Findings

● NOT Significant Variables (3):
  ○ QBS, FBS, and LBS

● Significant Variables (9):
  ○ GINI, SALARY, RBS, WRS, TES, OLS, DLS, DBS, STS
    ■ General Managers can obtain 1 more win by:
      ● GINI: -13.74 coefficient.
      ● Salary: + $10,141,987.83
THE EMPIRICAL MODEL

Positional Results

General Managers can obtain 1 more win by:

Overpaid (most to least):
- STS: $7,407,407.41
- RBS: $11,467,889.91
- OLS: $12,642,225.03
- DBS: $20,746,887.97
- TES: $38,167,983.93

Underpaid: (most to least)
- DLS: $60,975,609.76
- WRS: $81,300,813.01
THE EMPIRICAL MODEL

Conclusions

- There is no “superstar effect” in the NFL
- More spending on the active roster leads to more wins
- There is evidence that certain positions are overpaid/underpaid
  - Findings agree with Winsberg 2014 that offensive line is overvalued.
  - Inconclusive evidence as to the effect of quarterback spending on team wins
- Recommended that further research required to understand fully
QUESTIONS?