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Passing on Success?
Productivity Outcomes for Quarterbacks Chosen in the 1999-2004 National Football League Player Entry Drafts

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Abstract

Seventy quarterbacks were selected during six NFL drafts held 1999-2004. This paper analyzes information available prior to the draft (college, college passing statistics, NFL Combine data) and draft outcomes (overall number picked and signing bonus). Also analyzed for these players are measures of NFL playing opportunity (games played, games started, pass attempts) and measures of productivity (Pro Bowls made, passer rating, DVOA, and DPAR) for up to the first seven years of each drafted player's NFL career. We find that more highly-drafted QBs get significantly more opportunity to play in the NFL. However, we find no evidence that more highly-drafted QBs become more productive passers than lower-drafted QBs that see substantial playing time. Furthermore, QBs with more pass attempts in their final year of more highly-ranked college programs exhibit lower NFL passing productivity.

JEL Classification Codes: L83, J23, J42

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I. INTRODUCTION

Each April, the National Football League (NFL) conducts its annual player entry draft. Most players chosen are from the approximately 120 "amateur" football programs that comprise the elite National College Athletic Association's (NCAA's) Division I-A. The 32 NFL teams take turns, primarily in reverse-order of the prior year's competitive quality, choosing approximately 250 entering players annually; these players represent approximately the top 10% of the available entering "amateur" players. While selected players may only negotiate a playing contract with the drafting team, the NFL draft does not create a purely monopsonistic situation. The opportunity cost to a team that fails to reach an agreement with its draft choices is the loss the right to one-seventh or so of the team's rights to acquire a top amateur player below his free-market value. In a league in which the average playing career is very short, and with a "hard" cap for total team payroll, such a loss is significant.

The scarce access to top entering players created by the draft also implies that mistakes in the evaluation of entering players' quality are costly. Consequently, teams spend considerable resources attempting to gauge players' likely future productivity. The primary question addressed by this paper concerns how effective teams are at drafting players of the quarterback position, widely held to be the most competitively influential single position on the field.

To this end, we have assembled a data set of approximately 3500 elite college football players who were eligible for the six NFL drafts held between 1999 and 2004. Approximately 1500 of these 3500 prospects actually were drafted, including 70 quarterbacks (QBs), who, in addition to their salaries, were paid guaranteed signing

bonuses that totaled $45 million. We characterize the eventual annual productivity of these quarterback draftees for their first three to seven years in the NFL in terms of: games played, games started, Pro Bowl (all-star game) rosters made, pass attempts and completions, passing yards, and touchdown passes. We also consider three other measures of quarterback productivity: "passer rating" (an official NFL index statistic), DPAR, and DVOA. The latter two are indices created by the website footballoutsiders.com. We find that how highly a quarterback is chosen in the draft has a significant impact on his likelihood of seeing game action, but is very poorly correlated with his on-field productivity. We then offer some possible explanations for this finding.

Background

The NFL's first regular season game is generally played on the first or second Sunday of September. The sixteen-game regular season ends in early January, followed by the playoffs, culminating in early February with the Super Bowl, the league's championship game between the winners of its two conferences. The NCAA College football schedule begins a bit earlier each year than does the NFL's, but is completed about the same time that the NFL playoffs begin. An important difference between college and NFL football is that the players are considered to be amateurs, although the spirit of the term suffers mortal damage in practice. NCAA players are only permitted four years of eligibility, although this matter also is subjected to supremely lawyerly interpretations of all forms.

Upon completion of one's college eligibility, a player may declare himself available for the NFL player entry draft, held in April of each year. Some budding stars

declare themselves available for the draft while they still have some college eligibility remaining, but NFL rules only permit this if the player's age cohort has graduated from high school three or more years earlier. Two months before the draft each year, the top 300 or so prospects are invited to a "Scouting Combine," at which each player is subjected to a variety of physical tests of strength, speed, and intelligence (Wonderlic test). These results, along with the evaluations of in-house scouts and draft consulting firms, are used by teams in making their draft choices.

The draft consists of seven rounds, each in which all of the 32 teams is entitled to one pick, plus any "compensatory" picks. Compensatory draft picks are awarded after rounds 3 to 7. These are meant to compensate teams for certain kinds of free agent losses in accordance with the NFL collective bargaining agreement with the NFL Players Association. Teams pick in reverse order of finish (ROF) of their prior-year competitive success; i.e., the team with the worst record the previous season chooses first in each round of the draft, followed by the second-worst, etc.; the Super Bowl winner picks last in each round. ROF-assigned draft picks can be traded among teams for players already under contract, and other draft picks, so the actual number of picks by any team can be more or less than seven in any given draft. Depending on the number of compensatory drafts awarded by the league, there are approximately 250 players drafted each year.

In accordance with the Invariance Principle (Rottenberg, 1956), there is substantial evidence in favor of fairly robust draft pick and player trading markets. Massey and Thaler (2005) identified 334 draft-day trades in the NFL, between 1987 and 2004 – about 8% of all picks, or an average of nearly twenty per year. Table 1 shows the number of picks in each round of the 2007 NFL draft that were not made by the ROF-

assigned team, along with the number of compensatory draft picks. These markets, along with the relatively high degree of variability in teams' between-season winning percentages, suggest that there is very little correlation between a team's actual draft order and future winning.[2] Indeed, this is the case for teams' QB drafts in particular (Figure 1).

Previous Studies

While there has been a great deal written about the NFL Draft and Combine in the popular sports press, there is relatively little about the topics in the sports economics literature. Most notable are papers by Hendricks et al. (2003) and by Massey and Thaler (2005). Hendricks et al. (2003) use the NFL as a test case for a general theory concerning labor market phenomena that result from uncertain measures of future productivity. They find evidence that draftees from less visible college programs suffer from statistical discrimination in the earliest rounds of the draft when teams are likely to be risk-averse. However, they also find that in later rounds, teams are more likely to select a player from a lesser known program. In later rounds, when the stakes seem lower, teams apparently weigh the option value of drafting an unheralded future star more heavily than they do earlier in the draft.

Massey and Thaler (2005) compare the quality of predictions rooted in economic theory to those envisioned by psychological research; this is accomplished by examining the trading of draft picks among teams. They find that top draft picks are overvalued by teams in a manner that is that is more consistent with the enduring decision-making

[2] The average standard deviation of NFL teams' series of winning percentages 1999-2006 = 0.168, equivalent to 2.7 games in a 16-game season.

biases suggested by psychology than by the economics of rational expectations and efficient markets.

McGee and Burkett (2003) consider the ability of Combine test results to predict the eventual round of the draft in which a player will be selected. They analyze Combine data for 326 college players who entered the 2000 NFL Draft, running a series of apparently OLS regressions for each position type, using draft round on the left-hand side and Combine results on the right-hand side of the regressions. They provide little detail of their regression analyses, reporting only coefficient estimates and R^2 values; they claim these R^2 values fall between 0.223 (LB) and 1.000 (WR, RB, and DB).

