JOURNAL OF AMATEUR SPORT
JAS
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Projecting a High-School Quarterback's Performance at the Collegiate Level: A Comparison of the Rivals, 247 Sports, and ESPN Recruiting Ratings

Joshua D. Pitts[1]
Michael M. Stephens[1]
Stephen J. Poole[1]

[1]*Kennesaw State University*

The authors examined recruiting ratings for high-school quarterbacks over the period 2006-2012 from Rivals, 247 Sports, and ESPN. Three career college-performance measures were collected for each quarterback as well – passing yards per attempt, passing touchdowns per attempt, and quarterback rating. In order to determine which recruiting service ratings were more strongly correlated with quarterback performance, the authors employed Lee & Preacher's (2013) test of the difference between two dependent correlations with one variable in common and ordinary least squares regression analysis. Lee & Preacher's test revealed that the Rivals ratings have the strongest correlation with quarterback performance over the time-period examined. The 247 Sports ratings followed closely behind the Rivals ratings; however, the ESPN ratings correlated much more weakly with a quarterback's career performance in college. The regression results also showed that a one-standard deviation improvement in a quarterback's Rivals rating is associated with larger increases in quarterback performance and that the Rivals ratings explained more of the variation in quarterback performance compared to the 247 Sports and ESPN ratings. Thus, there was much evidence that the Rivals ratings are superior to the 247 Sports and ESPN ratings in projecting a high-school quarterback's actual performance in college.

Each year in August, the college football season begins anew, and fan bases from hundreds of schools across the United States become excited about their favorite team's prospects for the new season (Brennan, 2015). Due to the nature of collegiate athletics, roster turnover is high among college football programs as players graduate, transfer, leave school early for the National Football League (NFL), or separate from the team for other reasons (Caron, 2018; Culpepper, 2018). As a result, each new season for a team brings with it many new faces. For many teams, their quarterback is their most important player. Thus, expectations increase when a highly rated quarterback joins a team's roster (for example, see Kramer, 2013).

Even the wealthiest college football programs must contend with limited resources. Thus, many programs are vigilant in seeking ways to gain an advantage over their opponents. This has led to an arms race in college football, resulting in higher coaching salaries (Tsitsos & Nixon, 2012), new or significantly upgraded facilities (Popp, Richards, & Weight, 2018), and higher tuition rates (Smith, 2012). Given the importance of the quarterback position (Leigh, 2014), the expectations of highly ranked quarterbacks (Kramer, 2013), and the difficulty of playing the position (Kissel, 2013), it is important for college football coaches and scouts to take advantage of all available resources when recruiting quarterbacks to their program. Coaches and scouts will certainly weigh their own evaluations of players more heavily than evaluations made by individuals outside of their programs (Sayles, 2015). Other things equal, however, it is not out of the question that player evaluations made by individuals unrelated to the program might influence a coach's decision on which player to devote more resources to recruiting (Barnett, 2018). Rivals, 247 Sports, and ESPN all offer their own rankings of high school football players based on the assessments of their talent evaluators. While it certainly would not be the most important determinant of resource allocation in recruiting, in light of a program's scare resources and the importance of the quarterback position, knowing which recruiting service is best at predicting a quarterback's actual collegiate performance could help them be more efficient in recruiting.

While there has been increased interest from researchers surrounding the various aspects of college football recruiting, the authors were not aware of any previous study that evaluates and compares multiple recruiting services. This study addresses this dearth in the literature by evaluating and comparing three of the most popular recruiting services' ratings of high-school quarterbacks. The three recruiting services examined are Rivals, 247 Sports, and ESPN. In addition to a quarterback's rating from each of these recruiting services, data on three career college-performance measures was collected as well. The purpose of the research was to determine which recruiting service rating was most strongly correlated with a quarterback's actual perfor-

mance in college. In other words, which recruiting rating is best at projecting a quarterback's performance in college? Using data on college football quarterbacks from the Atlantic Coast Conference (ACC), Big East, Big Ten, Big XII, Pacific-12 (Pac-12), and Southeastern Conference (SEC) in addition to the University of Notre Dame between the period 2006 and 2012, the researchers found that the Rivals ratings have outperformed the 247 Sports and ESPN ratings in projecting a high-school quarterback's performance at the collegiate level.

