

Finding Value in the National Football League Draft: A Labor Market Analysis

Divya Parmar

University of California, Irvine

Abstract

The National Football League's 2005 Collective Bargaining Agreement was not re-approved as it neared expiration, leading to a 2011 lockout that started in the spring, continued through the 2011 Draft, and was finally resolved in the fall. One criticism of the system was the inefficiency of rookie wages; another was that top picks received lower compensation under the new CBA. In looking at production and salary in both the pre and post-2011 Lockout, production decreased after the top picks, but efficiency increased. This phenomenon happened at nearly indistinguishable rates in both periods, demonstrating a lack of change in pick efficiency. In looking at salary by testing for statistically significant difference in distribution, every round, except the second round, differed after the lockout. This demonstrates that the new CBA changed the salary structure by shifting money to different draft slots than before.

Introduction

In the National Football League, teams and players agree to contracts which determine player salaries. Each team has a set salary cap, which is determined by the share of total revenue that the players get according to the Collective Bargaining Agreement (CBA). The 2005 CBA did not include explicit player slotted salaries. Prior to 2011, there was no explicit rookie salary scale in the CBA, meaning that rookies received whatever their agents asked for, usually based on historical salaries. This was skewed heavily to the top of the draft, meaning that first few picks were getting approximately \$50 million before playing a single game. The money dropped off dramatically, to about \$20 million in the middle of the round and \$12 million at the end of the round.

As the CBA neared expiration, there was no consensus between the union and the teams. The 2010 season was played in an uncapped, meaning no salary cap on the teams because of future uncertainty, season. The lockout continued into the spring, and the 2011 NFL Draft took place with no CBA governing it. When the NFL was locked out without a CBA in 2011, there was a great debate about rookie salaries and whether the system should be changed. Massey and Thaler (2005) found that second round picks actually had the highest value, and first round picks were overvalued. In the final agreement, rookie salaries were slotted much lower because of the belief that rookies were overpaid compared to performance, and that is what I intend to investigate in this paper. I briefly investigate Massey and Thales' findings to see whether their conclusion holds up for a later time period, whether excessive rookie salaries were indeed a valid point of debate in 2011. However, my main question was whether there was a change in salary structure overall, measured by the distribution of wages across the NFL Draft.

Methodology

This research intends to look at two areas: efficiency and salary. In terms of efficiency, this paper looks at whether production followed a similar trend in both periods, and whether efficiency improved under the new CBA because of the new salary structure. It also looks at rookie salaries and whether the salary structure changed in 2011, especially at the top end of the draft. To assess that, I looked at data from the 2009, 2010, 2012, and 2013 NFL Drafts. Data was taken from pro-football-reference.com (for player production data) and spotrac.com (for salary data).

The production data is a cumulative metric, and Pro Football Reference provides a single number for each player for each season. The metric is called Career Average Value, and it averages from 0 to 15 per season. The salary data comes from Spotrac, a company that gathers historical data across various sports leagues, with the NFL being one of them. For this analysis, I used average salary. This includes bonuses, which are divided up over the length of the contract and added to the base salary per year.

First, I looked at efficiency in a way similar to Massey and Thaler. I defined efficiency (Equation 1) only in terms of first year production and salary to reduce the effects of renegotiation and other external factors such as a player getting cut for poor performance.

Equation 1

$$\text{Efficiency} = \frac{\text{Average Value (AV) in First Season}}{\text{Salary in first year of rookie contract}}$$

I looked at both regression models and statistical tests to measure difference in distribution. For my regression model (Equation 2), my dependent variable is the salary of the pick. I estimate that it's a quadratic model based on pick number, so I include a quadratic term. I also include CBA and CBA-related interaction terms: CBA equals 1 if the period is post-2011 lockout (i.e. 2012 and 2013 NFL Drafts, because the 2011 NFL Draft was conducted without a CBA and thus had different rules) and 0 otherwise (i.e. 2009 and 2010 NFL Drafts).

Equation 2

$$\text{Salary} = \alpha + \beta_1 \text{Pick} + \beta_2 \text{Pick}^2 + \beta_3 \text{CBA} + \beta_4 \text{CBA} : \text{Pick} + \beta_5 \text{CBA} : \text{Pick}^2$$

In addition, I included positional dummies for key offensive and defensive positions to measure if points in the distribution were distorted due to factors outside of pick number and draft year (Equation 3). I included positional dummies for quarterback (QB), running back (RB), wide receiver (WR), offensive lineman (OL), defensive end (DE), linebacker (LB), and cornerback (CB).