Mirabile (2005) analyzed 84 quarterbacks drafted and signed by NFL teams from 1989-2004. The OLS models estimated in the paper found no statistically significant relationship between the players' Wonderlic scores and their collegiate passing performances. The paper also concluded that the Wonderlic test had no statistically significant predictive for the players' NFL compensation.

Concept

**Info about pool causes draft causes opportunity causes productivity

II. DATA

A data set describing the top 25 NFL QB prospects (as designated by the firm NFL Draft Scout) for each of the six NFL Drafts 1999-2004 was assembled for this paper.[3] Data for each prospect include the following: the draft year, college program, final year college passing statistics, NFL Combine test results (height, weight, 40-yard time, 20-yard time, 10-yard time, bench reps, vertical jump height, broad jump length, cone test time, shuttle test time, and Wonderlic score), whether or not the player was drafted, the overall draft selection number for the player (if any), the drafting team and the player's subsequent teams, the drafting team's average winning percentage for the next four years, rookie year salary, signing bonus (if any), the number of games appearances in each of the player's first seven seasons in the NFL, the number of starts in each of the player's first seven seasons, whether or not the player earned a spot in the Pro Bowl roster in each of his first seven seasons, and three measures of NFL QB productivity (described below)[4]

Combine results, college programs, and draft results were taken from NFL Draft Scout (2005, 2006), one of the services that collects information on college players that it considers "prospects" for each year's draft.[5] The source of salary, bonus, and team winning percentage information used here is Rodney Fort's Sports Business Data Pages website (Fort, 2005, 2006, 2007). Game appearance and games started data were found

[3] There were only 18 QB prospects identified for the 2001 draft.
[4] The data set only includes playing data 1999-2004; thus the full seven years of game appearances, starts and Pro Bowls is only available here for the players in the 1999 and 2000 drafts. Six years of playing data are included for players in the 2001 draft, five years for players in the 2002 draft, etc.
[5] Note that not all prospects participate in the Combine, nor do all participants undergo every Combine evaluation.

in annual issues of the NFL Record & Fact Book (NFL, various years). Pro Bowl rosters were taken from the Pro Football Reference website (pro-football-reference.com, 2006).

Players'' final college year statistics were taken from the NCAA career statistics search page (NCAA, 2007) for the 2001 season and after, and from the individual schools' programs websites (as available) for the 1998, 1999, and 2000 college seasons. These were used to calculate the player's passer rating according to the NCAA formula.[6] Each player's college was identified either as belonging to a "BCS conference" or a "Non-BCS Conference" depending on whether or not the school's conference was a participant in the Bowl Championship Series; such participation is associated with higher caliber of college football (and includes the independent Notre Dame University). The relative strength of individual college programs was gauged by using the final Associated Press Division I-A college football rankings from 1992-2003 as reported by Shrpsports.com (shrpsports.com, 2007). These data were used to construct a "college power ranking index."[7] There were 74 schools that were represented at least once in the AP Top 25 1992-2003 (Table 2 and Figure 2). This index is used here as a measure of the reputation of players' college programs.

Players' NFL statistics (passing attempts, completions, passing yards, and passing touchdowns) were taken from NFL.com (2007). These were used to calculate the player's passer rating according to the NFL method.[8] In addition, two relatively new measures of productivity developed by Football Outsiders were used: DVOA and DPAR

[6] The NCAA formula is: [{ (8.4 * yards) + (330 * touchdowns) - (200 * interceptions) + (100 * completions) } / attempts]. (Stassen.com, 2007).
[7] The value of the index for each college is equal to the number of times the school's football program finished in the Top 25, times 26 minus the average ranking when in the Top 25. This captures quality in terms of ranking and endurance; higher index values are associated with more prestigious programs.
[8] A full description of the NFL passer rating can be found at http://www.nfl.com/news/981202qbrate.html.

(footballoutsiders.com, 2007). DVOA is "defense-adjusted value over average" and DPAR is "defense-adjusted value over replacement." These are based on observations of specific play-by-play situational success rates as compared to the average across all NFL quarterbacks. Higher values are indicative of more productive seasons.

III. ANALYSIS

Pre-Draft QB Prospect Information

Table 3 compares both the drafted and undrafted top 25 QB prospects' final year college passing statistics as well as some information about the college programs. Equality of means and equality of variance tests between the drafted and undrafted prospects were performed; the results of these are also shown in Table 3. While final year college passer rating means were not significantly different between the two groups, the following means were significant: final year passing yards and touchdowns, whether or not the player's college was a BCS school, and the college's power index.

Table 4 compares drafted and undrafted prospects' NFL Combine results as well as equality of means and equality of variance tests. Drafted QBs were slightly but significantly taller and heavier than undrafted top 25 QB prospects, but there was no significant difference in mean Wonderlic score, Body Mass Index (BMI), or forty-yard dash time between the two groups.

QB Draft Outcomes

Table 5 reports the drafting outcomes of the top 25 QB prospects for each of the 1999-2004 NFL drafts. This information is separated by top 10 picks overall, top 30 picks (approximately the first round), and top 75 picks (approximately the first two rounds). Overall, about half of the top 25 QB prospects in any given year are drafted, with one or two QBs typically taken among the top 10 picks overall. Table 6 lists the college programs from which more than one QB was drafted during this period.

Those drafted in the first round or so negotiate signing bonuses that frequently exceed $1 million – clearly far above such players' opportunity costs during the typical QB initial NFL contract length of about 4 or 5 years (Figure 3). This result suggests that monopsony may not be a very good economic model of the early rounds of the draft.

Table 7 shows the results of a series of LOGIT models for which the dependent variable is a dummy equal to 1 if the player was drafted, and zero if not. The regressions generally indicate that players are more likely to be drafted if they are taller, faster, have more passing opportunities in their final college season, and perhaps come from a college program with a better football reputation. However, apart from pass attempts during the final college year, OLS models of draft order (not included here) do not generally find significance with respect to these variables.

Post-Draft Playing Opportunities

Most QBs drafted 1999-2004 got an opportunity to play in at least one NFL game, and nearly all QBs drafted among the top 75 picks overall were able to play (Table 8). Drafted QBs' mean number of games played and games started during the first seven

years of their careers are shown in Table 9 and Figure 4. Table 8 also includes the mean number of pass attempts by year. Obviously, drafted QBs get a considerable amount of playing time on average.

NFL QB playing opportunities are correlated with draft position. Figures 5, 6, and 7 show the average games played, games started, and pass attempts for those QBs drafted 1999-2002, respectively (i.e., those QBs for which there is at least five seasons of data). Table 10 shows the results of OLS regressions against the natural log of overall draft pick number for average games played, games started, and pass attempts for all QBs drafted in the data set (1999-2004).[9] The coefficients and overall regressions are highly significant – more highly drafted QBs clearly got more opportunities to play in the NFL than those drafted lower.

