The Effect of Recruit Quality on College Football Team Performance

Stephen A. Bergman and Trevon D. Logan

The Ohio State University

August 2013

Abstract

Previous studies have examined the benefits of highly rated recruiting classes in college football and have found that higher rated recruiting classes are related to greater success on –the- field. Teams with strong traditions usually recruit better players and this implies that the relationship between recruit quality and on the field success may be over-stated. We analyze the effect of recruit quality on team performance with school fixed effects. Using data collected from recruiting services, we obtain the number of individual recruits by *ex ante* star rating for every Football Bowl Division (FBS) school for the years 2002 to 2012. We also record team performance in the regular season, conference success and post season during the same time period. We find that controlling for between school heterogeneity lowers the estimated effect of recruit quality on wins, but the effect is still statistically and economically significant. In addition, we find that recruit quality is an important determinant for the probability of an appearance in the most lucrative bowl games. Our estimates imply that a 5-star recruit is worth more than $150,000 in expected BCS bowl proceeds to an individual school.

JEL Codes: D3, D8, J2

Keywords: BCS, College Football, Recruiting

Contact Information

Bergman (Corresponding Author): Department of Economics, The Ohio State University, 410 Arps Hall, 1945 N. High Street, Columbus, OH 43210 email: bergman.146@buckeyemail.osu.edu.

Logan: Department of Economics, The Ohio State University and NBER, 410 Arps Hall, 1945 N. High Street, Columbus, OH 43210 email: logan.155@osu.edu

1. Introduction

With the increasing popularity of college football and the large dollar payouts for major bowl appearances there is a large emphasis on college football recruiting. Previous studies have examined the benefits of highly rated recruiting classes and have found that higher rated recruiting classes are related to greater success on the field (Langletts 2003). Those studies aggregate all players recruited in a given year and are cross-sectional. This potentially conflates the heterogeneity between football programs as opposed to the effects of recruits themselves. Teams with strong traditions usually recruit better players, on average. This implies that the relationship between recruit quality and on the field success may be over-stated in a cross-section. While a cross section tells us that schools that perform well have better recruits on average, it does not answer the question of what happens to on-field-success when a school recruits players that are better than their own average recruits.

Another concern is that recruit quality is an *ex ante* measure, based upon high school observations and predicted success at the college level. It could be the case that the quality of players could be poorly approximated by their high school performance. Indeed, many highly-touted recruits do not pan out, play positions other than those they played in high school and other players who were not highly rated become genuine stars. There is little empirical evidence that individual recruit ratings are strongly related to performance, but there are studies which show that particular aspects of team performance are related to recruit quality (Meers 2013). In this paper we analyze the effects of within school *ex ante* recruit quality on team performance. This allows us to analyze two related issues: (1) the effect of within-school changes in recruit quality on

team performance and (2) an assessment of the quality of *ex ante* ratings of high school football players. Furthermore, our approach allows us to look at several dimensions of success—the number of wins, success within a conference, and bowl appearances.

We collected a unique dataset from Rivals.com, recording the number of individual recruits by *ex ante* star rating for every Football Bowl Division (FBS) school for the years 2002 to 2012 and we record team performance during that same period. Using this data, we estimate the relationship between team performance and recruit quality. Controlling for individual school heterogeneity with fixed effects lowers the effect of recruit quality on wins by more than 25% compared to the cross-sectional estimates, but the remaining effect is still statistically significant and substantively large. For example, an additional five star recruit increases the number of wins by 0.437 between schools and by 0.306 within schools.

We also find that the impact of recruits quality differs by *ex ante* recruit rating. The higher the star rating, the larger the effect of recruit quality on wins and post season success. This suggests that *ex ante* ratings of recruit quality are largely consistent with the actual quality of players. Higher rated recruits have a larger effect on team success than lower rated recruits. Even more, the difference between the OLS and fixed effects results decreases with recruit *ex ante* quality.

Moving beyond wins, we extend the analysis to an examination of the relationship between college football recruits and specific indicators of post seasons success. The potential financial gains a university could receive from a successful college football season are large. One school can earn more than $4 million dollars if they appear in a

Bowl Championship Series (BCS) game. This places pressure on schools and athletic administrations to do their best to attract the best talent. Since most players are recruited by schools in the same athletic conference and nearly all bowl games are assigned by conference affiliation, we estimate the relationship between recruit quality and the probability of landing in a premier bowl game using conference fixed effects. Controlling for school fixed-effects, we find that a five star recruit increases the probability of landing in a BCS game by 4.28%. Given that these games pay schools on average $4 million dollars to individual schools, our results imply that a five star recruit is worth more than $150,000 in BCS bowl appearance alone. More importantly, the effect of recruits on post season success is lower when looking between schools and conferences than within conferences.

The paper proceeds as follows. In the next section we briefly review the context of college football recruiting and previous estimates of the relationship between recruit quality and team performance. We then describe the data and our empirical methodology. Next we present our results. The final section concludes.

2. The Role of Recruits in College Football Success

There is a widely-held belief that recruits have a positive impact on performance, but there are few studies that look directly at the impact of recruit quality on team performance. Since college football programs and schools benefit from a billion dollar market for exceptional on- the- field performance, teams invest a large amount of money in recruiting programs in hopes of higher returns in post-season financial rewards. The recruiting expenses include professional staff, expenses for campus visits, marketing and

traveling to meet recruits. According to ESPN, some of the top programs (teams with a history of on the field success) spend close to a million dollars on their recruiting programs annually (Sherman 2012). Earlier work has examined the relationship between financial investment and success on the field, and how the two have a positive correlation (Dummond et al. 2008). The belief is that investing more in recruiting and obtaining higher rated recruits will lead to greater success on the field, which will result in increased revenue from athletic events.

Langlett (2003) examined the relationship between college football recruiting and team performance. He analyzed the top 25 ranked teams from each year and matched them with the top 10 recruiting classes of that year from 1991-2001. When a team recruits well, they see an increase in amount of wins in the subsequent years. The greatest effect a recruiting class had on the field is within the first year the recruiting class takes the field. Langlett found strong persistence-- schools that do well in a given year have better recruiting classes and a higher probability of on the field success. The reverse is also true—teams who do not obtain higher rated recruits most likely stay out of the top 25 in subsequent years.

