Considerations for an NFL Rookie Pay Scale

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Considerations for an NFL Rookie Pay Scale
Abstract

Many believe current high first-round, NFL draft picks receive unjustifiably high compensation. The teams in possession of high draft picks are meant to use them to build towards future competitiveness. However, as contended, the cost of choosing a player within the first 5 selections is so astronomical, if a team makes a subpar pick, they can negatively affect their salary cap for years to come. Further, the tightened salary cap makes it harder to sign talented players, which, in turn, hurts team competitiveness. The fewer competitive teams in the league, the less entertaining the games become. Lagging entertainment value leads to decreased demand, which leads to decreased revenue.

Through the use of several areas of Economics, the current compensation model and its underlying assumptions were examined. It was determined the model itself is correct, however many underlying assumptions are inaccurate, or worse—invalid. Through exposing the inefficiencies underlying the model, and devising methods with which to correct for these imperfections, the risk associated with high first-round selections is mitigated, and balance can be restored to the system.

This is a very pressing issue because the current Collective Bargaining Agreement between Players and Owners is set to expire after the 2009 season, setting up an uncapped year in 2010, and a potential work-stoppage in 2011—a detrimental situation to both players and owners. This analysis does much to address a significant problem with the current CBA, and bring both parties one step closer to successfully negotiating a new CBA so a work-stoppage can be avoided.

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Introduction

Over the past several years, some have seen an emergent trend in the collective league consciousness that would suggest the current Rookie compensation model is weighted too heavily at the top; and that some smoothing of contract value is in order. Over the past 8 years, the depreciation in total contract value from the 1st to the 15th pick has been 50%, on average. More simply, the 1st overall pick historically signs a contract worth twice as much as that of the 15th pick. Thus, some data does exist which suggests compensation may be top-heavy. Although this may be a common belief, the resultant behavior of teams and top draft prospects couldn’t be further from realizing such a theory in practice. Teams continue to award windfall contracts to top prospects. This begs the question of whether the current model, and its underlying assumptions, is in any way inefficient?

In order to unearth any inefficiency we must first understand the framework in which Rookies are compensated upon entering the NFL. After the principal draft, every NFL team has a specific level of Salary Cap Room available—or, more accurately, “set-aside”—to sign their drafted players acquired through exercised picks. The amount of cap room available to sign the players isn’t determined by overall available team cap room alone. Instead, it is a function of the following:

- Total number of a team’s exercised draft picks
- Total value of a team’s exercised draft picks (the higher the pick, the higher the value)

In short, the more draft picks a team exercises, and the higher those picks are in the draft, the greater the Salary Cap allotment for that year’s Rookie contracts will be for that team. It is essential to keep in mind that the allotment doesn’t warrant additional cap room for the overall team Salary Cap. Instead, the interplay between the Rookie Cap Pool and the Overall Salary Cap is a zero sum game. If the size of the “Rookie Cap Pool” slice increases—due to either an increased number of exercised picks, a higher total value of exercised picks, or a combination of both—the “Remaining Cap Room” slice necessarily decreases in size proportionately:

Table 1: Conceptual Representation of Rookie Cap Pool Affect on Total Remaining Salary Cap

![Graphs showing conceptual representation](image)

*Note: The above graphs are used to conceptualize the zero-sum interplay between the Rookie Cap Pool and the overall Salary Cap; therefore, no values have been included.*

The Rookie Cap Pool is effectively the only restrictive measure currently in place to regulate Rookie contract value. Even then, it effectively only governs Cap Value impact of the first year of the contract. All subsequent years are restricted by the overall Salary Cap.
Within this framework, the current pay structure compensates players primarily on a level consistent with their expected potential for positional success in the league. Further, part of a player’s compensation may be guaranteed against injury or other negative externalities—the extent of which is also consistent with that player’s expected potential. Finally, the compensation is secondarily adjusted for positional importance and other factors. Players with greater expected potential for positional success are more likely to help create successful teams which, in turn, generate more revenue for both team owners and the league. It is in the best interest of the teams to identify such players, and compensate them accordingly.

Over the course of this analysis, I strive to determine whether the current pay structure through which the top 15 selections in the draft are compensated is efficient. I've compiled detailed player, contract, and team information from NFL.com, USA Today, and ESPN.com. My dataset links player names with the year in which they were drafted, the selection position in which they were drafted, the NFL team for which they play, the position in which they play, Pro Bowl appearances, detailed, annual contract information, and a menu of other variables calculated from these base observations.

I'm proposing the model itself is correct. Players should be compensated primarily on expected potential (likelihood of success); should receive guaranteed monies proportionate to their level of expected potential as insurance against negative externalities; and finally, should experience secondary compensation adjustment based on positional importance and other factors. That being said, I believe the assumptions underlying the model should be analyzed, reevaluated and, where appropriate, updated in order to ensure all players are compensated efficiently so as not to award unwarranted value to contracts. It is imperative to the interests of the teams and owners that this unwarranted value is avoided because any guaranteed monies must be paid to the player regardless of whether he performs adequately. Therefore, any Rookie who fails to achieve success with respect to his contract, and is subsequently released from his team, can still affect Salary Cap considerations for the duration of his guaranteed money proration.
Model

In the introduction, I posed a brief overview of the current pay structure for Rookies drafted to the National Football League.

As one can easily deduce, it is impossible to observe a player’s potential for success in the NFL (p) ex-ante. If such observation was possible, there would be no draft “busts,” and all players would be paid efficiently by their p level. Unfortunately, the only way to truly know if a player will succeed in the NFL is to retroactively study their play ex-post. Therefore, expected potential for success in the NFL is what all franchises labor to determine for each player. However accurately measuring a player’s true potential for success is exceedingly difficult. Nevertheless, teams have developed methods by which they attempt to do exactly that.

Expected potential for success in the NFL is more commonly referred to as “Draft Stock,” but for the purposes of this paper, I will simply refer to it as the former. Teams go to great lengths to determine players’ expected potential for success in the NFL (E[p]). First and foremost, players’ collegiate careers are carefully studied to determine both their positional and raw talent levels relative to their peers—primary drivers of E[p]. Parameters such as the school at which the player competed, the conference in which the player competed, and a host of various individual, positional statistics factor into a team’s calculation of a player’s E[p]. Prospects that excel at respected schools in highly competitive conferences tend to have a higher E[p] than those who rank lower in said categories.

Further, events such as the NFL Scouting Combine, University Pro Days, and individual workouts subject players to a variety of physical fitness tests. The results of these tests have the potential to greatly alter a team’s measurement of a player’s E[p]. Every year a handful of players improve perception of their E[p] so significantly that they are eventually selected in a more favorable draft round than they otherwise would have been expected to attain. Of course, there are also a handful of players who have such poor showings that their E[p] drops to the point where they are eventually selected in a less favorable draft round. Either way, one can be sure the results of these fitness events have the ability to significantly alter overall perception of player E[p].