Equation 3

$$\text{Salary} = \alpha + \beta_1 \text{Pick} + \beta_2 \text{Pick}^2 + \beta_3 \text{CBA} + \beta_4 \text{CBA} : \text{Pick} + \beta_5 \text{CBA} : \text{Pick}^2 + \beta_6 \text{QB} + \beta_7 \text{RB} + \beta_8 \text{WR} + \beta_9 \text{OL} + \beta_{10} \text{DE} + \beta_{11} \text{LB} + \beta_{12} \text{CB}$$

In addition to the regression, I used a test called the Kolmogorov-Smirnov test to measure distributions. This test is explained more in the results section.

I also looked at percentage change in Year One salary, comparing pre and post-lockout for each draft pick slot (Equation 4).

Equation 4

$$\text{PercentageChange} = \frac{(\text{Post Year 1 Salary}) - (\text{Pre Year 1 Salary})}{(\text{Pre Year 1 Salary})}$$

Results

As expected, higher drafted players do have higher production, and this can be seen in the Average Value (production metric) for rookie seasons for players in the 2009/2010 drafts and the 2012/2013 drafts. The trend is the same, with a slight but not drastic production increase after the lockout (Figure 1). This demonstrates that production did not change because picks were paid under a different model. Because of this, efficiency was the same under both systems, increasing throughout the first three rounds without significant difference between the lines (Figure 2). In looking at salary, I plotted both the average salary and year one salary, labelling for CBA status (Figure 3). Post-lockout salaries seem to be higher, except for the top of Round 1.