Dummond et al. (2008) examined the supply and demand of college football recruits. They paid particular attention to the decision making process recruits face when choosing which school to attend. They found a positive relationship between recruit quality, on the field success, and end of the year rankings. Their results are consistent with Langlett's results. Although their main focus is the decision process of high school recruits, the results are also consistent with substantial heterogeneity between schools. Those that recruit better players continue to do so and their results suggest that such

persistence have effects over time.

There are two open questions in the literature. First, we do not know if recruit quality estimates are driven by between school effects or are genuinely related to recruit quality. If schools with winning traditions attract higher rated recruits it could be the case that recruit quality effects are overstated. A more precise estimate would be to consider within school effects. To find how a team performs on the field when they recruit better than their own average is a more accurate estimate as it controls for the substantial between school heterogeneity. Second, aggregate measures of recruiting classes used in previous studies are relative rankings of classes. They do not use time-consistent measures of quality nor do they reflect the fact that recruiting classes are bundles of players with various characteristics. While there will be high quality players in every recruiting class, there will also be years where, for a variety of reasons, there is higher average player quality than other years. Measures of individual player quality, the star-rating, may be a better proxy for recruit quality in estimating such effects. The star ratings are designed to be time-consistent measures of the quality of a recruit and may give a more precise estimate than the aggregate ratings of classes.

3. Data

To estimate the relationship between recruit quality and on the field success, we compiled data from various sources to construct a unique data set that combines precise estimates of individual recruit quality and team performance. We used Rivals.com, ESPN, *USA Today College Football Encyclopedia* and *ESPN College Football Encyclopedia*. We recorded the full set of recruiting information for all FBS teams from Rivals.com for the

years 2002-2012, recorded every team in the FBS and their complete recruiting class for the last 12 years. Specifically, we recorded the number of 5, 4, 3, and 2 star recruits for each year each school, recording wins, losses, conference championships, bowl appearances, conference standings at the end of the season, and conference wins and losses for each team. We obtained this information from *The ESPN Encyclopedia of College* Football and online resources such as athletic department websites.

It is important to note that the ratings of recruits are an *ex ante* consensus evaluation. There is no set rubric for how recruits are rated and there are several recruiting rankings that can, in some instances, give the same player widely different ratings. That being said, there is usually a consensus formed about the potential of players much like those evaluated for the NFL draft. Most important, recruit ratings are not relative- they are ratings that are designed be time-consistent. We use the ratings given by Rivals.com, which is the most prominent recruiting service for football players during this time period.

Players are evaluated on athletic ability, strength testing, recorded highlights of high school football games, cognitive ability, and personality. It is not known if all evaluators have access to the same set of information. For example, athletic ability is evaluated by evaluating vertical and long jump, forty yard dash, shuttle time, bench press, squat and other various weight lifting drills. Taking into consideration the highlight tapes of high school performances while putting each recruit through an extensive interview process, evaluators gather enough information to give a proper analysis on the recruit's

ability.[1] For this reason, the number of highly ranked players (5-star or so called "blue chip" recruits) varies every year. It is not the case that the top number or percent of recruits will always be given the highest rating-the star rating is an attempt to form a cardinal rating for players such that a 5 star recruit in one year is a 5 star recruit in another year.[2]

The summary statistics for the data are given in Table 1. The average number of five star recruits is .2984 per class per year for each team. As there are more recruits rated of lower quality, we expect teams have, more lower ranked recruits. Teams have more than two four star recruits on average (2.768), more than eight three star recruits (8.11) and more than ten two star recruits (11.177) all give us key insight on how certain classes perform against the national average. The average number of wins for a college football team per year is 6.539. Most teams will recruit more than twenty players each year.

There are large differences in average recruit quality by conference. Table 2 shows the average number of recruits by star rating for conferences. Throughout the analysis, we are careful to use contemporaneous conference alignment for each year. For example, if University X was aligned to conference 1 for three years and then conference 2 for the remaining years in the data, we assign University X to their aligned conference for those specific years. Table 2 shows a substantial degree of disparity between premier conferences and lower quality conferences. Each South Eastern Conference (SEC) team brings in .963 five star recruits and 7.155 four star recruits each year. This is nearly .7

[1] The evaluation Process is explained in greater detail in Weathersby (2013)
[2] Since highly rated recruits get more attention their evaluations are likely less error-prone. Major evaluators are unlikely to spend a lot of attention on a two star recruit as opposed to a five star recruit. Same idea applies to the NFL draft.

more five star recruits and almost 5 more four star recruits each year compared to the national average. The SEC has won the last 7 Bowl Championship Series (BCS) national championships and it appears that the quality of recruits they obtain each year is well above the national average and other BCS affiliated conferences. We found the top three teams, based on most wins, from the SEC, Big East, MAC, and Mountain West. The top three teams in the SEC (LSU, Alabama, and Georgia) had 1.8 five star recruits on average while the top Big East (Rutgers, Louisville, and Connecticut) teams had .05 five stars, on average. Outside of the major conferences the differences are even larger. The Mountain West's top three teams (TCU, Boise State, and Utah) recruited 2.9 four star recruits while the top three teams in MAC (Miami Ohio, Northern Illinois, Ohio) had .1 four star recruits, on average. Neither conference had five stars in this data.

4. Methodology

We estimate the relationship between recruit quality and wins in two ways. The first method is a traditional OLS regression, similar to previous studies that estimate the effect between schools. The second method is a fixed effects specification to control for between-school heterogeneity in average recruit quality. As we noted earlier, we could serve as a source of bias in the OLS specifications. The main concern is whether variation in recruit quality matters as much within an individual school as it does between schools.