NFL Productivity Outcomes

Table 11, and Figures 8 and 9 show various measures of passer productivity by year in the league, as well as the percentage of drafted QBs that made a Pro Bowl roster. The measures used here are the NFL's passer rating measure, as well as Football Outsiders' DVOA and DPAR indices. All three measures tell essentially the same story: QB performance peaks around Year 4 or 5, and begins to decline sometime thereafter. However, it should be noted, as shown by Figure 10, that less than two-thirds of QBs – even first-rounders - are still with the team that drafted them by in Year 5. As suggested by Table 12, Super Bowl QBs can come from just about anywhere in the draft, but they on average have nearly six years of NFL experience.

[9] These regressions were tested for heteroskedasticity using the White test (White, 1980); none was found at the 10% level. Furthermore, censored (on the left at zero) TOBIT regressions were also run; they are not reported here, but gave coefficients and R^2 values very similar to those indicated in Table 9.

Tables 13, 14, 15, and 16 show the results of more systematic testing of the hypothesis that QBs drafted higher and paid higher signing bonuses are more productive. The OLS model results shown in Table 13 shows no evidence of any statistically significant relationship between NFL career passer rating (minimum 50 attempts) and either draft order or signing bonus (in $2007).[10]

Table 14 repeats these regressions using average season DVOA (minimum three seasons with minimum 100 pass attempts). While there is some suggestion that a relationship between overall draft order and DVOA might exist, top 10 picks overall in the data set are significantly *negatively* associated with DVOA; i.e., the very top picks underperformed their peers, *ceteris paribus*. While the coefficient on the overall draft order number is also counterintuitively negative, it is not significant. Table 15 reports similar OLS regressions using DPAR as the dependent variable, and finds similar results, although DPAR is negatively *and* significantly associated with signing bonus. Finally, Table 16 reports LOGIT regressions of a dummy variable =1 if the player ever made a Pro Bowl roster (0 otherwise). The regressions indicate no significant relationship between making the Pro Bowl with neither overall draft order nor signing bonus.

Table 17 breaks down QB draft choices and eventual NFL productivity by college conference. The SEC and PAC 10 conferences saw the most quarterbacks drafted between 1999 and 2004, but they cannot boast the most productive quarterbacks. Indeed, draftees from non-BCS schools – comprising about 30% of all draftees – showed significantly greater average NFL career passer ratings than did draftees from BCS schools (equality of means t = 2.28). Average seasonal DVOA and DPAR were also

[10] All the models in Tables 13-15 and in Table 18 were tested and corrected if necessary for heteroskedasticity at the 10% level in accordance with White (1980).

higher on average for the non-BCS draftee group, but the number of QBs with three or more seasons of at least 100 pass attempts was too small to find statistically significantly different means.

The suggestion of BCS vs. non-BCS draftees from Table 17 is analyzed further in Table 18 wherein OLS regressions of draft pick number and career NFL passer rating are tested against college statistics and Combine data (among the top 25 QB prospects each year). The regressions make the case that draft decisions seem to be overly reliant upon whether or not the draftee had a lot of passing attempts in his final season playing for a highly-ranked college program. The NFL passer productivity does not support this reliance. Furthermore, neither draft decisions nor productivity outcomes appear to be correlated with Combine measurements, calling into question why these measurements are made at all.

IV. SUMMARY

We found that college QBs drafted in the 1999-2004 NFL drafts differ little from those not drafted among the top 25 QB prospects in any given year. They are all larger-than-average and exception athletes, although draftees are more likely to be slightly larger, have more pass attempts, and perhaps hail from better college programs than their undrafted counterparts among the top 25 prospects.

Our analysis suggests that QBs drafted earlier get significantly larger guaranteed signing bonuses and are given significantly more opportunity to play in the NFL than those chosen later. However, there is very little or no support for the claim that earlier

draftees are any more productive passers than those from later rounds who get substantial playing time; in fact, QBs drafted among the top 10 picks overall may be significantly *less* productive passers than those chosen later who get substantial playing time. This result cannot be explained with "higher draft picks play for lousier teams." Furthermore, prospects from more highly ranked college programs, who throw a lot of passes in their final college season, exhibit lower average NFL passer productivity. Because of the great degree of pick trading and the natural high year-on-year variation in team winning percents, there is no significant relationship between where a team picks its QBs and its competitive success during the next four years.

Perhaps the 1999-2004 QB drafts were unusual in some way. If not, then perhaps there is very little actual difference among the top college QB prospects in any given draft. Any eventual productivity differences are more due to random events than significant talent differences. However, this could not explain the reason why higher picks garner so much more opportunity to play. Behavioral economics and psychology may be better suited to this phenomenon than rationality or randomness.

In any case, the QB draft may be more crapshoot than college job fair. Because the top QB picks receive such large signing bonuses, but do not seem to be any more productive than those chosen later, perhaps teams would be better off trading down for later QB picks.

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[need to include lit search stuff here; White]

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Table 1: Departures from Reverse-Order-of-Finish, 2007 NFL Draft

Round	No. of Picks Not Made by ROF Assigned Team	Pct. of ROF PicksNnot Made by ROF Assigned Team	Compensatory Picks	*Compensatory Picks as Pct. of Total Picks*
1	10	31.3%	0	0%
2	19	59.4%	0	0%
3	10	31.3%	4	11.1%
4	18	56.3%	6	15.8%
5	11	34.4%	5	13.5%
6	16	50.0%	4	11.1%
7	11	34.4%	13	28.9%
Total	95	42.4%	32	12.5%