Literature Review

Interest in sports recruiting has increased dramatically in recent years with researchers from the fields of Economics, Sport Management, Statistics, Exercise Science, and Mathematics among others contributing to a better understanding of the nuances surrounding the recruitment of high-school athletes. The majority of these studies have focused on the relationship between recruiting and team success. Although the impact of recruiting success on team success varies in each study, previous research by Langelett (2003), Herda et al. (2009), Treme, Burrus, & Sherrick (2011), Caro (2012), Bergman & Logan (2014), Pitts & Evans (2016), and Dronyk-Trosper & Stitzel (2017) all supports the notion that recruiting more highly rated players results in improved team performance in the sports of football and basketball. Thus, it is clear that ratings of high-school athletes provided by recruiting services are at least somewhat useful in projecting collegiate performance.[1] In addition to this line of research, Klenosky, Templin, & Troutman (2001), Dumond, Lynch, & Platania (2008), Huffman & Cooper (2012), and Mirabile & Witte (2017) have used data from recruiting services to analyze which factors influence a recruit's school-choice decision. This research reveals that recruits value the quality of facilities (Dumond et al., 2008; Klenosky et al., 2001; Mirabile & Witte, 2017), the academic reputation of the university (Dumond et al., 2008; Huffman & Cooper, 2012; Klenosky et al., 2001; Mirabile & Witte, 2017), the historical success of the program and its head coach (Dumond et al., 2008; Huffman & Cooper, 2012; Mirabile & Witte, 2017), the level of competition at which the program competes (Dumond et al., 2008; Mirabile & Witte, 2017), relationships with coaches (Klenosky et al., 2001; Mirabile & Witte, 2017) , potential for playing time (Klenosky et al., 2001; Mirabile & Witte, 2017), and proximity to home among other factors (Dumond et al., 2008; Klenosky et al., 2001; Mirabile & Witte, 2017). In addition, Pitts & Rezek (2012) examined a university's decision to offer a high-school football player an athletic scholarship and quantified the factors that determine the number of scholarship offers a high-school football recruit receives.

Whereas most previous studies have taken an aggregate approach to examining the ability of recruiting ratings to project collegiate performance (Bergman

& Logan, 2014; Caro, 2012; Dronyk-Trosper & Stitzel, 2017; Herda et al., 2009; Langelett, 2003; Pitts & Evans, 2016; Treme et al., 2011), some studies have focused on the ability of recruiting ratings to project the collegiate performance of individual athletes. Abbasian, Sieben, & Gastauer (2016) examined the relationship between a high-school football recruit's Rivals rating and their performance in college and the NFL. Their dataset consisted of recruits on the Rivals website between the years 2003 and 2012. As one would expect, their findings revealed that NFL teams were more likely to select higher-rated recruits in the draft. Similarly, among those players selected in the NFL draft, teams selected recruits with higher Rivals ratings earlier in the draft. Lastly, the authors found that higher-rated recruits were significantly more likely to earn first-team All-American honors in college.[2] Similarly, Wheeler (2018) found that NFL teams select high-school football recruits with higher ratings from 247 Sports earlier in the draft. However, the author found no evidence of a significant correlation between a recruit's 247 Sports rating and his eventual performance in the NFL.

In the sport of golf, Earley (2011) investigated the relationship between junior girl's golf ratings and these athletes' performances in college. The author found that the junior ratings have a strong correlation with the golfers' performances in their first two years of college. While the correlation remained significant throughout their collegiate careers, there was evidence that the strength of the relationship declined after their first two years on campus. This suggests that the golfers' initial stock of talent became less important and external factors, such as coaching and player development, became of greater importance as the players' collegiate careers progressed. Similarly, Brusa (2018) showed that the performance of track and field athletes in high-school distance races was a strong predictor of their race times as collegiate track-and-field athletes.

Lastly, McNeilly (2010) used high-school recruiting rankings from Scout, Rivals, and ESPN to examine the relationship between recruiting ratings and collegiate performance for basketball players signed in the 2007-2009 recruiting classes. The author found some evidence that higher-rated players enjoy more-productive and successful collegiate careers. The author did not attempt to determine which recruiting service offered a better projection of collegiate productivity but simply used multiple recruiting services to get an average rating for players across the different recruiting services.

Thus, there is much evidence that recruiting is important to the success of collegiate sports programs. There is also considerable evidence that the ratings provided by recruiting services, which evaluate athletes based on their performances in high school, are quite useful in projecting athlete performance in college. However, little is understood about which recruiting service is a more-reli-

able predictor of athlete performance in college. This study seeks to provide an answer to this question for the evaluation of high-school quarterbacks transitioning to college in the sport of football. More specifically, which of the following recruiting service ratings are more strongly correlated with a quarterback's actual performance throughout his college career – Rivals, 247 Sports, or ESPN?