Finally, there is a psychological element to determination of E[p] as well. Tests such as the Wonderlic intelligence exam, as well as various psychological screening processes to which teams subject prospects, serve to further refine E[p]. In general, the effects such tests have on E[p] are minimal; however, in some extreme cases, they have been known to undermine all previous beliefs on a player’s potential. Of course, the extreme cases aren’t the focus of this study, and as such, won’t be used in further analysis contained in this paper.

Once a team has calculated an entire draft class’ individual E[p]’s, they construct their “draft board”—a list of all players ranked on E[p] in descending order. This list is used to determine draft day behavior. If a team uses a pick for “need” based ends, they either choose the player whose E[p] ranks the highest of all players available at a specific position or the player whose private value to the team is greater than his positional peers’ common values. Otherwise, teams tend to select the “best” player available in which case they either select the player whose E[p] ranks the highest of all available players or they select the player whose private value ranks higher than all other players’.

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These selection criteria suggest the current pay structure functions to reward players with higher \( E[p] \). The greater the perception a player is likely to succeed in the NFL, the greater his overall contract value. Within a meritocracy, such behavior is not only efficient, but encouraged; and one would be hard pressed to contend the NFL is not a meritocracy. Therefore, it would follow that the player with the highest \( E[p] \) should be awarded a contract with the greatest overall value. Historically, this has been observed on an annual basis.

Of course, overall contract value isn’t simply defined by monies paid to the player. There are other, equally significant parameters that also affect contract value: most notably, guaranteed compensation. As a contact sport, injuries are common in football. If a player suffers an injury and is physically prevented from honoring his contract, he would naturally be subject to forfeiture of compensation. Therefore, as a means to increase contract value, contracts tend to include some proportion of guaranteed money—which acts as insurance against the risk of injury. As such, one would expect to see players with higher \( E[p] \) successfully negotiate offers that include greater levels of guaranteed compensation.

Once again, such scenarios are observed on an annual basis. Players with exceedingly high \( E[p] \) are extended offers in which most of the contract’s value is guaranteed as insurance against injury or other detrimental factors. Concordantly, players with a lower expected potential are offered contracts with a significantly reduced level of guaranteed compensation, if at all. For example, players selected first overall—who have most likely owned the highest \( E[p] \) in each of their respective draft classes—are known to sign contracts in which more than 50% of their promised compensation is fully guaranteed against an exhaustive menu of negative externalities. With contracts awarded to the top 5 selections now promising over $72 Million in potential monies paid, certain franchises are guaranteeing upwards of $41 Million regardless of the player’s future performance.

Finally, as specified in the introduction, contract value is also subject to positional considerations. Generally, certain positions’ \( E[p] \) is weighted more heavily than others. Due to this, we tend to see players at some positions awarded contracts with greater overall value than players with an equivalent \( E[p] \) at less “favorable” positions. In 2008, Matt Ryan, a Quarterback selected 3rd overall, was awarded a contract that many would argue held greater value than the 1st overall selection Jake Long, an Offensive Tackle. This would lead us to believe that while Jake Long’s \( E[p] \) was at least equivalent, if not superior, to Matt Ryan’s, the position of Quarterback commands greater negotiating power than that of Offensive Tackle.

No model is complete without underlying assumptions. Concordantly, the current Rookie pay structure is subject to several fundamental assumptions that govern eventual contract value for each player. Those assumptions are presented below:

- Players with greater \( E[p] \) are inherently more likely to succeed in the NFL
- Players selected higher have greater \( E[p] \) than those selected lower, and should be compensated at a higher rate
By entering the league, all players bear the same risk stemming from negative externalities

- As a result of this common risk, players selected higher bear greater opportunity cost—in the case of realized negative externalities—than those chosen lower due to greater $E[p]$ and should be awarded increased guaranteed compensation as insurance against this risk
- Of two players drafted for the same position, the player selected higher should be awarded a contract of greater value because his true $E[p]$ must be greater
- Certain positions should be awarded contracts of greater value than others because their $E[p]$ is weighted more heavily
  - Their $E[p]$ is weighted more heavily because realization of success at that position is of greater comparative benefit to the team than realization of success at another position

Each assumption exists for good, logical reason. Those reasons are presented below:

- It would follow that $E[p]$ is, on some level, positively correlated with $p$. Therefore, one would expect to see players with higher $E[p]$ have a greater probability of actually achieving success in the NFL.
- NFL draft boards commonly report a player’s $E[p]$ as a numerical “grade” on a scale of 1-99. In general, one can be certain that players selected high in the draft most likely have grades, or $E[p]$’s, superior to their peers drafted with lower selections. As such, they should be compensated more generously.
  - It should be noted that there is no standard draft board. Each individual franchise creates their own by grading players individually and separately from other franchises. The theoretical common value of a given player is often times very different from a team’s private value of the same player. Private value is generally determined by the team’s needs, $E[p]$, and available Salary Cap endowment. As such, a team’s draft board is one of their most closely guarded secrets. That being said, it is very rare for a team’s private valuation of a player to vary so significantly from the common valuation that the player is chosen either well before or well after his “natural” selection position. Names like Tom Brady, Jason Peters, and James Harrison are few and far between.
- The opportunity cost associated with failure to achieve success increases proportionately with probability of success. Increased guaranteed compensation hedges against this inherent risk.
- When drafting for a specific position, teams maximize expected utility by choosing the player with the highest $E[p]$ available at that position. Therefore, any player who plays the given position, but is selected with a later pick, must have a lower $E[p]$, and should be awarded a contract of lesser value.
- Success at certain positions can translate into overall team success more directly than success at others. Although two players’ $E[p]$’s may be equivalent, the player at the more favorable position should be awarded a contract of greater value.
Data
This study uses data from a variety of sources; principal among which are NFL.com and USA Today, and ESPN.com.

NFL.com
I compiled 6 years worth of detailed draft and player data from NFL.com. I extracted:

- Player Name
- Draft Year
- Draft Position (Pick Number)
- Player Position
- NFL Team
- Whether they made the Pro Bowl at least once from 2000-2008
- Team Wins
- Team Losses
- Team Ties
- Win Percentage

The first 5 variables contain 90 observations all collected from the 2000, 2001, 2002, 2003, 2004, and 2005 NFL drafts. The Pro Bowl variable, which also contains 90 observations, was observed from player statistics as reported by the league from 2000-2008. The final 4 variables contain 543 observations collected from the 2000-2008 NFL season statistics. The reason the number of observations in these variables is greater than that of the others is because every observed player’s career lasted longer than a single season. The range of potential career lengths is [1,9] because there have only been 9 observed seasons since the 2000 draft. The population group sampled included all players drafted in Draft Positions 1-15 from 2000-2005.

This data is exhaustive and reliable as it comes from the league itself. One can be certain there are virtually zero omissions or errors systematically inherent to the dataset compiled from this source. There was absolutely no interpretation on any level with respect to this portion of my overall dataset.

The win percentage variable was calculated by the NFL through division of the sum of Team Wins and one-half times Team Ties by the sum of Team Wins, Team Losses, and Team Ties. This variable does not include postseason appearances.