Note: ROF = Reverse-Order-of-Finish

Figure 1: Relationship Between Team QB Draft Order and Winning Percentage

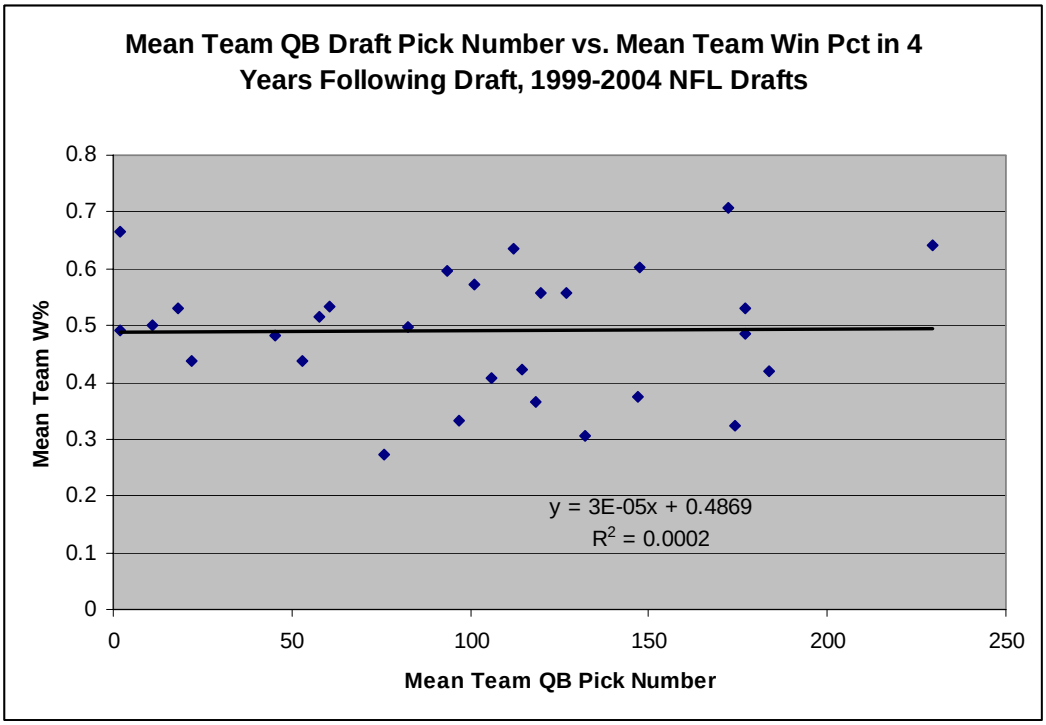

Table 2: Top 25 Colleges in terms of Power Ranking Index

College	Top 25 Finishes, 1992-2003	Mean Finish when in Top 25	Power Ranking Index
Florida State	12	6.08	239
Florida	11	7.55	203
Nebraska	11	7.64	202
Miami-FL	11	9.36	183
Michigan	12	11.58	173
Tennessee	10	9.40	166
Ohio State	9	7.78	164
Kansas State	9	12.22	124
Penn	8	11.25	118
Georgia	9	13.33	114
Alabama	7	10.14	111
Colorado	7	10.57	108
Texas	9	14.78	101
Oklahoma	5	6.40	98
Notre Dame	7	12.86	92
Texas A&M	7	13.29	89
Washington	7	14.00	84
Auburn	7	14.57	80
Virginia Tech	7	14.57	80
LSU	5	11.20	74
USC	4	7.50	74
Oregon	5	11.40	73
Wisconsin	4	9.75	65
N. Carolina	5	13.20	64
Washington State	4	10.75	61

Note: Index based on AP Top 25 Final Rankings 1992-2003 Seasons.

Figure 2: College Power Ranking Indices in Descending Order

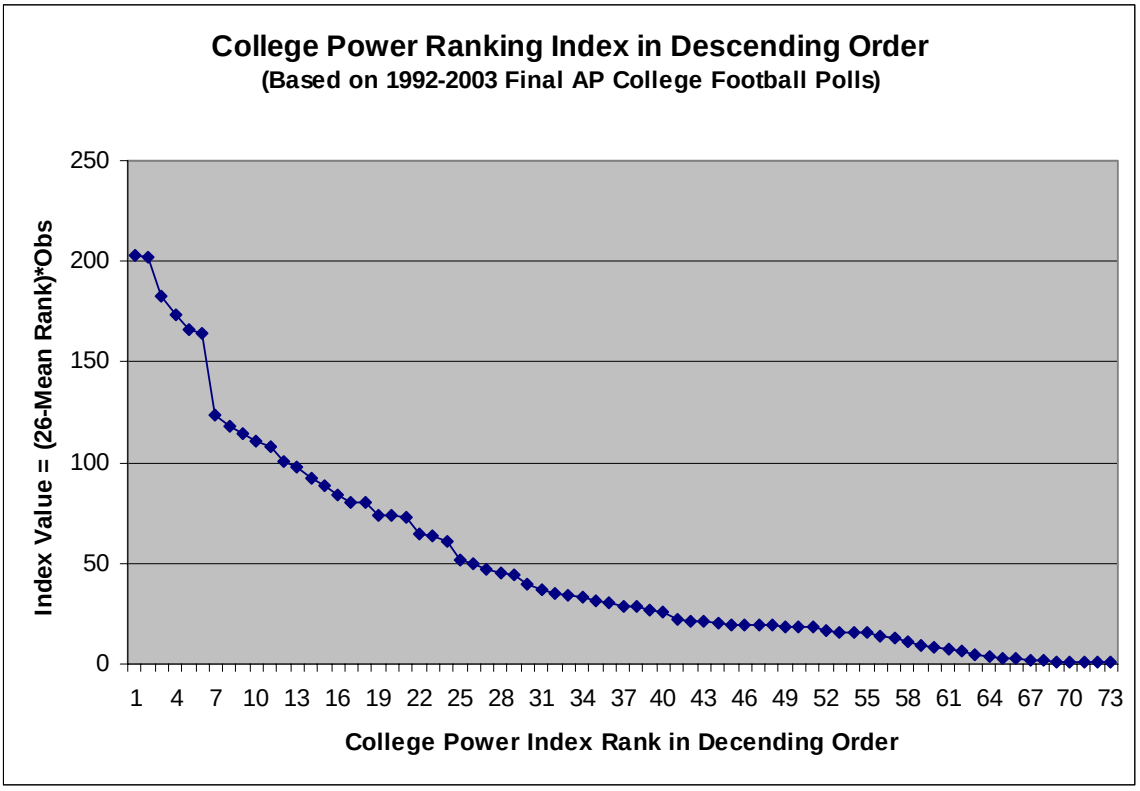

Table 3: Summary of Drafted and Undrafted Top 25 QB Prospects' Final Year of College Statistics, 1999-2004 NFL Drafts

	Mean Passer Rating (NCAA method)	Mean Yards	Mean Touchdowns	College in BCS Conference?	College in Top 25 1992-2003?	Mean College Power Index
All Top 25 Prospects	137.4	2702.9	20.8	0.58	0.62	70.5
Top 25 Prospects Drafted	140.3	2984.5	22.8	0.70	0.77	77.3
Top 25 Prospects Not Drafted	134.2	2400.0	18.6	0.47	0.48	60.1
No. Drafted	56	56	56	56	70	54
No. Not Drafted	52	52	52	52	73	35
Equality of Means t	1.83**	3.57**	2.35**	2.90**	3.75**	1.28
Pr(t)	0.070	0.0005	0.020	0.004	0.0003	0.200
Equality of Variance F	1.020	1.45	1.06	1.18	1.41	1.25
Pr(F)	0.947	0.176	0.827	0.479	0.147	0.466

Notes: "Top 25 Prospects" according to ranking by NFL Draft Scout. ** = Significant at the 5% level

Table 4: Summary of Drafted and Undrafted Top 25 QB Prospects' Selected Combine Results, 1999-2004 NFL Drafts

	Wonderlic	Height	Weight	BMI	Forty-Yd Dash
All Top 25 Prospects	25.51	74.23	219.36	27.91	4.86
Prospects Drafted	26.05	74.62	222.20	28.05	4.84
Prospects Not Drafted	24.80	73.86	216.64	27.91	4.87
No. Drafted	66	69	70	70	67
No. Not Drafted	50	73	73	73	72
Equality of Means t	0.983	2.91**	2.39**	0.531	1.03
Pr(t)	0.328	0.004	0.020	0.597	0.31
Equality of Variance F	1.24	1.16	1.59	1.56	1.07
Pr(F)	0.43	0.648	0.052	0.062	0.778