Rivals, 247 Sports, and ESPN Recruiting Services

As can be seen in the literature review, researchers have previously used each of the three recruiting services employed in this study to examine issues surrounding the recruitment of high-school football players. Of these three services, 247 Sports appears to have been the earliest to provide recruiting ratings for high-school football players as their ratings date back to 1999. The first recruiting ratings available on Rivals were for the year 2002, while the first recruiting ratings available from ESPN were for the year 2006. Furthermore, each service employs different techniques to evaluate prospects.

A recruit's Rivals rating can be between 5.2 and 6.1. According to Rivals.com (2016a), a rating of 5.2-5.4 implies that they view the player as a "low-end Football Bowl Subdivision (FBS) prospect."[3] A rating of 5.5-5.7 suggests the player is "among the nation's top 800-850 prospects overall." A rating of 5.8-6.0 indicates the player is an "All-American candidate." Lastly, a rating of 6.1 means the player is "among the nation's top 30-35 players overall."

A recruit's 247 Sports rating can be between zero and one with a player's expected contribution in college increasing with his rating. According to 247 Sports.com (2012), it is a composite score that averages a recruit's rating across multiple recruiting services, including additional ratings from 247 Sports, and it attempts to provide a consensus from the industry in regards to a prospect's expected value. Finally, a recruit's ESPN rating can be between 50 and 100. According to ESPN.com (2013), a rating of 50-59 implies that they do not expect the player to contribute at the FBS or Football Championship Subdivision (FCS) levels.[4] A rating of 60-69 suggests the player is likely an FCS-caliber player, but he could potentially compete at a non-Power 5 school within the FBS.[5] A rating of 70-79 suggests the player is likely a good fit for a non-Power 5 school within the FBS. A rating of 80-89 implies that they expect the player to contribute significantly to a Power 5 school. Lastly, according to ESPN.com (2013), a rating of 90-100 means that they expect the player to compete "for All-American honors with the potential to have a three-and-out college career with early entry into the NFL draft." Each of the recruiting services are summarized in Table 1.

The different methods employed by the recruiting services can lead to some appreciable differences in their rankings of players as well as their overall team-recruiting rankings. For example, in the

Table 1

Summary of Recruiting Services

	Rivals	247 Sports	ESPN
First Year Available	2002	1999	2006
Minimum Rating	5.2	0	50
Maximum Rating	6.1	1	100
Indicates low talent-level	Not rated	Values close to 0	50-59
Indicates average talent-level	5.2-5.7	Values close to 0.5	60-79
Indicates elite talent-level	5.8-6.1	Values close to 1.0	80-100

2016 overall team-recruiting rankings, both Rivals.com (2016b) and 247 Sports.com (2016) agreed that the University of Alabama signed the top-ranked recruiting class while ESPN.com (2016) gave that designation to Florida State University. Further down the list, the differences in overall team-recruiting rankings become more pronounced. According to Rivals.com (2018a), the University of Pittsburgh signed the 36th ranked recruiting class in 2018; however, 247 Sports.com (2018a) assigned their class a ranking of 46th and ESPN.com (2018a) assigned their class a ranking of 56th. As for individual player-rankings, quarterback Adrian Martinez was the 98th ranked player in the class of 2018 according to Rivals.com (2018b). However, he was the 139th ranked player according to 247 Sports.com (2018b) and the 103rd ranked player according to ESPN.com (2018b).

According to Table 2, the average high-school quarterback in the sample received a Rivals rating of 5.740, a 247 Sports rating of 0.899, and an ESPN rating of 78.960. Thus, it seems as though the 247 Sports and Rivals ratings may be slightly more generous to quarterback prospects than the ESPN ratings, but for the most part, each recruiting service offers a similar projection of collegiate performance for the average quarterback in the sample. While performance projections for the average quarterback in the sample are similar, projections for individual quarterbacks in the sample can be substantially different.