Specifically, our OLS estimate of the relationship between wins and recruit quality is:

$$Y = \beta_0 + \beta_1\ 5\ star + \beta_2\ 4\ star + \beta_3\ 3\ star + \beta_4\ 2\ star + \mu$$

And the fixed effects specification is:

$$Y = \beta_1\ 5\ star + \beta_2\ 4\ star + \beta_3\ 3\ star + \beta_4\ 2\ star + \theta + \mu$$

where

Y= The outcome of interest (wins, conference or post season success)

Star= Ex ante recruit rating

θ= Individual School fixed effects

Our primary interest is the difference between beta coefficients in the fixed effects and OLS specification. We also estimate specifications with conference fixed effects for outcomes, such as bowl appearances, where within-conference variation may be critical in determining the outcome.

5. Results

5.1 Within and Between School Effects of Recruit Quality on Wins

We begin with the OLS and fixed effects regressions of wins on recruit quality. The results are given in Table 3. The OLS regression coefficients for recruit ratings are larger than the fixed effects estimates. Examining within school effects (Column 2), we see that bringing in a five star recruit increases a team's wins by .306 in a given season. This effect is lower than the .437 coefficient in the OLS regression. Formal test of the difference between the OLS and fixed effects regression reveal that the difference between the two estimates for five star recruits is statistically significant at the 5% level (t=2.395). For four star recruits are the OLS estimates are consistently larger than the

fixed effects estimates, and the difference for four star recruits is statistically significant as well (t=2.018).

The difference between the OLS and fixed effect estimates is not uniform, however. The coefficient on three star recruits in the fixed effects regression (.0555) is larger than the OLS coefficient for three star recruits (.046). This implies that within schools three star recruits have a larger impact on the number of wins than between schools. This result is most likely due to the fact that three star recruits are recruited by a variety of football programs and their marginal impact on an individual school's success could be quite large for schools without strong tradition. For example, a three star recruit may be more likely enroll in a school if coaches can guarantee playing time, media exposure, and less competition from other highly-rated recruits. In short, these recruits are more numerous and highly elastic at various levels of college football success. We also need to take into consideration that there are more three star recruits then five and four star recruits. The Law of Large Numbers could explain the difference, meaning the chances that a three star recruit out performs his "rating" are higher than five and four star recruits given the relatively large number of three star recruits. Also lower rated recruits have more heterogeneity since they aren't evaluated and scrutinized at the same level of higher rated recruits. Three star and two star recruits aren't subject to rechecking of their evaluation as much as higher rated recruits. Even with that as a potential explanation the actual difference is small and is not statistically significant (t=0.349).

For two star recruits, the effect is negative in both the OLS and fixed effects estimates. The fixed effects estimate (-0.0103) is not statistically significant, but the between school estimate (-0.0455) is. We conjecture that the negative effect of two star

recruits is that they are of lower quality relative to higher rated recruits. Since schools can only recruit a given number of players, the addition of a two star recruit by definition means the exclusion of a three, four or five star recruit from the roster. Since these higher rated players are playing for opponents this would imply a decreasing number of wins for a school with more two star recruits. Even so the difference between the two estimates is statistically significant, however (t=1.76).

To give a more concrete idea of the substantive import of the results we also present estimates of the magnitude of the shifts in standard deviation of bringing in these highly talented recruits. We calculate the effect of a one standard deviation change in recruit quality on the standard deviation of wins. This is shown in Table 4.The OLS results show larger changes in standard deviation of wins. A one standard deviation change in the OLS regression for five star recruits changes the standard deviation of wins by .1196, which is a significant impact for a single on wins. In the fixed effects results, this estimate changes to .08375, which is still sizable. A one standard deviation change in four star recruits changes the standard deviation of wins by .0827 in the fixed effects and .211 in the OLS results. The .00105 difference between five and four star recruits in the fixed effects estimates suggests that five star and four star recruits have nearly the same impact on the standard deviation of wins when looking within schools. The small difference between five and four star recruits raises the question of how important is to get a five star recruit over a four star recruit when examining the effects it has on the standard deviations of wins. From our results the difference is so small that it suggest that

bringing in a five star recruit over a four star recruit may not increase the number of wins.[3]

In short, we find through the fixed effects results that even the best teams improve when they recruit the best players. The OLS regression most likely overstates the effects of recruit quality on wins, but even within schools the effect is sizable and significant. The standard deviation change results suggest that five star recruits have the same impact four star recruits have on shifting standard deviation of wins for school. Below, we consider the effects of recruit quality on conference success by estimating the relationship with school fixed effects.

5.2 Conference Specific Outcomes and Recruit Quality

We extend our analysis further to examine the effects of recruits on conference specific outcomes. In recent years there has been disparity between BCS conferences. Within in the last decade the SEC has dominated college football, winning the last seven national championships. It is important to examine conference success since in some conferences the level of competition may be different and the substantial heterogeneity between conferences may create different effects of recruit quality on success. Teams will play majority of their games against opponents from the same conference. Also, most recruits, regardless of quality, will be recruited by teams within the same conference. Conference standing, in particular, is a relative indicator for how an individual school did relative to its closest peers that particular season. We examine conference wins and conference

[3] We do not present results for effects such as margin of victory or success against highly-ranked opponents. In those instances it could be the case that a five star recruit would be more valuable than for the outcomes considered here.

standing, since both indicate how a team performs in a specific season and both are key factors in determining post season placement and payouts.

We show the results in Table 5. The OLS coefficients for conference wins are larger than the fixed effect coefficients. The OLS five star coefficient is 128% larger than the fixed effects five star coefficient. The four star OLS more than one fold larger than the fixed effects four star coefficient. We see similar results in conference standings where the OLS coefficient is greatly larger than the fixed effects coefficient. The OLS results, similar to the results in Table 3, overstate the effect of recruit quality on wins. The fixed effects once again show, however, that even the best teams benefit from higher rated recruits for conference-specific outcomes. The between school results may overstate or understate the effect of recruit quality because due to the disparity between conferences.

5.3 Post Season Success

The previous results showed that conference wins and conference standing are related to recruit quality. This is important since relative standing in the conference is a key determinant of post-season placement and the financial gains of specific bowl assignments. Examining post seasons success is important since this is where schools receive a large financial gain that varies by their conference standings. The connection is clear-- better recruit results in more wins, improved conference standings and better slotting for more lucrative post season bowls.