Note: ** = Significant at the 5% level

Table 5: QBs Drafted, 1999-2004 NFL Drafts

Draft Year	No. of Prospects	Pct of Prospects Drafted	Number Drafted	Top 5 Picks	Top 10 Picks	Top 30 Picks	Top 75 Picks
1999	25	52.0%	13	3	3	5	6
2000	25	48.0%	12	0	0	1	3
2001	18	55.6%	10	1	1	1	4
2002	25	36.0%	9	2	2	2	3
2003	25	48.0%	12	1	2	4	4
2004	25	56.0%	14	2	2	4	4
All Years	*143*	*49.0%*	*70*	*9*	*10*	*17*	*24*

Note: Mean overall pick number for QBs drafted 1999-2004 = 119.2

Table 6: Colleges from which Multiple QBs were Drafted, 1999-2004

School	No. Drafted 1999-2006		School	No. Drafted 1999-2006
LSU	4		Kansas State	2
Michigan	4		Kentucky	2
Oregon	4		Louisiana Tech	2
BYU	3		Louisville	2
Florida	3		Marshall	2
Ohio State	3		Miami (FL)	2
Tennessee	3		Michigan State	2
Tulane	3		Mississippi	2
Washington	3		Notre Dame	2
Boston College	2		Sam Houston State	2
Cal Davis	2		South Carolina	2
Central Florida	2		Stanford	2
Florida AM	2		Texas	2
Fresno State	2		Texas Tech	2
Iowa State	2		Virginia	2

Figure 3: Signing Bonus vs. Draft Pick Number

Note: Figure does not show Carson Palmer's $10 million signing bonus in 2003.

Table 7: LOGIT MODELS: Dependent Variable = 1 if Drafted, 0 if Not Drafted

	LOGIT 1	LOGIT 2	LOGIT 3	LOGIT 4
Constant	-19.8 (-1.18)	-17.2 (-1.34)	-24.1 (-2.24)**	-14.6 (-0.739)
Height	0.421 (1.74)*	0.339) (1.92)*	0.433 (2.88)**	0.483 (1.72)*
Weight	0.296 (1.31)			
Wonderlic	0.0945 (1.75)*	0.0508 (1.18)*		0.176 (2.19)**
40-Yd Dash	-4.51 (-1.99)**	-2.46 (-1.62)*	-2.34 (-1.75)*	-5.96 (-1.76)*
Pass Att in Final College Season	0.00841 (2.61)**	0.00704 (2.50)**	0.00750 (2.92)**	0.00872 (2.21)**
NCAA Passer Rating in Final College Season	-0.015 (-0.733)			
College in BCS Conference? (dummy)	0.741 (1.1)	0.950 (1.74)*	1.18 (2.48)**	
(Passer Rating x College Power Index)/10000				7.84 (1.25)
McFadden R	0.255	0.155	0.185	0.352
N **(N undrafted, N drafted)**	71 (32, 39)	87 (35, 52)	106 (52, 54)	51 (18, 33)

* = significant at 10% level

** = significant at 5% level

Table 8: QBs Drafted: Played vs. Never Played

Category	Drafted QBs that Played in at Least One Game	Drafted QBs that Never Played	Drafted QBs that Started at Least One Game	Drafted QBs that Never Started	N
All Drafted QBs	81.4%	18.6%	82.2%	17.8%	70
Top 75 Picks	95.8%	4.2%	95.8%	4.2%	24
Mean Pick Number	103.7	187.4	88.1	187.1	70

Table 9: Drafted QBs: Mean Annual Games Played and Started, Pass Attempts

Year	Mean Games Played	Mean Games Started	Mean Pass Attempts	N
Year 1	3.557	2.229	148.42	70
Year 2	5.500	4.000	193.54	70
Year 3	5.729	4.614	227.47	70
Year 4	5.107	4.304	294.73	56
Year 5	5.045	4.386	254.45	44
Year 6	3.800	3.543	286.92	35
Year 7	3.240	3.160	384.86	35