USA Today
I compiled 9 years worth of detailed player contract data from USA Today. I extracted:

- Base Salary
- Signing Bonus
- Other Bonus
- Total Salary
- Cap Value
- Real Base Salary
- Real Signing Bonus
- Real Other Bonus

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- Real Total Salary
- Real Cap Value
- 4-Year Career (Dummy Variable, 1 if Yes, 0 if No)
- 6-Year Career (Dummy Variable, 1 if Yes, 0 if No)
- Still in League (Dummy Variable, 1 if Yes, 0 if No)
- Overall Value of Second Contract vs. First Contract (Increased, Decreased, Equivalent)

The first 10 variables contain 543 observations each, collected from the USA Today salary database. The “Real” variables have been adjusted for inflation based on inflationary data as reported by the US government and its Consumer Price Index, compiled by inflationdata.com. The final 4 variables are calculated through simple indexing of the previous data. Using contract data, length of career and comparative value of contracts are easily observed.

This is arguably the most reliable secondary data source on NFL contracts available. According to USA Today, “the data are based on USA Today research, information from player agents and NFL Players Association research documents.” The strength of this database resides in its completeness, transparency, and, most importantly, level of detail.

A potential weakness in the data source arises due to the fact that there was some minimal interpretation of values on the part of USA Today. USA Today elaborates,

All players receive a minimum base salary. For players whose base salary is listed as $0, their actual base salary was rolled into a bonus. Practice players and players who receive less than the league minimum (about $285,000 in 2007) is not included. Starting with the 2001 season, signing bonuses are listed in entirety only for the year the contract was signed. In prior years, the bonus is pro-rated over the life of the contract. As a result, a player’s total salary can fluctuate extensively from one year to the next.

Of course, all potential systematic errors due to interpretation can be entirely sidestepped by using overall Cap Value as the primary metric of contract value because, as USA Today explains, “The cap value represents the player’s pro-rated signing bonus, plus [earned] salary and other bonuses for the season.” The cap value is a hard number. All cap values for a given team’s roster must sum to be greater than the league minimum for annual salary expenditures, but less than the league maximum (Salary Cap) for annual salary expenditures. Therefore, any potential weakness in the dataset is significantly mitigated if not entirely corrected.

The “Real” variables were calculated by deflating monetary values from 2001-2008 using 2000 as a base year, and inflationary data from the US CPI. The “length of career” variables were “calculated” by observing each player’s contract history, and determining the number of years they were compensated to play in the NFL. Similarly, the Second Contract variable was calculated by determining if the overall Cap Value impact of a player’s second contract versus the first.

ESPN.com
When ESPN bills itself as “The World Leader in Sports,” few tend to disagree. ESPN is one of the most trusted sports news outlets available. Any data gleaned from their archives should be treated as complete and accurate, unless expressly proven otherwise. It is because of this reason I chose to extract the Jimmy Johnson Draft Value Chart from the ESPN.com archives.
This chart, designed by former NFL Head Coach Jimmy Johnson, assigns a unitless, numerical value to all draft picks as a means of determining fair trades between packages of picks. The entire chart contains over 240 observations—one for each available pick in the draft—however, only observations 1-15 are useful for this study.

This Draft Value Chart is used by all 32 NFL franchises when determining fair trades on draft day. It is widely available to anyone who wishes to use it. This coupled with the longstanding, reliable reputation ESPN has earned speak to the strength of the source. There are no notable weaknesses.

From the Draft Value Chart, I calculated the rate of depreciation between picks, as well as the absolute depreciation from pick 1 to pick 15.

The following are tables discussing the descriptive statistics of my dataset on the whole.

### Summary Statistics: Part 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Error</th>
<th>Median</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Salary</td>
<td>$ 1,154,605.98</td>
<td>$ 65,450.68</td>
<td>$ 600,000.00</td>
<td>$ 1,584,393.32</td>
</tr>
<tr>
<td>Sign Bonus</td>
<td>$ 2,221,102.35</td>
<td>$ 143,203.06</td>
<td>$</td>
<td>$ 3,466,578.93</td>
</tr>
<tr>
<td>Other Bonus</td>
<td>$ 740,960.47</td>
<td>$ 75,278.96</td>
<td>$ 15,740.00</td>
<td>$ 1,822,310.78</td>
</tr>
<tr>
<td>Total Salary</td>
<td>$ 3,581,216.38</td>
<td>$ 159,936.11</td>
<td>$ 2,102,365.00</td>
<td>$ 3,871,643.37</td>
</tr>
<tr>
<td>Cap Value</td>
<td>$ 3,012,752.84</td>
<td>$ 101,804.05</td>
<td>$ 2,240,571.00</td>
<td>$ 2,464,415.04</td>
</tr>
<tr>
<td>Real Base Salary</td>
<td>$ 991,255.97</td>
<td>$ 54,525.87</td>
<td>$ 505,439.20</td>
<td>$ 1,319,931.51</td>
</tr>
<tr>
<td>Real Sign Bonus</td>
<td>$ 1,942,126.71</td>
<td>$ 123,110.80</td>
<td>$</td>
<td>$ 2,980,197.03</td>
</tr>
<tr>
<td>Real Other Bonus</td>
<td>$ 634,373.31</td>
<td>$ 64,219.31</td>
<td>$ 13,390.87</td>
<td>$ 1,554,585.00</td>
</tr>
<tr>
<td>Real Total Salary</td>
<td>$ 3,136,977.96</td>
<td>$ 137,639.18</td>
<td>$ 1,889,051.15</td>
<td>$ 3,331,891.66</td>
</tr>
<tr>
<td>Real Cap Value</td>
<td>$ 2,615,293.00</td>
<td>$ 84,719.24</td>
<td>$ 2,033,827.05</td>
<td>$ 2,050,835.60</td>
</tr>
<tr>
<td>Win Percentage</td>
<td>50.87%</td>
<td>0.80%</td>
<td>50.00%</td>
<td>18.68%</td>
</tr>
</tbody>
</table>

### Summary Statistics: Part 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Salary</td>
<td>$ 11,730,770.00</td>
<td>$</td>
<td>$ 11,730,770.00</td>
<td>586</td>
</tr>
<tr>
<td>Sign Bonus</td>
<td>$ 25,200,000.00</td>
<td>$</td>
<td>$ 25,200,000.00</td>
<td>586</td>
</tr>
<tr>
<td>Other Bonus</td>
<td>$ 18,766,160.00</td>
<td>$</td>
<td>$ 18,766,160.00</td>
<td>586</td>
</tr>
<tr>
<td>Total Salary</td>
<td>$ 30,750,000.00</td>
<td>$</td>
<td>$ 30,750,000.00</td>
<td>586</td>
</tr>
<tr>
<td>Cap Value</td>
<td>$ 14,137,500.00</td>
<td>$</td>
<td>$ 14,137,500.00</td>
<td>586</td>
</tr>
<tr>
<td>Real Base Salary</td>
<td>$ 9,379,599.17</td>
<td>$</td>
<td>$ 9,379,599.17</td>
<td>586</td>
</tr>
<tr>
<td>Real Sign Bonus</td>
<td>$ 20,149,222.87</td>
<td>$</td>
<td>$ 20,149,222.87</td>
<td>586</td>
</tr>
<tr>
<td>Real Other Bonus</td>
<td>$ 16,026,694.98</td>
<td>$</td>
<td>$ 16,026,694.98</td>
<td>586</td>
</tr>
<tr>
<td>Real Total Salary</td>
<td>$ 25,533,443.03</td>
<td>$</td>
<td>$ 25,533,443.03</td>
<td>586</td>
</tr>
<tr>
<td>Real Cap Value</td>
<td>$ 11,697,638.33</td>
<td>$</td>
<td>$ 11,697,638.33</td>
<td>586</td>
</tr>
<tr>
<td>Win Percentage</td>
<td>1</td>
<td>0.00%</td>
<td>100.00%</td>
<td>543</td>
</tr>
</tbody>
</table>
The table below offers some general statistics about the dataset in general:

### Summary Statistics: Part 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total</th>
<th>Ratio to Total</th>
<th>Ratio to Group</th>
</tr>
</thead>
<tbody>
<tr>
<td># Total Obs. Picks 2000-2005</td>
<td>90</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td># Total Contract Year Obs.</td>
<td>543</td>
<td>6.03</td>
<td>-</td>
</tr>
<tr>
<td># Total Defensive Picks</td>
<td>45</td>
<td>50.00%</td>
<td>-</td>
</tr>
<tr>
<td># Total Offensive Picks</td>
<td>45</td>
<td>50.00%</td>
<td>-</td>
</tr>
<tr>
<td># Total Defensive Pro Bowlers</td>
<td>24</td>
<td>26.67%</td>
<td>53.33%</td>
</tr>
<tr>
<td># Total Offensive Pro Bowlers</td>
<td>21</td>
<td>23.33%</td>
<td>46.67%</td>
</tr>
</tbody>
</table>

By observing the top 15 selections from the 6 NFL Drafts from 2000-2005, I accumulated 90 observations on which to conduct my research. Much of the following analysis will focus on Pick Segments (picks 1-5, 6-10, 11-15) and Phase of Game (defense vs. offense).

The following table provides illuminating information about many of the variables used throughout the analysis—principal among them are Pro Bowl and Real Cap Value.

### Summary Statistics: Part 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>% Yes</th>
<th>% No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro Bowl</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>4-Year Career</td>
<td>93.33%</td>
<td>6.67%</td>
</tr>
<tr>
<td>6-Year Career</td>
<td>90.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>Still in League</td>
<td>74.32%</td>
<td>25.68%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>% Increased/Equivalent</th>
<th>% Decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Contract Dummy</td>
<td>77.78%</td>
<td>22.22%</td>
</tr>
</tbody>
</table>

The Pro Bowl, 4-Year Career, 6-Year Career, and Still in League variables are all, as aforementioned, dummy variables [0 if No, 1 if Yes].
Analysis

The following section will be entirely focused on relating actual data to the current compensation model and its underlying assumptions in order to determine model accuracy. In short, does the data available reinforce the model’s assumptions, or does it actually contradict them?

Let us first turn our attention to the model itself. In this initial section of the analysis, I will operate under the assumption that all the model’s underlying assumptions are true. In this case, we’d expect to see a grouping of highly paid players within the first several picks, and a significant depreciation in contract value by the 15th pick. As discussed in the Data section, the Cap Value metric most efficiently includes Base Salary, Signing Bonus, and Other Bonuses into a single value. That way, I can effectively compare annual contract value between players. The following table compares the first-year Cap Value impact each player has against his team’s salary cap for the 2000 NFL Draft.

Table 2: First Year Cap Value Impact Depreciation of the First 15 Selections in the 2000 NFL Draft

<table>
<thead>
<tr>
<th>Player Name</th>
<th>Draft Year</th>
<th>Draft Position</th>
<th>Cap Value</th>
<th>Depreciation %</th>
<th>Absolute Dep. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courtney Brown</td>
<td>2000</td>
<td>1</td>
<td>$2,475,300.00</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>LaVar Arrington</td>
<td>2000</td>
<td>2</td>
<td>$2,304,600.00</td>
<td>6.90%</td>
<td>6.90%</td>
</tr>
<tr>
<td>Chris Samuels</td>
<td>2000</td>
<td>3</td>
<td>$2,157,300.00</td>
<td>6.39%</td>
<td>12.85%</td>
</tr>
<tr>
<td>Peter Warrick</td>
<td>2000</td>
<td>4</td>
<td>$2,090,000.00</td>
<td>3.12%</td>
<td>15.57%</td>
</tr>
<tr>
<td>Jamal Lewis</td>
<td>2000</td>
<td>5</td>
<td>$1,878,000.00</td>
<td>10.14%</td>
<td>24.13%</td>
</tr>
<tr>
<td>Corey Simon</td>
<td>2000</td>
<td>6</td>
<td>$1,870,000.00</td>
<td>0.43%</td>
<td>24.45%</td>
</tr>
<tr>
<td>Thomas Jones</td>
<td>2000</td>
<td>7</td>
<td>$1,731,000.00</td>
<td>7.43%</td>
<td>30.07%</td>
</tr>
<tr>
<td>Plaxico Burress</td>
<td>2000</td>
<td>8</td>
<td>$1,660,000.00</td>
<td>4.10%</td>
<td>32.94%</td>
</tr>
<tr>
<td>Brian Urlacher</td>
<td>2000</td>
<td>9</td>
<td>$1,540,000.00</td>
<td>7.23%</td>
<td>37.79%</td>
</tr>
<tr>
<td>Travis Taylor</td>
<td>2000</td>
<td>10</td>
<td>$1,453,000.00</td>
<td>5.65%</td>
<td>41.30%</td>
</tr>
<tr>
<td>Ron Dayne</td>
<td>2000</td>
<td>11</td>
<td>$1,364,500.00</td>
<td>6.09%</td>
<td>44.88%</td>
</tr>
<tr>
<td>Shaun Ellis</td>
<td>2000</td>
<td>12</td>
<td>$1,235,000.00</td>
<td>9.49%</td>
<td>50.11%</td>
</tr>
<tr>
<td>John Abraham</td>
<td>2000</td>
<td>13</td>
<td>$1,140,000.00</td>
<td>7.69%</td>
<td>53.94%</td>
</tr>
<tr>
<td>Bubba Franks</td>
<td>2000</td>
<td>14</td>
<td>$1,243,800.00</td>
<td>-9.11%</td>
<td>49.75%</td>
</tr>
<tr>
<td>Deltha O'Neal</td>
<td>2000</td>
<td>15</td>
<td>$1,181,000.00</td>
<td>5.05%</td>
<td>52.29%</td>
</tr>
</tbody>
</table>

Total Depreciation 52.29%

Note: Data are from the USA Today NFL Player Salary Database and NFL.com’s historical draft data. “Dep. %” is calculated by determining the percentage decline in First Year Cap Value Impact from pick i to pick i+1 (i=1, 2,...,15). “Absolute Dep. %” is calculated by determining the percentage decline in First Year Cap Value Impact from pick 1 to pick i (i=2, 3,...,15). There is no depreciation reported for the first pick because it serves as the base case for this table. “Total Depreciation” reports the overall depreciation of First Year Cap Value Impact over selections 1 to 15.
The “Total Depreciation” metric at the bottom measures the overall depreciation from the 1st picks’ Cap Value impact to the 15th pick’s Cap Value impact. This calculation shows throughout the life of his contract, on average Courtney Brown stands to be compensated at a level that is more than double that of Deltha O’Neal. If all underlying assumptions are accurate, one could reasonably argue Courtney Brown is approximately twice as likely to achieve success at his position than Deltha O’Neal.