The largest reward for a successful season is an appearance in a BCS Bowl. The BCS Bowl system is constructed to consist of five BCS Bowl Games (Sugar, Orange,

Tostitos, Rose, and the BCS National Championship) which give bids to the conference champion of the five automatic qualifying BCS conferences (Big East, ACC, PAC 10, Big 12 and SEC). This leaves four spots open for at large bids where these bids are given to the top four teams in the BCS rankings that have not received automatic bids from the conference affiliation. While the payout amounts differ, conferences are also aligned to compete in second tier bowls such as the Cotton, Gator, and Capital One Bowl. In general, the financial structure of these bowls is the same the conference receives a payment and the individual school receives more than their conference share for appearing in the bowl game.

We estimate the effects of recruit quality on post-season appearances using probit regressions where the dependent variable is the appearance in a particular post season event and school fixed effects. We use a probit model to estimate the effect a recruit of a specific quality rating has on the probability of winning a conference championship, appearing in a BCS or second tier bowl game, and obtaining a bid to any bowl game. Second Tier bowls are bowls of high quality that have larger cash payouts and are guaranteed to teams with relatively high conference standing— the Capital One, Tangerine, Gator, Cotton, and Outback Bowls. [4]

We show the results in Table 6. When we examine the results of post season success on recruit quality, we see that five star recruits have a large impact on BCS bowl appearances and conference championships. One five star recruit increases a BCS bowl appearance probability by .0428 in the school fixed effects compared to the probit

[4] Our selection of Second Tier bowls is admittedly ad hoc and is based on the relevance of these bowls over this time period.

estimate .0145. This suggests that teams see large benefits to obtaining a five star recruit, even for teams which have strong traditions. The fixed effects regression coefficients are larger than the pooled probit coefficients for BCS appearance. When teams bring in five and four star recruits, the team increases their chances of appearing in a BCS bowl game significantly, even when controlling for the time invariant aspects of each specific school. The fixed effects coefficient for five star recruits is nearly 170% larger than the pooled probit estimate.

As we described earlier, there is significant heterogeneity between and within conferences. Since bowl appearances are tied to conferences we estimate the effects of recruit quality on post-season appearances using probit regressions where the dependent variable is the appearance in a particular post season event .In this instance we use conference fixed effects. Our reasoning is similar to what we advanced earlier—teams compete for recruits within conference, for the most part, and since the bowl assignments are arranged through conference affiliation two teams from the same conference cannot appear in the same conference affiliated bowl.

These results are also included in Table 6. The conference fixed effects coefficients are consistently larger than the pooled probit estimates in post season play but vary in size relative to the school fixed effects depending on the outcome. Conference fixed effects are larger than both school fixed effects and probit estimates when examining Bowl Appearances. The conference fixed effects for five star recruits is .0452 compared to the .0222 school fixed effects and the .0356 of the probit regression, although none of the results is statistically significant. The same is true for four star recruits, where the results are statistically significant. The conference fixed effects

coefficient for four star recruits are larger than the school fixed effects and probit estimates (.0366 compared to .0174 and .0294).

Our regressions show that five and four star recruits improve a team performance and the probability of placement in a more lucrative bowl. Whether it is obtaining a bid to a BCS bowl or winning a conference championship, highly rated recruits increase improve your chances of achieving post season and conference success. The results are substantively similar when using either school or conference fixed effects.

5.4 Team Composition -- Lagged Recruiting Classes

Teams are made up of players from a number of consecutive recruiting classes. As such, it is important to consider the effects of contemporaneous and lagged recruits on team success. In our specifications we have estimated the contemporaneous relationship between recruit quality and success. One issue is that, as described earlier, teams with previous recruiting success are likely to have current recruiting success. To investigate this possibility we lagged recruit quality to track their impact on the field as they progress through the program.

When we analyze the serial correlation of recruit quality, we find there is a strong persistence over time. We show the results in Table 7. The fixed effects estimates, which show some statistical significance, are not substantively large. The one year fixed effects lagged variables are only 20% of the OLS results and roughly 30% for the two year results. The fixed effects results show that the lagged effects are surprisingly negligible. This is consistent with high levels of persistence in recruit quality for each specific school.

The results for recruit quality lags suggest that we isolate the effects of idiosyncratic changes in the number of high quality recruits on wins in our preferred specification. The addition of lags in recruit quality do not have a substantial impact on model fit once team fixed effects are included. In fact, the inclusion of lags yields mis-specified results due to the high degree of colinearity between years. Even with this concern, we report these results in Tables 8 and 9 for completeness. We see that the specifications estimated earlier are not enhanced by the inclusion of the lagged measures of recruit quality. The results with lagged variables are consistent with the previous literature that there are strong persistent effects in recruit quality. This persistence creates a difficulty in trying to analyze the effect of recruit quality on wins—simply including previous recruiting classes results in a mis-specified model due to the colinearity. The standard correction to this autoregressive problem is to use first differences or to take deviations from trend. In our specification, the inclusion of fixed effects is a close proxy. The fixed effects captures the average recruit quality for each school over the sample period. As such, our look at contemporaneous effects of recruits quality on wins controls for the lag effects of recruit quality and the persistence of recruit quality over time. The substantive effects remain the same even when accounting for lagged recruiting class quality.

6. Conclusion

The college football market is a multi-billion dollar industry. Schools reap large benefits, financial and non-financial, from success at the highest levels.[5] Our goal was to determine if the perceived benefits to recruiting were the same within schools as between

[5] Dummond (2008) explains college football recruiting from both sides of the market

schools. One could argue that schools which regularly bring in high quality recruits could see little additional benefit to improvements in recruit quality. In this paper we analyzed the effects of recruit quality on football programs in seasons and post season success. We looked not only at wins, but conference standing and the likelihood of post season appearances at several levels. We also looked at the effects of recruit quality within conferences since most recruits are lobbied by conference peers before making their final decision of where to play.