Figure 4: Drafted QBs: Mean Annual Games Played and Started

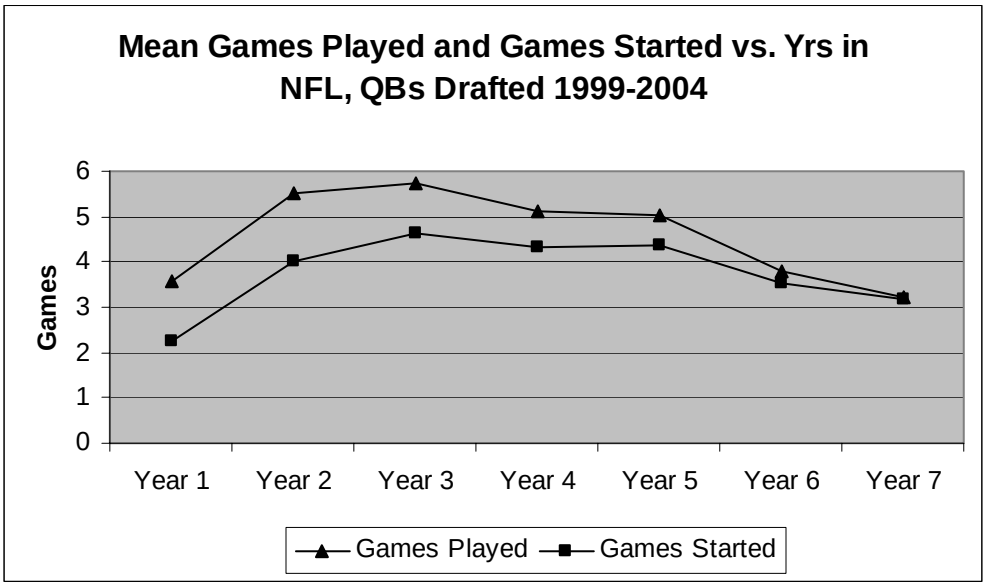

Figure 5: Mean Games Played per Season vs. Draft Pick, QBs Drafted 1999-2002

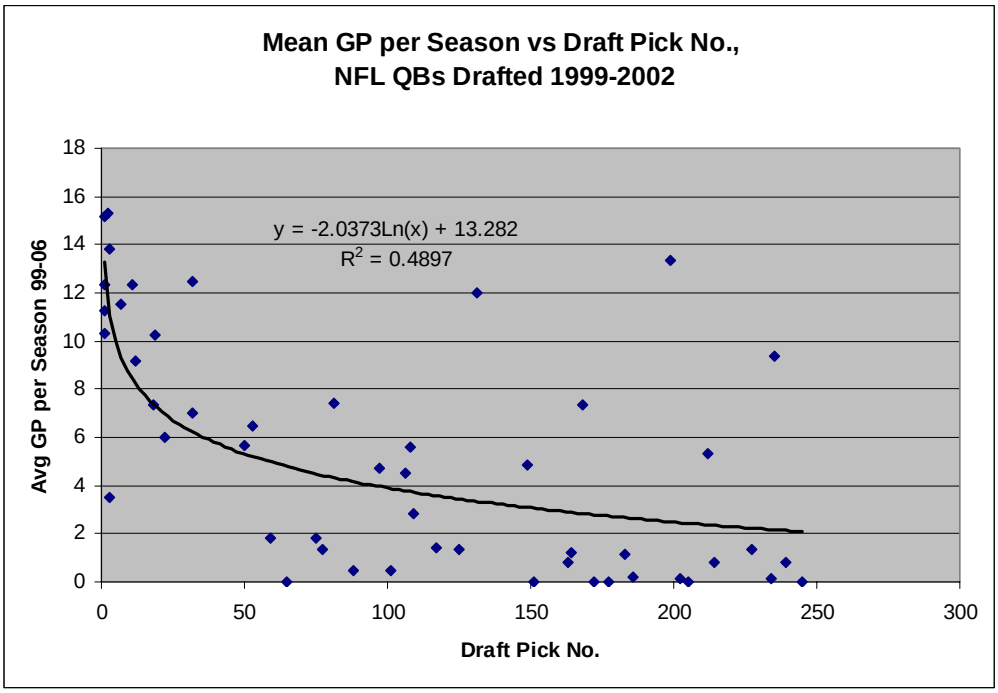

Figure 6: Mean Games Started per Season vs. Draft Pick, QBs Drafted 1999-2002

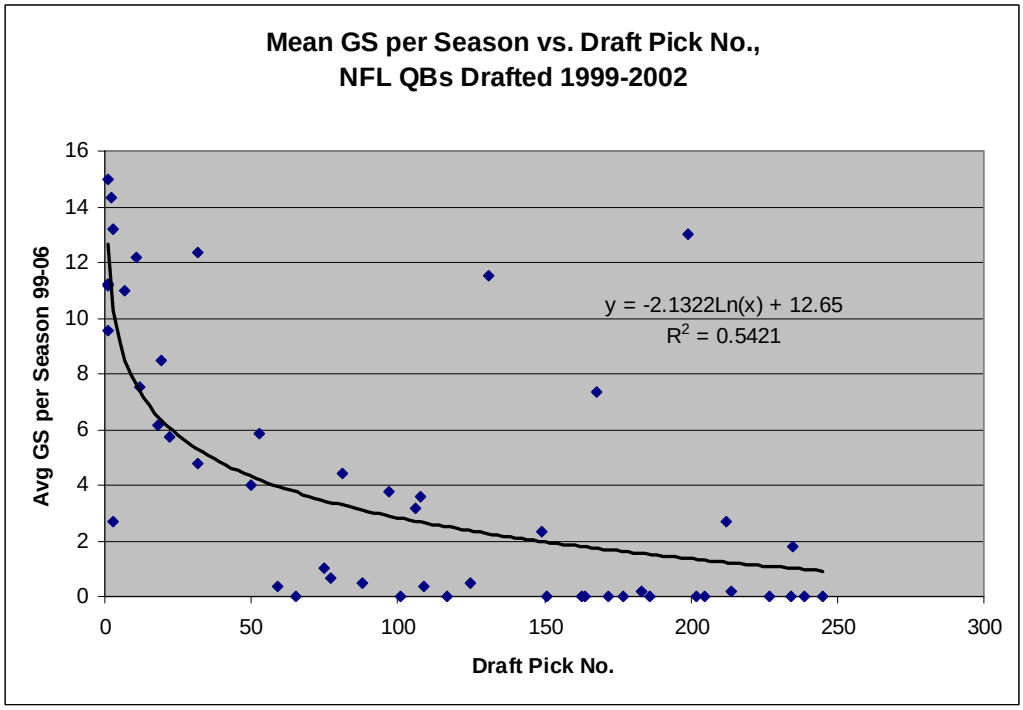

Figure 7: Mean Pass Attempts per Season vs. Draft Pick, QBs Drafted 1999-2002

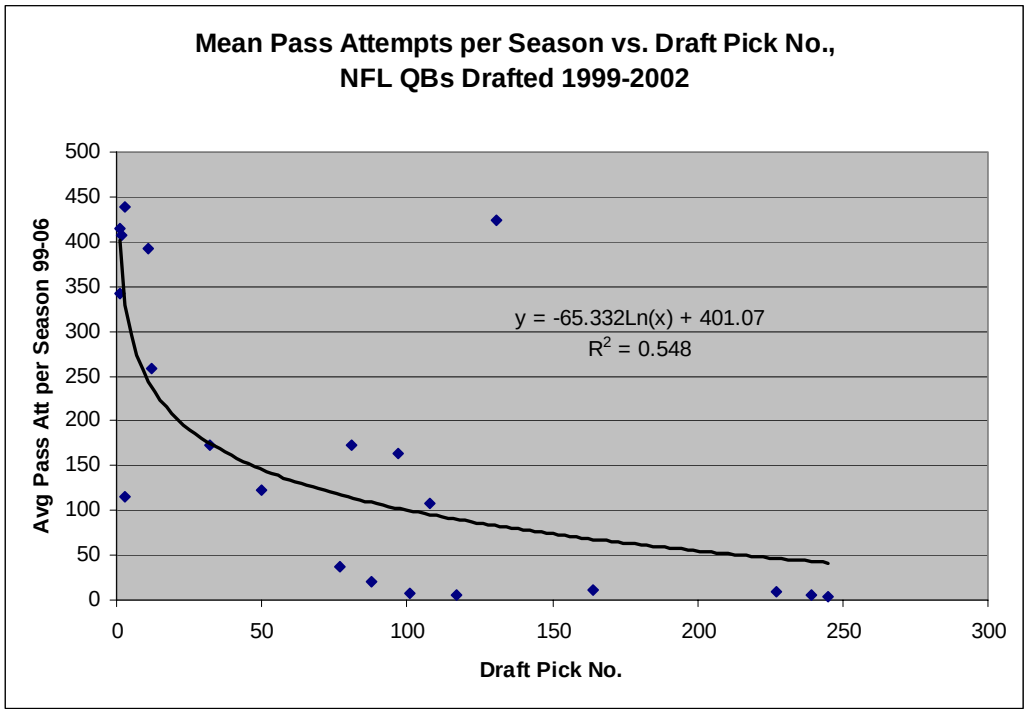

Table 10: OLS Regression Results, QBs Drafted 1999-2004

	Dep Var = Mean Games Played per Season	Dep Var = Mean Games Started per Season	Dep Var = Mean Pass Attmpts per Season
Constant	13.77 (12.6)	12.8 (13.2)	400.1 (8.31)
ln(draft pick)	-2.15 (-8.78)	-2.21 (-10.1)	-65.0 (-5.70)
R^2	0.532	0.600	0.575
Adj R^2	0.525	0.594	0.558
F	77.2	101.9	32.5
Pr(F)	0.0000	0.0000	0.0000
N	70	70	26