Methodology

The Sample

The dataset consists of 149 quarterbacks whose entire collegiate careers took place between the years 2006 and 2012. To be included in the sample, all three recruiting services must have rated the quarterback. In addition, the quarterback must have played the entirety of their collegiate career at a school belonging to the ACC, Big East, Big Ten, Big XII, Pac-12, or SEC. Quarterbacks who attended Notre Dame are also included in the sample. For the entire time-period under consideration, the Bowl Championship Series (BCS) system was in place for FBS teams. Each of the

Table 2

Means and Standard Deviations for the Full Sample and Conference Subsamples

Variable	Full Sample	ACC	Big Ten	Big XII	Big East	Pac-12	SEC
Yards per Att	7.575	7.481	7.393	7.896	7.417	7.761	7.796
	(0.862)	(0.854)	(0.785)	(0.961)	(0.880)	(0.718)	(0.934)
TD per Att	0.056	0.053	0.053	0.060	0.049	0.061	0.059
	(0.014)	(0.012)	(0.013)	(0.017)	(0.014)	(0.015)	(0.014)
QB Rating	137.572	135.073	133.329	143.726	134.267	143.678	139.871
	(14.675)	(13.450)	(12.841)	(15.047)	(19.524)	(13.190)	(16.051)
Rivals Rating	5.740	5.750	5.704	5.678	5.733	5.774	5.786
	(0.194)	(0.237)	(0.193)	(0.157)	(0.197)	(0.205)	(0.205)
247 Rating	0.899	0.906	0.890	0.878	0.916	0.903	0.918
	(0.054)	(0.058)	(0.057)	(0.041)	(0.055)	(0.059)	(0.059)
ESPN Rating	78.960	78.962	78.107	77.087	80.167	79.130	81.893
	(4.565)	(4.142)	(5.202)	(3.397)	(2.317)	(5.413)	(4.280)
N	149	26	28	28	6	23	28

Note: Standard deviations are in parentheses under the means.

six conferences listed above and Notre Dame were automatic qualifiers under the BCS system. The six champions of these conferences automatically qualified to compete in one of the system's five prestigious bowl games, which included the Fiesta Bowl, Orange Bowl, Rose Bowl, Sugar Bowl, and BCS National Championship game. Notre Dame automatically qualified for one of these major bowls if they finished the season ranked in the top eight of the BCS rankings. Thus, each quarterback examined in the sample competed at a similar level of competition.[6] ESPN ratings were unavailable before 2006, and data collection was stopped in the year 2012 to ensure that the sample only includes quarterbacks who have completed their collegiate careers.

Collegiate Performance Measures

Three career college-performance measures were collected for each quarterback – passing yards per attempt (*Yards per Att*), passing touchdowns per attempt (*TD per Att*), and quarterback rating (*QB Rating*).[7] *QB* Rating takes into account total passing yards, total passing touchdowns, total completions, and total interceptions. It is a more encompassing measure of a quarterback's performance as a passer, and it is calculated as:

$$QB\ Rating = \frac{(8.4*Pass\ Yards)+(330*Pass\ TD)+(100*Comp)-(200*Int)}{Pass\ Attempts} \quad (1)$$

where *Pass Yards* represents career passing yards, *Pass TD* represents career passing touchdowns, *Comp* represents career completions, *Int* represents career interceptions, and *Pass Attempts* represents career passing attempts. The average

quarterback in the sample had 7.575 passing yards per attempt, 0.056 passing touchdowns per attempt, and a quarterback rating of 137.572.

In addition to presenting means and standard deviations for the full sample, Table 2 also presents means and standard deviations for each of the variables by athletic conference.[8] During the time-period examined, Big XII quarterbacks earned the most passing yards per attempt and the highest quarterback ratings, on average, while Pac-12 quarterbacks had the most passing touchdowns per attempt. However, all three recruiting services agreed that SEC schools recruited the highest-caliber quarterbacks on average. This may be due to an SEC bias among recruiting services if services upgrade a recruit's rating when he receives interest from or signs with an SEC team. That is, recruiting services may increase a high-school quarterback's recruiting rating after he commits to an SEC school. Thus, the recruiting ratings of all SEC quarterbacks could be slightly inflated (Connelly, 2016; Talty, 2015). Alternatively, it may be that quarterbacks at SEC schools competed against opponents with superior defenses compared to their counterparts at non-SEC schools, thus lowering their average performance levels.

Procedures

The empirical method for determining which recruiting service has been more accurate in projecting a high-school quarterback's performance at the collegiate level follows Steiger (1980) and Lee & Preacher (2013). First, the correlation coefficient between performance measure *j* and recruiting service *k* was calculated. Second, the correlation coefficient between performance measure *j* and recruiting service *h* was calculated. Third, the correlation coefficient between recruiting services *k* and *h* was calculated. Finally, Lee & Preacher's (2013) calculation for the test of the difference between two dependent correlations with one variable in common was used to determine if there was a statistically significant difference between recruiting service *k*'s and recruiting service *h*'s correlations with performance measure *j*.