Even when controlling for differences between schools, the best teams benefit from recruiting top rated recruits. We extended our analysis to conference and post seasons play and find that fixed effects regression coefficients are larger for conference wins, conference standings, BCS bowl games and second tier bowl games. This suggests that higher rated recruits have larger impact within schools and within conferences for conference standing and post season success. Overall, our results show that higher rated recruits do improve on the field performance, and significantly increase the likelihood of a team appearing in a major post season bowl game

The results with respect to conferences and post season success are consistent with the incentives in the recruiting bonanza that has been documented for college football. While teams can (and do) win with talent of lower ratings, success at the highest levels of college football is much more likely to happen when a team possesses highly rated recruits. Even the best programs have strong incentives to recruit the best players, improving over their average recruit quality still matters for these schools. Our back of the envelope calculation suggest that a five star recruit is worth more than $150,000 to an individual school as they increase the likelihood of appearing in the most

lucrative type of post season play (a BCS game), which nets a school $4 million dollars above their conference-allotted share of the revenue.

The findings here can be extended into several directions. First, we know little about the career trajectory of recruits. While the results here speak to their impact on team success, they do not tell us if that is the result of players changing or moving to different positions than played in the past. Indeed, the recruit effect we estimate could be an athlete effect and not a recruit effect. Secondly, the results within schools do not distinguish specific classes nor weight recruits. If recruits at lower performing schools remain in school longer the persistent effects of recruiting quality could differ by teams. Third, a head-to-head chess-player type rating of schools (where the most desirable schools are the ones chosen by recruits given the option to attend) could be used as a control for recruit expectation of team quality. These extensions would add to the limited body of empirical research on the effects of recruit quality. As these within-school results have shown, even schools with strong traditions have surprisingly large incentives to recruit the best players.

References

Boyles, B., & Guido, P. (2011). *The USA today college football encyclopedia: A comprehensive modern reference to America's most colorful sport, 1953-present*. New York, NY: Skyhorse.

Dumond, M., Lynch, A. K., & Platania, J. (2008). An Economic Model of the College Football Recruiting Process. *Journal of Sports Economics, 9*(1), 67-87. Retrieved Fall, 2012.

Langlett, G. (2003). The Relationship between Recruiting and Team Performance in Division 1A College Football. *Journal of Sports Economics*, *4*(3), 240-245. Retrieved Fall, 2012.

MacCambridge, M. (2005). *College Football Encyclopedia: The Complete History of the Game*. New York City, NY: Cambridge.

Meers, K. (2013, February 21). Analyzing the Lagged Effect of College Football Recruiting [Web log post]. Retrieved Spring, 2013, from http://harvardsportsanalysis.wordpress.com/2013/02/21/analyzing-the-lagged-effect-of-college-football-recruiting/

O'Brien, C.W. "College Football Recruiting." *Bleacher Report*. N.p., 29 Jan. 2009. Web. 10 June 2013

Sherman, Mitch. "Balancing the Recruiting budget." *ESPN*. ESPN Internet Ventures, 12 June 2012. Web. 11 June 2013. http://espn.go.com/college-sports/recruiting/football/story/_/id/8041461/the-cost-recruiting

Weathersby, Edwin. "College Football Recruiting." *Bleacher Report*. N.p., 26 Mar. 2013. Web. 10 June 2013.

Team Rankings: FAQ Ranking Index. (n.d.). *Rivals.com*. Retrieved Spring, 2012, from http://rivals.yahoo.com/ncaa/football/recruiting/teamrank/2014/all/all

Table 1: Summary Statistics

Variable	Mean	Standard Deviation
	(1)	(2)
All FBS Teams		
Wins	6.539	3.032
Five Star Recruits	0.298	0.824
Four Star Recruits	2.768	3.998
Three Star Recruits	8.111	5.653
Two Star Recruits	11.178	7.913
Conference Statistics		
Conference Wins	3.878	2.216
Conference Standings	4.238	2.533
Post Season Success		
BCS Bowl Game	0.063	0.243
Second Tier Bowl Game	0.064	0.245
Bowl Appearance	0.536	0.499

*Observations 1,3000

***Note:* Data consists of all FBS Teams from 2002-2012

Table 2: Average Recruit Quality by Conference

Star Rating	Whole Sample	BIG 10	BIG 12	ACC	PAC 10	SEC	BIG EAST	Non-BCS
Five Star Recruits	**0.298**	**0.344**	**0.433**	**0.488**	**0.607**	**0.963**	**0.150**	**0.306**
	(0.8241)	(0.7359)	(0.,8961)	(.9611)	(1.3447)	(1.2952)	(.4799)	(0.2314)
Four Star Recruits	**2.768**	**3.926**	**4.756**	**4.442**	**4.946**	**7.156**	**2.213**	**0.406**
	(3.9976)	(4.12)	(4.4198)	(3.9959)	(3.8246)	(5.0621)	(2.478)	(1.4008)
Three Star Recruits	**8.111**	**10.623**	**12.559**	**10.829**	**11.366**	**11.474**	**10.650**	**4.318**
	(5.6527)	(4.144)	(5.1155)	(4.1479)	(4.5242)	(4.9937)	(4.9913)	(4.2709)
Two Star Recruits	**11.178**	**6.893**	**5.882**	**6.124**	**5.500**	**4.993**	**10.163**	**16.946**
	(7.9113)	(5.3052)	(5.1155)	(4.4581)	(4.4235)	(5.6601)	(6.462)	(6.467618)
One Star Recruits	**0.048**	**0.016**	**0.024**	**0.000**	**0.071**	**0.096**	**0.063**	**0.054**
	(0.4978)	(0.127)	(.1525)	--	(.4183)	(0.8799)	(.599)	(0.53553)
Average Star	**2.612**	**2.890**	**2.976**	**2.943**	**3.015**	**3.156**	**2.646**	**2.199**
	(0.5446)	(0.4376)	(0.417)	(.3996)	(.4291)	(0.4648)	(0.3603)	(0.3199)
Observations	1,300	122	127	129	112	135	80	595

Note:

*Average Star Quality of teams from BCS Conference (Standard Error is in Parentheses)

** Number of Teams in Each Conference: Big Ten (12), SEC(14), ACC(15), Big East(15), Pac 10(12), Big 12(10)

*** Throughout the analysis definitions we are careful to use contemporaneous conference alignment for each year.For example, if University X was aligned to conference 1 or three years and then conference 2 for the remaining years in the data, we assign University X to their aligned conference for those specific years.