Table 11: Drafted QBs: Measures of Passer Productivity

Year	Passer Rating (NFL method)	No. in Pro Bowl?	Pct in Pro Bowl	Mean DVOA (min 100 passes)	Mean DPAR (min 100 passes)	Obs
Year 1	58.22	4	5.71%	-18.10	-11.08	11
Year 2	69.37	1	1.43%	-13.79	9.77	23
Year 3	78.10	4	5.71%	-0.47	15.55	20
Year 4	66.63	5	8.93%	6.99	19.62	12
Year 5	74.13	4	9.09%	12.75	39.65	9
Year 6	80.53	1	2.86%	23.34	81.64	5
Year 7	82.67	0	0.00%	-20.12	6.18	5

Figure 8: DVOA vs. Years in NFL

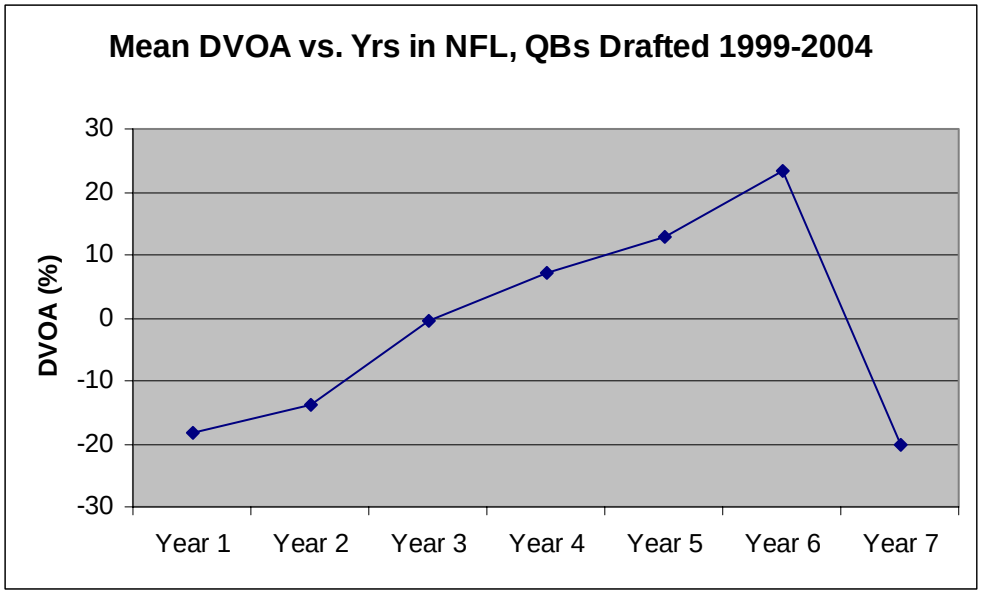

Figure 9: DPAR vs. Years in NFL

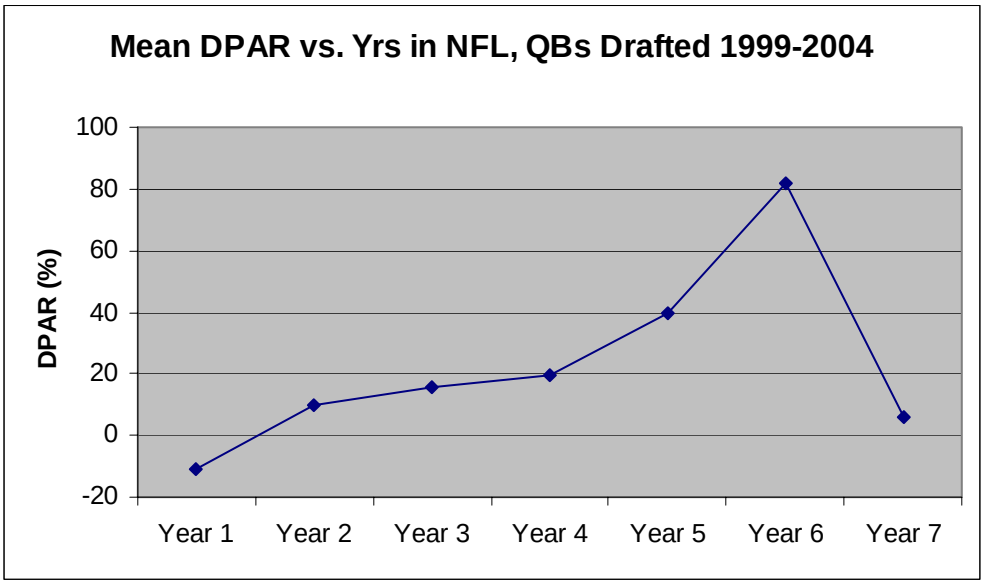

Figure 10: Percent of Drafted QBs Still with Drafting Team by Years Following Draft

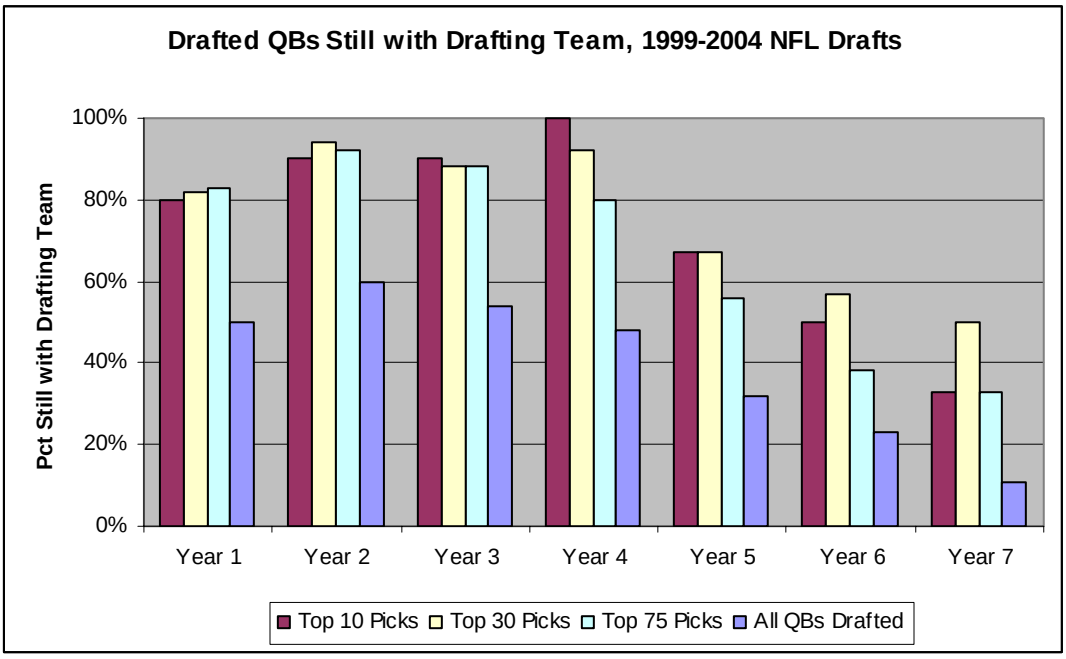

Table 12: NFL Super Bowl QBs 1999-2006 Seasons

Mean Overall Draft Pick	89.2
Super Bowl Appearances by Undrafted QBs	3
Mean Years of NFL Experience for Super Bowl QBs	5.9

Table 13: OLS Models Career of Passer Rating vs. Draft Order and Signing Bonus

Constant	75.2 (16.8)**	53.8 (3.13)**	65.0 (25.5)**	65.5 (23.0)**	64.1 (20.7)**
ln(overall pick no.)	-2.50 (-2.51)				
ln(real signing bonus)		0.996 (0.747)			
Top 10 Pick dummy			9.30 (1.53)		
Top 30 Pick dummy				3.63 (0.715)	
Top 75 Pick dummy					5.83 (1.24)
R^2	0.070	0.014	0.046	0.010	0.030
N	42	40	51	51	51
Heteroskedasticity-Corrected?	Yes	No	No	No	No

Notes:

Dependent Variable = Career NFL Passer Rating, minimum 50 passing attempts.
t-values in parentheses.
* = significant at 10% level; ** = significant at 5% level.