If I were to repeat the same analysis for draft years 2001-2005, we would see similar results for total depreciation. The following table reports the total depreciation in Cap Value impact from the 1st to 15th pick from 2000-2005.

Table 3: Overall First Year Cap Value Impact Depreciation from Selection 1 to 15 in NFL Draft Years 2000-2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Picks 1-15 Cap Value Dep. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>52.29%</td>
</tr>
<tr>
<td>2001</td>
<td>49.66%</td>
</tr>
<tr>
<td>2002</td>
<td>52.12%</td>
</tr>
<tr>
<td>2003</td>
<td>52.60%</td>
</tr>
<tr>
<td>2004</td>
<td>44.30%</td>
</tr>
<tr>
<td>2005</td>
<td>47.41%</td>
</tr>
<tr>
<td>Average Dep.</td>
<td>49.73%</td>
</tr>
</tbody>
</table>

Note: Table 3 presents the “Total Depreciation” calculation reported in Table 2 for all draft years included in the dataset. “Average Dep.” is the mean of the 6 reported Total Depreciations.

It becomes immediately apparent that the Cap Value impact of the 1st player chosen is historically twice as large as that of the 15th selection. Once again, if all the underlying assumptions are to be considered accurate, one could claim year after year the 1st selection has an $E[p]$ that is effectively twice as high as the 15th’s. In other words, the 1st selection is twice as likely to achieve success at his position than the 15th selection. Of course, some Cap Value impact can be attributed to positional/other considerations, however this impact is secondary at best, and doesn’t confound the results.

If the underlying assumptions are correct, the current model seems to compensate players accurately and efficiently. The significant depreciation in compensation is simply a function of $E[p]$ level. $E[p]$ is calculated, and a player’s pay is negotiated accordingly.

At this point, one could reasonably argue the current Rookie compensation model is efficient.

To this point, I’ve simply claimed all underlying assumptions were accurate and proceeded accordingly. However, in order to truly claim the current Rookie compensation model is efficient, one should also analyze each individual underlying assumption to ascertain accuracy.

First Underlying Assumption:

- Players with greater $E[p]$ are inherently more likely to succeed in the NFL.
This first assumption is fairly difficult to argue with, as the basis of the $E[p]$ calculation is a player’s actual probability of success. Therefore, if teams calculate $E[p]$ in a way that is scientifically faithful—and it would be in every teams’ best interest to do so—one can be sure that, for our purposes, and by extension the purposes of all NFL teams, $E[p]$ is a valid measure of inherent likelihood of success.

For the time being, this assumption seems valid and accurate.

**Second Underlying Assumption:**

- Players selected higher have greater $E[p]$ than those selected lower, and should be compensated at a higher rate

This analysis is in the privileged position to be evaluating all players’ likelihood of success ex-post. Of course, during the draft, teams aren’t as lucky. I will use this position to determine if there are any significant trends in success history, and if these trends are statistically significant.

For the remainder of this analysis, I will define “success” as whether a player has been selected to the Pro Bowl from 2000-2008. This metric may seem unfair to some, but considering my analysis concentrates entirely on the first 15 picks of a given draft, I feel my process is accurate. A Pro Bowler in a given year is considered one of the premier players at his position in that year. When a player is selected among the first 15 picks, teams already signal they believe he is among the premier players at his position within his own draft class. Therefore, he is reasonably expected to make a Pro Bowl at some point in his career, because his starting place with respect to his peers has labeled him so. Some may argue with this approach, but keep in mind, the goal is to remain as objective as possible, and I believe few who follow suit could reasonably argue the words “success” and “Pro Bowl” are mutually exclusive.

To most accurately study the data to determine whether the assumption is valid, I will categorize all observed picks into 1 of 3 “Pick Segments.” The first five picks are grouped into Pick Segment (1-5), the second 5 into Pick Segment (6-10), and the third 5 into Pick Segment (11-15). This was done in order to relate selection order, contract value, and success rates most easily. It seems, historically, the contracts awarded to players in Pick Segment (1-5) experience a natural grouping of overall contract value. The same can be said for the remaining Pick Segments as well. Additionally, one would expect, under the current assumptions, players within each Pick Segment to have similar $E[p]$ values—they are supposedly equally likely to succeed.

The following table represents the number of players from each segment that have made it to a Pro Bowl from 2000-2008. Keep in mind the players studied are only those drafted from 2000-2005.
Table 4: Success Rate by Pick Segment for Players Selected in NFL Draft Years 2000-2005

<table>
<thead>
<tr>
<th>Pick Segment</th>
<th># Pro Bowlers (2000-2008)</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>16</td>
<td>53.33%</td>
</tr>
<tr>
<td>6-10</td>
<td>13</td>
<td>43.33%</td>
</tr>
<tr>
<td>11-15</td>
<td>16</td>
<td>53.33%</td>
</tr>
</tbody>
</table>

Note: “Success Rate” is calculated as the ratio of players in a Pick Segment who achieved Pro Bowl status at least once in their career to all observed players in the Pick Segment. In this case, each Pick Segment contains 30 observations (5 picks per year over 6 years of drafts).

It should be noted that, of the 30 players drafted in Pick Segment (1-5) from 2000-2005, 16 separate players have achieved Pro Bowl status at their respective positions at least once—the same success rate as Pick Segment (11-15). This is curious to say the least. If players with greater E[p] values are inherently more likely to succeed, and those players are historically chosen in higher Pick Segments, why do we see identical Success Rates in these two Pick Segments? This poses the question, “are the players chosen in Pick Segment (1-5) truly, inherently more likely to succeed than those selected in lower Pick Segments?” Or is this assumption inaccurate? Further analysis is required.

There may be some causality here. After all, positional considerations must be taken into account. Perhaps different phases of the game are addressed within different Pick Segments. For example, all the best Quarterbacks and Offensive Tackles may be selected within Pick Segment (1-5), leaving all the best Defensive Ends and Free Safeties to be selected in, say, Pick Segment (11-15).

The following chart illustrates the number of picks in each Pick Segment allotted by Phase of Game.