****Army, BYU, Navy, Notre Dame and Temple (selected years) are excluded for years in which they lack conference affiliation.

**** Non-BCS that don't have automatic BCS bowl bids (Conference USA, MAC, Mountain West and Sun Belt) and Indpendent Schools

Table 3: Regressions: Wins on Recruit Qaulity

Estimation Method	OLS	Fixed Effects
	Dependent Varibale	
	Wins	Wins
Recruit Quality	(1)	(2)
Five Star Recruits	0.437***	0.306***
	(0.12)	(0.117)
Four Star Recruits	0.159***	0.0623*
	(0.0301)	(0.0373)
Three Star Recruits	0.046**	0.0555***
	(0.0184)	(0.02)
Two Star Recruits	-0.0455***	-0.0103***
	(0.0167)	(0.0163)
Observations	1,300	1,300
R-Squared	0.18	0.443

Note: Standard errors are in parentheses

*Signifincant at 10% level; **Significant at 5% level;***Significant at 1% level

Data of all FBS Teams (Recruiting Statistics and Wins) used in these regressions

Table 4. Magnitude: Effect of one standard deviation change in recruit quality on standard deviation of wins

Receuit Quality	OLS	Fixed Effects
Five Star Recruits	0.1196	0.08375
Four Star Recruits	0.2111	0.0827
Three Star Recruits	0.0863	0.1042
Two Star Recruits	-0.0854	-0.0271

Note: Calculated by multiplying the standard deviation of average wins by star quality coefficient and dividing by the standard deviation of average wins [(S.D of Recruit Quality*Star Coefficient)/(S.D of Wins)]

Table 5. OLS and fixed effect regressions of conference wins and conference standings on recruit quality

Estimation Method	OLS	Fixed Effects	OLS	Fixed Effects	OLS	Fixed Effects
	(1)	(2)	(3)	(4)	(5)	(6)
			Dependent Variable			
Recruit Rating	Wins	Wins	Conference Wins	Conference Wins	Conferene Standings	Conference Standings
Five Star Recruits	0.437***	0.306***	0.362***	0.281***	-0.455***	-0.286***
	(0.12)	(0.117)	(0.0900)	(0.0886)	(-0.104)	(0.103)
Four Star Recruits	0.159***	0.0623*	0.0809***	0.00732	-0.0714***	0.0160
	(0.0301)	(0.0373)	(0.0230)	(0.0282)	(0.0266)	(0.0327)
Three Star Recruits	0.0460**	0.0555***	-0.0131	0.0129	0.000550	-0.0348**
	(0.0184)	(0.02)	(0.0144)	(0.0153)	(0.0167)	(0.0177)
Two Star Recruits	-0.0455***	-0.0103***	-0.0254*	-0.0116	0.0177	0.0256*
	(0.0167)	(0.0163)	(0.0132)	(0.0130)	(0.0153)	(0.0151)
Observation	1,300	1,300	1,255	1,255	1,255	1,255
R-Squared	0.18	0.443	0.196	0.069	0.069	0.217

Note: standard errors are in parentheses

*Significant at 10% level; ** Significant at 5% level;***Significant at 1% level

**Army, BYU, Navy, Notre Dame and Temple (selected years) are excluded for years in which they lack conference affiliation.

Table 6. Post Season Success and Recruit Quality: Probit Estimates

Esitmation Method	Probit	School Fixed Effects	Conference Fixed Effects	Probit	School Fixed Effects	Conference Fixed Effects
	(1)	(2)	(3)	(4)	(5)	(6)
Recruit Rating	Conference Championship	Conference Championship	Conference Championship	BCS Bowl Appearance	BCS Bowl Appearance	BCS Bowl Appearance
Five Star Recruits	0.0448***	0.0746***	0.0480***	0.0145***	0.0428**	0.0184***
	(0.0111)	(0.0216)	(0.0107)	(-0.00438)	(-0.0172)	(0.00595)
Four Star Recruits	0.00218	0.000612	0.00784**	0.00103	-0.0044	0.00185
	(0.00306)	(0.00772)	(0.00311)	(-0.00132)	(-0.00665)	(0.00178)
Three Star Recruits	-0.00445**	-0.00552	-0.00116	-0.00112	-0.00591	-0.00145
	(0.00208)	(0.00470)	(0.00216)	(-0.00964)	(-0.005)	(0.00138)
Two Star Recruits	-0.00208	-0.00749*	-0.00380**	-0.00518***	-0.0204***	-0.00634***
	(0.00188)	(0.00428)	(0.00186)	(-0.000988)	(-0.0052)	(0.00141)
Observations	1,231	568	1,231	1,300	396	1,096

Esitmation Method	Probit	School Fixed Effects	Conference Fixed Effects	Probit	School Fixed Effects	Conference Fixed Effects
	(7)	(8)	(9)	(10)	(11)	(12)
Recruit Rating	Second Tier Bowl Appearance	Second Tier Bowl Appearance	Second Tier Bowl Appearance	Bowl Appearance	Bowl Appearance	Bowl Appearance
Five Star Recruits	0.00429	0.00383	0.011	0.0356	0.0222	0.0432
	(-0.00543)	-0.0112	(0.0143)	(-0.0265)	(-0.0328)	(0.0267)
Four Star Recruits	0.00316	0.000534	0.00681	0.0294***	0.0174*	0.0366***
	(-0.00173)	-0.00356	(0.00431)	(-0.00618)	(-0.0095)	(0.00662)
Three Star Recruits	0.00299	0.000627	0.00319	0.0130***	0.0148***	0.0151***
	(-0.00119)	-0.00191	(0.00344)	(-0.0035)	(-0.00489)	(0.00396)
Two Star Recruits	0.00473	0.00079	-0.00193	-0.00651**	-0.000772	-0.00582*
	(-0.00127)	-0.00156	(0.00368)	(-0.00313)	(-0.00406)	(0.00328)
Observations	1,300	418	637	1,300	1,157	1,285

Note: Standard errors in parentheses. *Significant at 10% level; ** Significant at 5% level;***Significant at 1% level

All estimates are derived from probit specifications.