Table 14: OLS Models of DVOA vs. Draft Order and Signing Bonus

Constant	-4.13 (-0.611)	19.4 (0.514)	12.8 (2.68)**	6.85 (0.989)	13.2 (1.38)
ln(overall pick no.)	3.96 (1.84)*				
ln(real signing bonus)		-1.18 (-0.432)			
Top 10 Pick dummy			-17.1 (-2.26)**		
Top 30 Pick dummy				-1.44 (-0.161)	
Top 75 Pick dummy					-8.97 (-0.840)
R^2	0.206	0.107	0.282	0.002	0.051
N	15	15	15	15	15
Heteroskedasticity-Corrected?	No	No	No	No	No

Notes:

Dependent Variable = Mean DVOA for season, minimum 3 seasons with minimum 100 pass attempts.

t-values in parentheses.

* = significant at 10% level; ** = significant at 5% level.

Table 15: OLS Models of DPAR vs. Draft Order and Signing Bonus

Constant	10.6 (1.33)	135.7 (2.89)**	34.6 (3.18)**	25.5 (2.20)**	50.1 (3.50)**
ln(overall pick no.)	6.01 (2.14)*				
ln(real signing bonus)		-8.52 (-2.49)**			
Top 10 Pick dummy			-20.7 (-1.57)		
Top 30 Pick dummy				0.274 (0.018)	
Top 75 Pick dummy					-31.1 (-1.92)*
R^2	0.183	0.383	0.152	0.0000	0.236
N	14	12	14	14	14
Heteroskedasticity-Corrected?	Yes	No	Yes	No	No

Notes:

Dependent Variable = Mean DPAR for season, minimum 3 seasons with minimum 100 pass attempts.

t-values in parentheses.

* = significant at 10% level; ** = significant at 5% level.

Table 16: LOGIT Models of Pro Bowl Rosters Made vs. Draft Order and Signing Bonus

Constant	-0.996 (-1.27)	-6.55 (-2.11)**
ln(overall pick no.)	-0.324 (-1.59)	
ln(real signing bonus)		0.347 (1.48)
McFadden R^2	0.052	0.064
N **(N=0, N=1)**	70 (63, 7)	60 (54, 6)

Notes:

Dependent Variable = Did player ever make a Pro Bowl roster? (dummy=1 if yes)

z-values in parentheses.

* = significant at 10% level; ** = significant at 5% level.

Table 17: QB Productivity by College Conference

Conference	No. Drafted	Mean Pick	Med. Pick	Top Pick	Mean NFL Career Passer Rating	No. with 50+ Atts	Mean DVOA	Mean DPAR	DVOA and DPAR Obs.
SEC	13	112.4	117.0	1	62.6	11	-0.5	-1.3	4
PAC 10	9	65.9	19.0	1	55.3	7	-11.6	0.8	1
ACC	8	129.6	147.0	1	68.4	5	7.0	31.0	3
Big 10	7	153.4	192.0	32	61.0	6	19.4	32.7	2
Big 12	7	167.0	177.0	97	74.7	3			0
C-USA	7	35.4	22.0	7	78.7	7	9.3	40.8	4
Big East	4	78.5	81.5	2	67.4	3	6.3	41.4	1
Southland	3	142.7	164.0	81	63.1	3	-	-	0
WAC	3	185.7	212.0	106	67.7	3	-	-	0
MAC	2	99.0	99.0	11	87.9	1	-	-	0
MWC	2	200.5	200.5	151	95.1	1	-	-	0
A10	1	65.0	65.0	65	-	0	-	-	0
D-III	1	186.0	186.0	186	-	0	-	-	0
MEAC	1	205.0	205.0	205	-	0	-	-	0
ND	1	214.0	214.0	214	-	0	-	-	0
SWAC	1	195.0	195.0	195	-	0	-	-	0
Big Sky	0	-	-	-	61.0	1	-	-	0
Non-BCS	**21**	**118.2**	**108.0**	**7**	**74.2**	**16**	**9.3**	**40.8**	**4**
BCS	**49**	**119.6**	**117.0**	**1**	**63.1**	**35**	**4.8**	**19.7**	**11**
All	**70**	**119.2**	**113.5**	**1**	**66.6**	**51**	**6.0**	**25.7**	**15**

Note: DVOA and DPAR are seasonal averages, reported only for those QBs with at least three seasons with 100 pass attempts. ND = Notre Dame. D-III = NCAA Division III.

Table 18: OLS Models of Draft Pick and Career NFL Passer Rating vs. College Statistics and Combine Data

	Dep Var = ln(pick)	Dep Var = NFL Career Passer Rating	Dep Var = ln(pick)	Dep Var = NFL Career Passer Rating	Dep Var = ln(pick)	Dep Var = NFL Career Passer Rating
Constant	25.3 (2.94)**	-188.5 (-1.46)	24.8 (2.53)	-14.2 (-0.120)	5.78 (2.85)**	56.4 (2.27)**
College Passer Rating	-0.0290 (2.30)**	0.0000 (0.0005)			-0.0158 (-1.09)	0.124 (0.682)
Coll Atts x Coll Power Score/10000	0.149 (1.20)	-3.36 (-2.84)**			0.164 (1.80)*	-2.53 (-2.61)**
Height	-0.329 (2.23)**	3.93 (2.25)**	-0.378 (-2.99)	2.41 (1.51)		
Forty-Yard Dash	1.69 (1.32)	-4.99 (-0.433)	1.69 (1.56)	17.0 (-1.37)		
Wonderlic	-0.0480 (-1.27)	-0.241 (-0.485)	-0.0234 (-0.729)	-0.330 (-0.850)		
BCS Conference (dummy)			0.095 (0.281)	-12.8 (-2.44)**		
R^2	0.290	0.352	0.161	0.190	0.0880	0.191
F	3.090**	2.605**	2.839**	2.142**	2.120	3.533**
N	44	30	64	46	47	33
Heteroskedasticity-Corrected?	Yes	No	Yes	No	No	No

Notes:

College statistics for final college season.
Career Passer Rating is for NFL career, minimum 50+ career attempts.
t-values in parentheses.
* = significant at 10% level; ** = significant at 5% level.