Table 5: Total Number of Picks Allotted to each Phase of Game by Pick Segment in NFL Draft Years 2000-2005

<table>
<thead>
<tr>
<th># of Picks Allotted by Phase of Game</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
</tr>
<tr>
<td>6-10</td>
</tr>
<tr>
<td>11-15</td>
</tr>
</tbody>
</table>

Note: As in Table 4, each Pick Segment totals 30 (5 picks per year over 6 years of drafts). Each Pick Segment contains a total of 30 picks from the years 2000-2005. We can see a clear focus on offensive players in Pick Segment (1-5), and an equal but opposite focus on defensive players.

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players in Pick Segment (11-15). It becomes immediately apparent that the types of players being selected to the Pro Bowl from Pick Segment (1-5) are essentially not “competing” against the players selected to the Pro Bowl from Pick Segment (11-15). This could potentially explain the reason for equivalent success rates. The underlying assumption may still be valid.

Of course, simply observing which types of players are selected in which Pick Segment hardly achieves statistical significance. If the heart of the assumption in question lies in success rates, I would do well to compare success rates by phase of game and pick segment. The following chart does exactly that.

Table 6: Success Rate of each Phase of Game by Pick Segment in NFL Draft Years 2000-2005

<table>
<thead>
<tr>
<th>Phase of Game</th>
<th>Defensive Success Rate</th>
<th>Offensive Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>57.14%</td>
<td>44.44%</td>
</tr>
<tr>
<td>6-10</td>
<td>50.00%</td>
<td>35.71%</td>
</tr>
<tr>
<td>11-15</td>
<td>60.00%</td>
<td>40.00%</td>
</tr>
</tbody>
</table>

Note: “Success Rates” are calculated as the ratio of players in a Pick Segment and particular Phase of Game who achieved Pro Bowl status at least once in their career to all observed players in the Pick Segment.

Of the 9 defensive players selected in Pick Segment (1-5) from 2000-2005, 44.44% have been selected to the Pro Bowl. Compare that to the 57.14% success rate of the 21 offensive players from the same segment. In Pick Segment (11-15), there is almost a complete reversal. 60% of the 20 defensive players selected in that Pick Segment have gone to the Pro Bowl, compared to 40% of the 10 offensive players selected. At first glance, it would seem a team is more likely to select an offensive Pro Bowler in Pick Segment (1-5) than Pick Segments (6-10) or (11-15). The opposite seems to be true for defensive players.

This casts doubt over the traditional $E[p]$ approach. If players selected in Pick Segment (1-5) have higher $E[p]$ than those selected in Pick Segment (11-15), one would expect both offensive and defensive success rates to be greater in Pick Segment (1-5). The data suggests that is not the case. This underlying assumption may not be valid after all.

In order to definitively determine if players in Pick Segment (1-5) are inherently more likely to succeed than those selected in Pick Segment (11-15), I will test for statistical significance on the 95% Confidence level. This is achieved through use of the following equation:

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\[ t = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}} \]

Where:
- \( \hat{p}_1 \) = observed first segment Success Rate
- \( \hat{p}_2 \) = observed second segment Success Rate
- \( n_1 \) = size of first sample group
- \( n_2 \) = size of second sample group

This T-Test reports if there is any inherent difference in probability of success between 2 populations. If the absolute value of the resultant value, the "t-statistic," is less than 1.96, we can say with 95% Confidence there is no statistically significant difference in probability of success between 2 populations. Therefore, the two populations compared are equally likely to produce players who will be selected to the Pro Bowl at their respective positions.

The following table reports the t-statistics for a range of population comparisons.

**Table 7: T-Test to Determine Statistical Significance of Intersegment/phase Success Rate Comparisons**

<table>
<thead>
<tr>
<th>Pick Segment</th>
<th>T-Stat</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1-5) Off. vs (11-15) Def.</td>
<td>-0.26272337</td>
<td>95% CI</td>
</tr>
<tr>
<td>(1-5) Def. vs (11-15) Off.</td>
<td>0.277631244</td>
<td>95% CI</td>
</tr>
<tr>
<td>(1-5) Off. vs (11-15) Off.</td>
<td>1.37068834</td>
<td>95% CI</td>
</tr>
<tr>
<td>(1-5) Def. vs (11-15) Def.</td>
<td>-1.200490096</td>
<td>95% CI</td>
</tr>
<tr>
<td>(1-5) Off. vs (1-5) Def.</td>
<td>0.991769407</td>
<td>95% CI</td>
</tr>
<tr>
<td>(11-15) Off. vs (11-15) Def.</td>
<td>-1.58113883</td>
<td>95% CI</td>
</tr>
</tbody>
</table>

*Note:* The Null Hypothesis is: the true, underlying probability of success for one pick segment and phase of game is inherently equivalent to the true, underlying probability of success for another pick segment. Our findings show we cannot reject the Null Hypothesis. Further, the frequency with which we accept the null hypothesis could lead us to believe each population is truly equally likely to achieve success.

I compared all possible permutations of Pick Segment (1-5) versus Pick Segment (11-15). The reason Pick Segment (6-10) is not represented is simple. The very nature of the NFL Draft stipulates that any player chosen in Pick Segment (11-15) was also available during Pick Segment (6-10). Therefore, if I prove statistical significance between Pick Segments (1-5) and (11-15), I've proven it for all permutations between all segments.

This table presents some very strong evidence. All possible permutations are significant at the 95% Confidence level. I have proven, with statistical accuracy, that an offensive player selected in Pick Segment (1-5) is equally likely to make a Pro Bowl as an offensive player selected in Pick Segment (11-15). The same is true for defensive players.

This data is devastating for the assumption that "Players selected higher have greater \( E[p] \) than those selected lower, and should be compensated at a higher rate." Although teams may "grade" them higher, there is no statistical evidence to prove they deserve that higher grade. Even more curiously, that grade, or \( E[p] \), is the primary driver of overall contract value.
This assumption is both inaccurate and invalid.

I have unearthed an extreme inefficiency within the current model. If these players are all equally likely to succeed at their position, why does contract value decrease by 50% from picks 1 to 15? The depreciation rate should be significantly mitigated in order to more accurately represent true $E[p]$.

**Third Underlying Assumption:**

- By entering the league, all players bear the same risk stemming from negative externalities—i.e., injuries or otherwise.
  - As a result of this common risk, players selected higher bear greater opportunity cost—in the case of realized negative externalities—than those chosen lower due to greater $E[p]$ and should be awarded increased guaranteed compensation as insurance against this risk.

It is virtually impossible to fully avoid injury as a player in the NFL. Even those who never play in a game are still subject to injury during practice. Even more alarming is the fact that several franchises have less than desirable histories with respect to staph infections further complicating injuries suffered at training facilities. This, coupled with the intense workout regimes many players subject themselves to during both the season and off-season, compound the potential for injury complications. It is fairly safe to say that no matter where a player is selected in the draft, the position in which he plays, how many years he’s been playing, or if he’s a starter or otherwise, all players are effectively equally likely to experience an injury.

The first part of this assumption is sufficiently valid and accurate.

On the other hand, my previous analysis would suggest the second part of the assumption may be somewhat inaccurate. If I have proven, with statistical significance, that each of the first 15 selections in a given draft is equally likely to yield a Pro Bowler, it would be very difficult to argue the 1st player selected faces significantly greater opportunity cost than the 15th.