Table 7: Correlation Between Previous and Current Recruit Quality

Previous and Current Recruit Quality

	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Five Star	Five Star	Four Star	Four Star	Three Star	Three Star	Two Star	Two Star
One Year Lag	0.466***	-0.093***	0.78***	0.0359	0.705***	0.317***	0.767***	0.288***
	(0.0239)	(0.0273)	(-0.0175)	(0.0299)	(0.0213)	(0.0303)	-0.0189	(0.0286)
Observations	1,170	1,170	1,170	1,170	1,170	1,170	1,170	1,170
R-squared	0.185	0.5233	0.515	0.7876	0.342	0.5271	0.467	0.6407

Previous Years and Current Year Recruit Quality

	OLS	FE	OLS	FE	OLS	FE	OLS	FE
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Five star	Five Star	Four Star	Four Star	Three Star	Three Star	Two Star	Two Star
One Year Lag	0.374***	-0.171***	0.505***	0.0477	0.460***	0.285***	0.537***	0.291***
	(0.0291)	(0.0326)	(0.0279)	(0.0324)	(0.0292)	(0.0332)	(0.0277)	(0.0329)
Two Year Lag	0.276***	-0.149***	0.380***	-0.0441	0.360***	0.185***	0.325***	0.149***
	(0.0272)	(0.0287)	(0.0275)	(0.0318)	(0.0299)	(0.0356)	(0.0279)	(0.0319)
Observations	1,051	1,051	1,051	1,051	1,051	1,051	1,051	1,051
R-squared	0.232	0.5278	0.553	0.7876	0.366	0.5708	0.485	0.6743

Note. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 8: Previous Recruit Quality and Team Performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Wins	Conference Win	Conference Standings	Conference Championship	Bowl Appearance	BCS	Second Tier
	OLS	OLS	OLS	Probit	Probit	Probit	Probit
Five Star	0.493***	0.359***	-0.428***	0.0521***	0.0350	0.0179***	-0.000665
	(0.143)	(0.101)	(0.118)	(0.0128)	(0.0326)	(0.00614)	(0.00554)
Five Star, t-1	0.199	0.134	-0.232**	-0.00299	0.0207	0.00317	0.0130**
	(0.145)	(0.0960)	(0.112)	(0.0119)	(0.0321)	(0.00548)	(0.00558)
Five Star, t-2	(-0.00874)	-0.0822	0.0502	0.00354	0.0175	0.00328	0.00618
	(0.133)	(0.0956)	(0.111)	(0.0123)	(0.0304)	(0.00504)	(0.00492)
Four Star	0.0421	0.0146	-0.0124	-0.000990	0.0112	-0.00376**	0.00269
	(0.0414)	(0.0297)	(0.0346)	(0.00406)	(0.00844)	(0.00187)	(0.00175)
Four Star, t-1	0.0272	0.0314	-0.0344	0.00707*	0.00512	0.000196	-0.00117
	(0.0421)	(0.0288)	(0.0335)	(0.00380)	(0.00881)	(0.00176)	(0.00178)
Four Star, t-2	0.0614	0.0377	-0.0353	-0.00431	0.0104	0.00107	0.00393**
	(0.0405)	(0.0262)	(0.0306)	(0.00369)	(0.00840)	(0.00175)	(0.00177)
Three Star	0.0580**	-0.0116	-0.0277	-0.00354	0.0109**	-0.000812	0.00170
	(0.0250)	(0.0179)	(0.0208)	(0.00264)	(0.00478)	(0.00129)	(0.00127)
Thee Star, t-1	0.00360	-0.00565	0.0112	0.00197	0.00103	-0.00219	0.00375***
	(0.0258)	(0.0176)	(0.0205)	(0.00258)	(0.00491)	(0.00139)	(0.00136)
Thee Star, t-2	-0.0151	-0.0117	0.0258	-0.00135	0.00172	0.000707	0.00158
	(0.0254)	(0.0150)	(0.0175)	(0.00220)	(0.00487)	(0.00131)	(0.00132)
Two Star	-0.0341	-0.0242	0.0126	-0.00153	-0.00507	-0.00547***	-0.00108
	(0.0219)	(0.0164)	(0.0191)	(0.00241)	(0.00411)	(0.00142)	(0.00145)
Two Star, t-1	-0.0207	0.00532	-0.00379	0.00121	-0.00180	-0.00199	0.00168
	(0.0223)	(0.0154)	(0.0180)	(0.00231)	(0.00418)	(0.00147)	(0.00148)
Two Star, t-2	0.00363	-0.0141	0.00109	-0.000564	0.00156	0.000582	0.00100
	(0.0199)	(0.0124)	(0.0145)	(0.00178)	(0.00374)	(0.00133)	(0.00135)
Observations	1,051	1,051	1,051	1,105	1,051	1,051	1,051
R-squared	0.191	0.092	0.081				

Note: Standard errors in parentheses(*** p<0.01, ** p<0.05, * p<0.1)