Figure 1

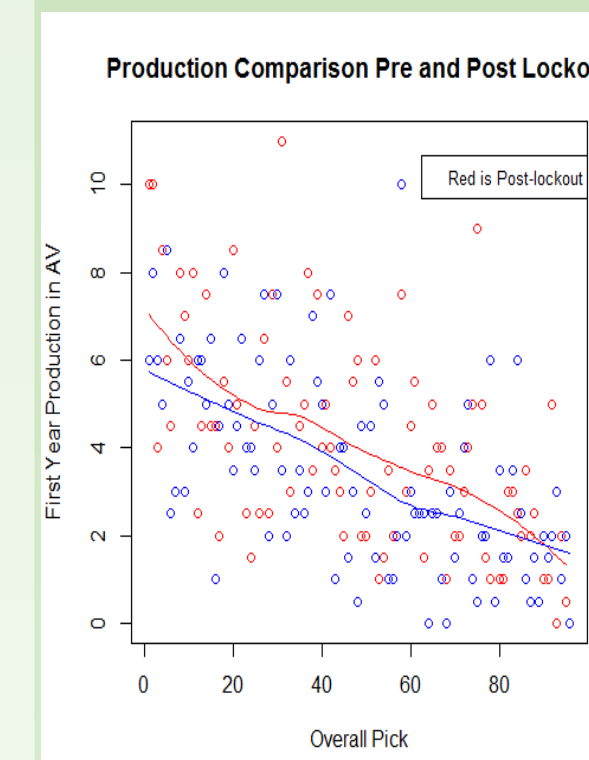


Figure 2

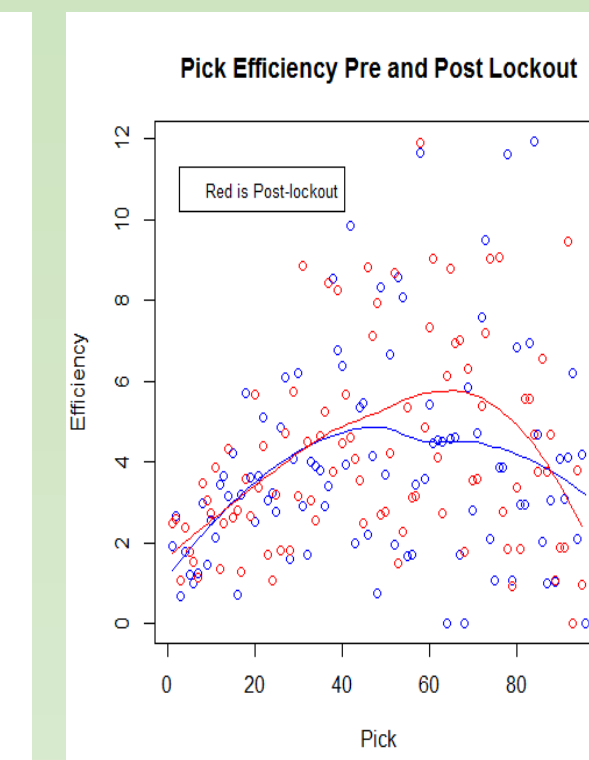
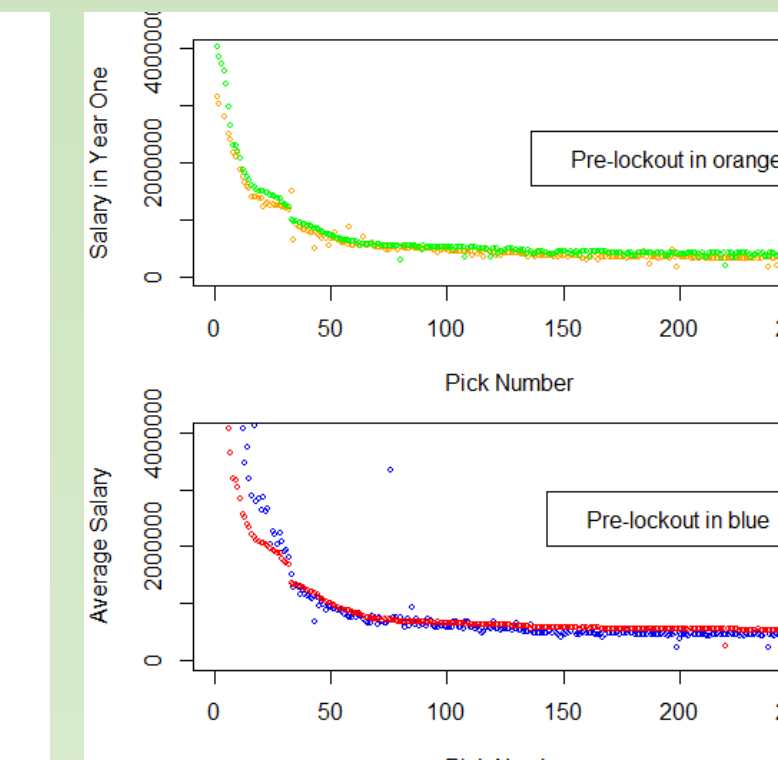


Figure 3



I ran the salary model for all four draft years separately, each year with Picks 1-253, and the CBA dummy having a value of 0 (for 2009/10) and 1 (for 2012/13). The quadratic model does hold, as Pick and Pick-Squared are significant. Our first glance of the plot of all points seemed to indicate that CBA would have some effect statistically. But surprisingly, CBA is not significant in any model. I looked at my positional regression to see if the pick model was impacted by positions. Only quarterback had a significant impact as a positional dummy. It seems that positional value is accounted for in draft order, except quarterback may be artificially inflated because of fan pressure.

I also looked at the effect of the CBA on first year salaries. I looked at percentage change by draft slot, and first year salaries seem to have generally increased, although there is noise in the graph. The percentage change increase seems to grow as the draft picks approach the late rounds (Figure 4). The distributions do seem to change, so I plotted both the pre and the post-lockout salaries, and ran the Kolmogorov-Smirnov test. I tested the draft distribution for Year One salary (Figure 5), and I got a significant test statistic (Figure 6).