In fact, I would go as far as to say that argument cannot be made by any reasonable person. By definition, because both players are equally likely to succeed, they both face the same opportunity cost of injury. Therefore, any guaranteed monies paid to one player must necessarily be paid to the other player based on the framework of the current model.

Further, if my preliminary conclusions are true, it would follow that no guaranteed monies should be appropriated based on positional considerations. If each and every player is equally likely to suffer an injury in a given year, regardless of position, no individual position can reasonably be said to bear greater risk than another. Thus, no individual position faces greater opportunity cost of injury than another. It should be noted this particular positional consideration is not a fundamental driver of my analysis and should, in no way, be considered a potential hindrance to the analysis overall.

Absent a complete retooling of the model itself, the second part of this assumption cannot logically exist as an underlying factor.
The second part of this assumption is inaccurate and invalid.

**Fourth Underlying Assumption:**

- Of two players drafted for the same position, the player selected higher should be awarded a contract of greater value because his true $E[p]$ must be greater.

Once again, my previous analysis would suggest this assumption is inaccurate. Because each of the top 15 selections is statistically equally likely to succeed, their true $E[p]$'s must be virtually equivalent. Virtually equivalent $E[p]$ values should lead to virtually equivalent contract values.

Our data prove this assumption is inaccurate. That being said, I hesitate to conclude it is invalid. After all, there must be some underlying reason a specific player is chosen above his peers in each position. I would argue such a phenomenon is a function of private value vs. common value rather than comparative $E[p]$ levels. Although two players may play the same position, their skill sets may be different.

Consider the two Wide Receivers drafted within the first 15 selections of the 2009 NFL Draft: Darrius Heyward-Bey and Michael Crabtree—chosen 7th and 10th, respectively. Before the draft, Crabtree was widely considered to be the top prospect at Wide Receiver. He was the most complete player at his position, ranking highly in speed, height, strength, and route running capability. Heyward-Bey was generally considered to occupy a slightly lower tier of receiver than Crabtree. This information would lead us to believe Crabtree had a higher common value than Heyward-Bey. Therefore, one would expect Crabtree's true $E[p]$ to be greater. However, before I go further, it should be noted Heyward-Bey unequivocally ranked higher than Crabtree in speed because he achieved the fastest 40-yd dash time of all the players who attended the NFL combine. Regardless, Crabtree's higher common value and $E[p]$ level suggest he would be drafted earlier than Heyward-Bey.

This was not the case. Heyward-Bey was selected 7th overall by the Oakland Raiders. Oakland’s private valuation of Heyward-Bey was greater than that of Crabtree’s. In effect, Oakland valued speed far more than they valued “completeness.” Although Crabtree's common value may have been higher, it didn’t matter. Oakland selected on private valuation in order to maximize utility.

In this case, Heyward-Bey wasn’t chosen on $E[p]$ value—an expectation projection. Instead, he was chosen on speed—a quantifiable skill. Heyward-Bey’s particular skill set served to increase his private value in the eyes of the Oakland Raiders to a level greater than that of Crabtree.

In light of this new analysis, I propose the assumption should be changed to the following:

- Of two players drafted for the same position, the player selected higher should be awarded a contract of greater value because his private value to the selecting team must be greater than his peers’ individual common values.

This new assumption is both valid and accurate.
Fifth Underlying Assumption

- Certain positions should be awarded contracts of greater value than others because their $E[p]$ is weighted more heavily
  - Their $E[p]$ is weighted more heavily because realization of success at that position of is of greater comparative benefit to the team than realization of success at another position

Like the first underlying assumption, the fifth is difficult to refute. The halls of Canton, Ohio are filled with Quarterbacks, Running Backs, and Wide Receivers who single handedly willed their team to success in times of adversity. One would be hard pressed to say the same for even the greatest Tight Ends or Fullbacks.

Therefore, although I have determined the top 15 selections are equally likely to achieve success within their position, actual realization of that success for certain positions carries with it greater team success. Increased team success leads to generation of greater revenue. Concordantly, owners should be willing to pay more for a player whose position carries with it a greater probability of increased team success, conditional on player success.

This assumption is both valid and accurate.

After reviewing all the assumptions underlying the current Rookie compensation model, I have determined the following corrections are in order:

- Players with greater $E[p]$ are inherently more likely to succeed in the NFL
- Players selected higher have greater $E[p]$ than those selected lower, and should be compensated at a higher rate
- By entering the league, all players bear the same risk stemming from negative externalities
  - As a result of this common risk, players selected higher bear greater opportunity cost—in the case of realized negative externalities—than those chosen lower due to greater $E[p]$ and should be awarded increased guaranteed compensation as insurance against this risk
- Of two players drafted for the same position, the player selected higher should be awarded a contract of greater value because his true $E[p]$ must be greater than his private value to the selecting team must be greater than his peers’ individual common values
- Certain positions should be awarded contracts of greater value than others because their $E[p]$ is weighted more heavily
  - Their $E[p]$ is weighted more heavily because realization of success at that position is of greater comparative benefit to the team than realization of success at another position
In other words:

- The First assumption is valid and accurate
- The Second assumption is invalid and inaccurate and should be discarded
- The Third assumption has 2 parts:
  - The first part is valid and accurate
  - The second part is invalid and inaccurate and should be discarded
- The Fourth assumption is valid, but inaccurate
  - It should be corrected as shown above
- The Fifth assumption has 2 parts:
  - The first part is valid and accurate
  - The second part is valid and accurate
Conclusion

Now that it has been determined there are several imperfections within the assumptions underlying the current NFL Rookie compensation model, one would do well to address these problems. The following suggestions each pertain to a specific inefficiency.

New Draft Value Chart (Correcting a Symptom of the Second Assumption)
Currently, Jimmy Johnson’s Draft Value Chart acts as a guide widely used by all NFL teams when determining the value of their (non-compensatory) draft picks with respect to potential trades.

Coach Johnson established a chart that assigns a numeric, “unitless” value to each individual pick in the draft. For instance, the 1st pick of the First Round of the draft is “worth” 3000, while the 15th pick of the First Round of the draft is “worth” 1050—a 65% depreciation in value over the 15 picks. Thus, in order to feasibly trade up to the 1st pick, the team with the 15th pick would have to put together a package of picks/players (in addition to the 15th pick) that would add 1950 worth of value to their 15th pick—thus creating a package “worth” 3000. The appeal of this chart is that it applies objective, cold, hard, negotiable numbers to an otherwise subjective, qualitative exercise.

This chart was created in the mid 1990’s, shortly after the current Collective Bargaining Agreement was signed; and as such, may be considered a bit outdated. While the first 5 picks do still command a high value, it should be also taken into account that the talent available during the subsequent 10 picks has led those picks to comparatively increase in value—thus somewhat closing the “gap” in value between picks 1 and 15. In order to more accurately represent the more deeply talented drafts in recent years, as previously stated, one must update the Draft Value Chart in an attempt to significantly mitigate the depreciation of pick value over the first 15 picks.