Table 9: Previous Recruit Quality and School/Conference Performance with Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Outcome	Wins	Wins	Conference Wins	Conference Wins	Conference Standing	Conference Standing	Conference Championship
Fixed Effects Level	School	Conference	School	Conference	School	Conference	School
Five Star	0.519***	0.518***	0.369***	0.370***	-0.371***	-0.436***	0.102***
	(0.147)	(0.141)	(0.102)	(0.0976)	(0.119)	(0.111)	(0.0278)
Five Star, t-1	0.281*	0.200	0.181*	0.162*	-0.192*	-0.217**	0.00823
	(0.150)	(0.143)	(0.0930)	(0.0928)	(0.109)	(0.106)	(0.0232)
Five Star, t-2	0.0934	0.0245	0.00843	-0.0518	0.00320	0.0308	0.00951
	(0.132)	(0.132)	(0.0912)	(0.0923)	(0.107)	(0.105)	(0.0241)
Four Star	-0.00562	0.0682*	-0.0339	0.0519*	0.0448	-0.0351	-0.00493
	(0.0416)	(0.0412)	(0.0297)	(0.0289)	(0.0347)	(0.0330)	(0.00868)
Four Star, t-1	0.00615	0.0505	0.00924	0.0683**	0.00744	-0.0549*	0.0112
	(0.0412)	(0.0419)	(0.0291)	(0.0281)	(0.0340)	(0.0320)	(0.00855)
Four Star, t-2	0.0572	0.0848**	0.0314	0.0501**	-0.0196	-0.0305	-0.0120
	(0.0405)	(0.0402)	(0.0253)	(0.0255)	(0.0296)	(0.0290)	(0.00763)
Three Star	0.0640***	0.0743***	0.00573	0.0179	-0.0361*	-0.0427**	-0.00609
	(0.0234)	(0.0253)	(0.0168)	(0.0178)	(0.0197)	(0.0202)	(0.00555)
Three Star, t-1	0.0319	0.0244	0.0159	0.0278	-0.00817	-0.0166	0.00819
	(0.0242)	(0.0260)	(0.0168)	(0.0175)	(0.0196)	(0.0200)	(0.00570)
Three Star, t-2	0.0135	0.00895	0.0263*	0.0192	-0.0175	0.00226	-0.000695
	(0.0245)	(0.0258)	(0.0160)	(0.0151)	(0.0186)	(0.0172)	(0.00497)
Two Star	-0.00201	-0.0333	-0.00910	-0.0349**	0.0214	0.0435**	-0.00320
	(0.0203)	(0.0218)	(0.0154)	(0.0162)	(0.0180)	(0.0184)	(0.00551)
Two Star, t-1	0.0125	-0.0237	0.0148	-0.000726	-0.00459	0.0124	0.000208
	(0.0206)	(0.0223)	(0.0142)	(0.0150)	(0.0166)	(0.0171)	(0.00501)
Two Star, t-2	0.0193	-0.00534	0.0148	-0.0130	-0.0168	0.0149	-0.00358
	(0.0184)	(0.0199)	(0.0131)	(0.0122)	(0.0153)	(0.0139)	(0.00429)
Observations	1,051	1,051	1,051	1,051	1,051	1,051	495
R-squared	0.445	0.216	0.430	0.102	0.395	0.218	-

Note : Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)* Columns 7 was estimated with a probit.

Table 9: Continued

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Outcome	Conference Championship	BCS Appearance	BCS Appearance	Second Tier Bowl Game	Second Tier Bowl Game	Bowl Appearance	Bowl Appearance
Fixed Effects Level	Conference	School	Conference	School	Conference	School	Conference
Five Star	0.0516***	0.0461***	0.0219***	0.0181	0.0101	0.0338	0.0248
	(0.0122)	(0.0174)	(0.00734)	(0.0262)	(0.0187)	(0.0270)	(0.0242)
Five Star, t-1	0.000612	0.0148	0.00386	0.0663***	0.0500***	0.0317	0.0135
	(0.0109)	(0.0182)	(0.00669)	(0.0255)	(0.0177)	(0.0275)	(0.0245)
Five Star, t-2	0.00371	0.0111	0.00516	0.0305	0.0246	0.0340	0.0147
	(0.0113)	(0.0188)	(0.00619)	(0.0238)	(0.0158)	(0.0242)	(0.0226)
Four Star	0.00258	-0.00642	-0.00415*	-0.000197	0.00404	0.00355	0.0143**
	(0.00380)	(0.00674)	(0.00233)	(0.00809)	(0.00521)	(0.00766)	(0.00707)
Four Star, t-1	0.0105***	-0.00317	0.000677	-0.0147*	-0.00842	0.00206	0.00909
	(0.00360)	(0.00639)	(0.00223)	(0.00837)	(0.00563)	(0.00758)	(0.00719)
Four Star, t-2	-0.00274	-0.00243	0.00179	0.00910	0.00817	0.00661	0.0116*
	(0.00342)	(0.00628)	(0.00221)	(0.00819)	(0.00531)	(0.00744)	(0.00690)
Three Star	-0.00206	-0.00612	-0.000678	0.00125	0.00264	0.0107**	0.0121***
	(0.00248)	(0.00518)	(0.00168)	(0.00654)	(0.00419)	(0.00431)	(0.00434)
Three Star, t-1	0.00475*	-0.00465	-0.00212	0.00692	0.00824*	0.00423	0.00431
	(0.00247)	(0.00531)	(0.00180)	(0.00691)	(0.00426)	(0.00444)	(0.00446)
Three Star, t-2	0.000438	0.00218	0.000962	-0.00206	0.00145	0.00477	0.00507
	(0.00208)	(0.00497)	(0.00168)	(0.00691)	(0.00437)	(0.00451)	(0.00442)
Two Star	-0.00194	-0.0199***	-0.00686***	-0.00326	-0.00354	-0.000310	-0.00391
	(0.00228)	(0.00581)	(0.00189)	(0.00748)	(0.00482)	(0.00373)	(0.00375)
Two Star, t-1	0.000897	-0.00812	-0.00202	0.0102	0.00557	0.00376	-0.00102
	(0.00214)	(0.00569)	(0.00196)	(0.00775)	(0.00489)	(0.00379)	(0.00383)
Two Star, t-2	-0.00105	0.00335	0.000393	0.00800	0.00313	0.00415	0.00130
	-0.00163	(0.00491)	(0.00176)	(0.00724)	(0.00456)	(0.00339)	(0.00342)
Observations	1,104	297	892	467	892	907	1,039
R-squared	-	-	-	-	-	-	-

Note : Standard errors in parentheses(*** p<0.01, ** p<0.05, * p<0.1)* Columns 8 - 14 were estimated with a probit estimate