Figure 4

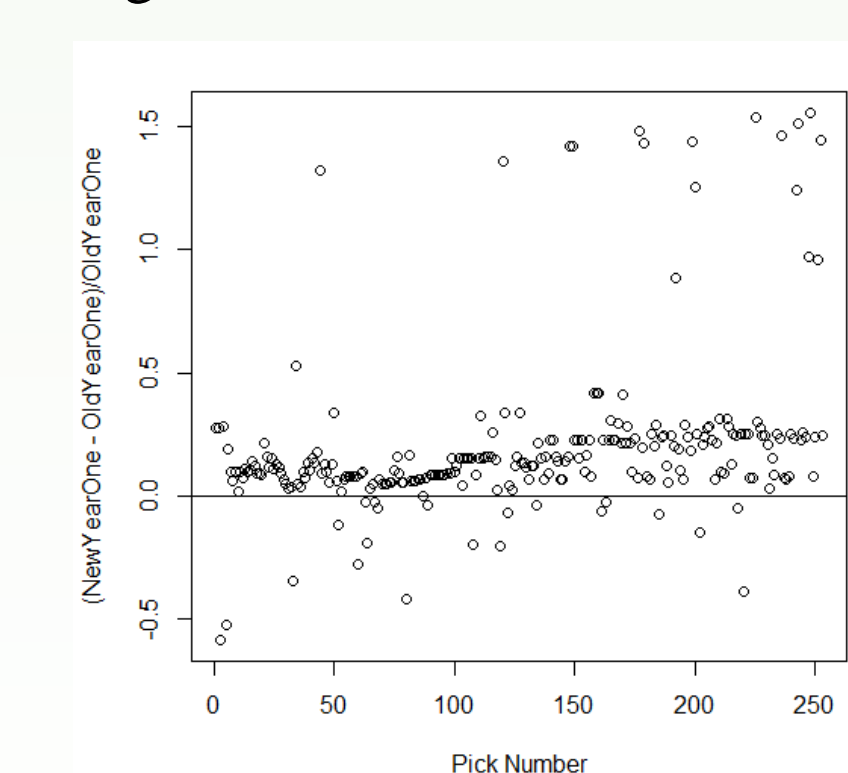


Figure 5

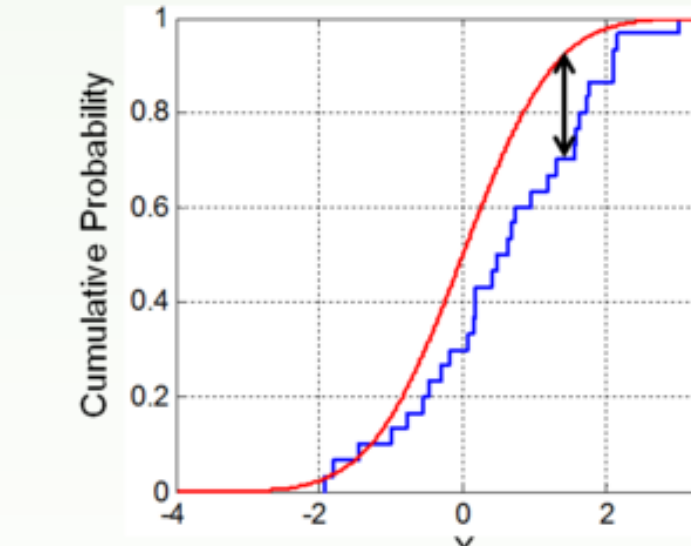


Figure 6

Two-sample Kolmogorov-Smirnov test
data: NewYearOne and OldYearOne
D = 0.3636, p-value = 5.884e-15
alternative hypothesis: two-sided

In terms of average salary, first round salaries came down tremendously in the new CBA, whereas second round salaries stayed somewhat similar. When I tested for statistical significance of salary distribution by round, the 1st round is significant at the 0.05 level, the 2nd round is not significant, and the rest is significant at well beyond 0.01.

Conclusion

This paper aims to look into both the topics of efficiency and salary distribution in the NFL Draft before and after the 2011 Lockout. In looking at production plots and the fitted model for efficiency, it seems that production follows roughly the same pattern as before the lockout, decreasing at a somewhat linear rate starting with the first few picks. Efficiency, in both periods, increases throughout the draft, as the decreased production is overcome with rapidly decreasing salaries, as seen by our quadratic term regression model. Although the salary distribution seems somewhat similar, there is a change in distribution for nearly all rounds of the draft. Our KS tests showed that latter rounds received the boost that came from more moderate salaries at the top of the draft. This change in distribution seems to indicate salary changed due to owner's recognition of inefficiencies in the previous CBA.

This research can be built on. The Collective Bargaining Agreement dictates the maximum increase in salary from year to year from a player's contract. With the readily available data, there is room to explore whether contracts actually follow these CBA rules in practice. In addition, research can be done on why pre-lockout contracts were much bigger than their respective post-lockout contracts. One possibility may be the reduced years of the later contracts. Other observations are that post-lockout salaries start higher because they may have to escalate slowly and have less seasons to fulfill. Pre-lockout salaries escalated quickly and went over longer number of seasons, and this may be evidence of back-loading. These are the various directions NFL Draft research can go from here.

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