Reputed Football Analyst Mike Florio of ProFootballTalk.com has done just that. Below is Table 3 which represents Jimmy Johnson’s (JJ) original Draft Value Chart alongside Mike Florio’s (MF) updated chart:
Table 8: Comparison of Overall Depreciation Underlying Jimmy Johnson’s and Mike Florio’s Draft Value Charts

<table>
<thead>
<tr>
<th>Pick Number</th>
<th>DFC (JJ)</th>
<th>DFC (MF)</th>
<th>% Decrease (JJ)</th>
<th>% Decrease (MF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3000</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2600</td>
<td>975</td>
<td>13.33%</td>
<td>2.50%</td>
</tr>
<tr>
<td>3</td>
<td>2200</td>
<td>550</td>
<td>15.38%</td>
<td>2.56%</td>
</tr>
<tr>
<td>4</td>
<td>1800</td>
<td>900</td>
<td>18.18%</td>
<td>5.26%</td>
</tr>
<tr>
<td>5</td>
<td>1700</td>
<td>880</td>
<td>5.56%</td>
<td>2.22%</td>
</tr>
<tr>
<td>6</td>
<td>1600</td>
<td>860</td>
<td>5.88%</td>
<td>2.27%</td>
</tr>
<tr>
<td>7</td>
<td>1500</td>
<td>845</td>
<td>6.25%</td>
<td>1.74%</td>
</tr>
<tr>
<td>8</td>
<td>1400</td>
<td>830</td>
<td>6.67%</td>
<td>1.78%</td>
</tr>
<tr>
<td>9</td>
<td>1350</td>
<td>820</td>
<td>3.57%</td>
<td>1.20%</td>
</tr>
<tr>
<td>10</td>
<td>1300</td>
<td>810</td>
<td>3.70%</td>
<td>1.22%</td>
</tr>
<tr>
<td>11</td>
<td>1250</td>
<td>800</td>
<td>3.85%</td>
<td>1.23%</td>
</tr>
<tr>
<td>12</td>
<td>1200</td>
<td>790</td>
<td>4.00%</td>
<td>1.25%</td>
</tr>
<tr>
<td>13</td>
<td>1150</td>
<td>750</td>
<td>4.17%</td>
<td>5.06%</td>
</tr>
<tr>
<td>14</td>
<td>1100</td>
<td>735</td>
<td>4.35%</td>
<td>2.00%</td>
</tr>
<tr>
<td>15</td>
<td>1050</td>
<td>720</td>
<td>4.55%</td>
<td>2.04%</td>
</tr>
<tr>
<td>% Dep. 1-15</td>
<td>65.00%</td>
<td>28.00%</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: "%Dep. 1-15" is calculated in the same manner as absolute depreciation of First Year Cap Value Impact from Tables 2 & 3.

Mr. Florio’s updated chart significantly mitigates the depreciation in pick value. Instead of losing 65% of overall value from the 1st pick to the 15th, only 28% is lost. Based on the analysis contained within this paper that confirmed there is no evidence that unequivocally supports statistical difference of success rates between populations, I'd argue Mr. Florio’s chart is the more accurate of the two. I would even go as far as to suggest that Mr. Florio’s chart should be considered as a replacement for Coach Johnson’s.

Is Mr. Florio’s chart the most accurate chart possible? I’d hesitate to support such a notion. Nevertheless, I feel it is a marked improvement over Coach Johnson’s as it more accurately addresses true, underlying $E[p]$. 

Mitigated Emphasis on Guaranteed Monies (Addressing a Symptom of the Second Part of the Third Assumption)

If players selected in the top 15 are equally likely to succeed, none faces greater opportunity cost failure stemming from negative externalities. Therefore, there is very little economic justification for players selected in Pick Segment (1-5) receiving greater guaranteed compensation than their peers in Pick Segments (6-10) and (11-15). Any increased guaranteed monies demanded by the higher selections must stem from a motivation other than increased opportunity cost.
I'm not saying guaranteed compensation should be removed entirely. There is a very definite, measurable opportunity cost of failure borne by all players from picks 1-15. Instead, I'm arguing any guaranteed compensation paid based on opportunity cost of failure should be virtually equivalent across each of the first 15 selections. Any augmented guaranteed monies demanded by a player must be paid based on other factors.

Cap Value Insurance (Addressing a Negative Externality that Stems from the Second Part of the Fifth Assumption)

According to the Second Part of the Fifth Assumption, teams are incentivized to "gamble" on a player who occupies a certain position in hopes of maximizing future utility. For example, if there is a "sure bet" available at Linebacker, and a "gamble" at Quarterback, risk neutral and risk seeking teams are more likely to choose the Quarterback to maximize expected future utility. A risk averse team would generally choose the Linebacker regardless of whether expected future utility favors the Quarterback—the risk associated with the Quarterback is simply too great.

Yet, high first round draft picks are awarded to teams who have the comparative greatest need to increase expected future utility. Therefore, it would be wise for the league to incentivize all teams—regardless of risk preferences—to take economically responsible gambles when appropriate.

So, why are certain positional selections considered a gamble in the first place? According to the compensation model presented in the analysis, Quarterbacks historically command a higher Overall Cap Value impact over the life of their contracts than other positions. Thus, if a Quarterback fails to achieve success, the team is negatively affected at a higher rate. This negative impact can be avoided if no guaranteed monies were written into a player's contract; but such a scenario would woefully lack Pareto Optimality—owners would be better off, but players would suffer significant losses in expected future utility.

I propose the league implement some sort of Cap Value insurance conditional on success. If a player is too injured to continue in the league, or terribly underperforms to the point of expulsion from the league, the team should be permitted to remove a percentage of his guaranteed monies from the Overall Cap Value. They would still be contractually obligated to pay him whatever guaranteed compensation he's already "earned," however this compensation's affect on the Salary Cap would be greatly mitigated.

This proposal promotes Pareto Optimality. The player is still paid his earned guaranteed compensation—he is equally well off. The positive effects experienced by the team are twofold: they recoup Cap Value that can be used to sign proven, successful veteran free agents and they'd also be incentivized to choose players based on their ability to increase expected future utility—not on their "ability" to be signed at a rate that lessens Cap Value impact.

If analyses were to be conducted that could define, in a statistically significant manner, which positions have historically higher success rates, this insurance can also be honed to include positional considerations. In this case, the insurance could be implemented in two fundamentally different ways: either the positions with the greatest success rates are most insured against failure—rewarding "responsible" selections—or the positions with the lowest success rates are most insured against failure—allowing risk averse teams to select a player whose private valuation is highest to them, regardless of position.
I’m partial to the latter positional implementation, as it focuses on player ability and team success rather than contractual or managerial concerns.

Hopefully, my analysis has shed light on the underlying imperfections that unfortunately drive the current Rookie compensation model. I feel that by finding equitable ways to address these issues, both the players and owners would be able to negotiate a mutually beneficial outcome.
Acknowledgements

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