Lastly, Ordinary Least Squares (OLS) regressions of the following form were estimated to evaluate each recruiting service's ability to explain variations in the quarterback-performance measures:

$$Performance\ Measure_i = \beta_0 + \beta_1 Recruit\ Rating_i + \boldsymbol{\gamma} Conference_i + \varepsilon_i \quad (2)$$

where $Performance\ Measure_i$ is one of the three quarterback-performance measures, $Recruit\ Rating_i$ is one of the three recruiting services' ratings, and $Conference_i$ identifies the athletic conference for quarterback *i*. β_0 is a constant, β_1 is a parameter to be estimated, γ is a vector of parameters to be estimated, and ε_i is a random-error term. Equation (2) was estimated for each combination of performance measures and recruiting ratings. Including the conference dummy variables controls for differences in athletic conferences that may contribute

to quarterback performance. Individual team fixed effects may be better, but fixed-effects estimation is not realistic in this case due to degrees of freedom. While every conference contains outliers, the majority of teams competing in the same athletic conference have similar resources and, thus, similar abilities to develop players. For example, all 13 public SEC institutions ranked in the top 32 schools of the USA Today Athletic Department Revenue rankings for the 2016-2017 academic year (USA Today, 2017). Thus, controlling for the conference in which a quarterback competes helps to control for that conference's style of play as well as the quality of coaches and other resources typically associated with that conference.

Results

Several correlation matrices are presented in Tables 3-9. Table 3 presents the correlation matrix between the performance measures and recruiting ratings for the full sample. Tables 4-9 show the correlation matrices between the performance measures and recruiting ratings by athletic conference. The correlation coefficients reported in Tables 3-9 are then used to perform Lee & Preacher's (2013) test. The test statistics for Lee & Preacher's test are reported in Table 10. Finally, Tables 11-13 present the OLS regression results for each specification of equation (2). The discussion of results begins with the correlation matrices before moving on to the results of Lee & Preacher's test. The OLS regression results are discussed at the end of the Results section.

Correlation Matrices

The weakest correlation among the recruiting services was between the Rivals and ESPN ratings. This is not surprising since the 247 Sports ratings take into account the other two recruiting services' ratings when producing their composite rating. Table 3 also reveals that the Rivals and 247 Sports ratings had a stronger relationship with the three measures of quarterback performance than the ESPN ratings. All three recruiting ratings were significantly correlated with passing yards per attempt and passing touchdowns per attempt at the 5% significance level. However, only the Rivals and 247 Sports ratings had a statistically significant correlation with quarterback rating. Furthermore, for the full sample, the Rivals ratings consistently had the strongest correlation with each performance measure, while the ESPN ratings consistently had the weakest correlation with each performance measure.

Because the quality of competition, the style of play, and resources may vary by conference, Tables 4-9 are also reported. These tables present the correlation matrices by athletic conference. Table 4 reports the correlation matrix between performance and recruiting rating for the ACC. Table 5 reports these results for the Big Ten. The correlation matrices between performance and recruiting rating for the Big XII and Big East are reported

Table 3

Correlation Matrix for the Full Sample

	Yards per Att	TD per Att	QB Rating	Rivals Rating	247 Rating	ESPN Rating
Yards per Att	1.000					
TD per Att	0.788***	1.000				
QB Rating	0.942***	0.862***	1.000			
Rivals Rating	0.246***	0.245***	0.212***	1.000		
247 Rating	0.238***	0.208**	0.182**	0.924***	1.000	
ESPN Rating	0.172**	0.165**	0.105	0.757***	0.815***	1.000

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

in Tables 6 and 7, respectively. Lastly, Tables 8 and 9 report the correlation matrices between performance and recruiting rating for the Pac-12 and SEC, respectively. The findings in these tables do differ somewhat from the findings reported for the full sample. For example, the 247 Sports ratings had a stronger correlation with performance than the other recruiting services' ratings for quarterbacks competing in the ACC. However, none of the recruiting ratings were significantly correlated with performance when only examining quarterbacks in the Big XII, Big East, or Pac-12. The Rivals ratings seem to be somewhat superior when examining quarterbacks in the Big Ten and SEC. All three recruiting services appear to be the most useful when projecting the performance of quarterbacks in the ACC since each rating was significantly correlated with all three performance measures in that conference.

Lee & Preacher's (2013) Test

With a few exceptions, the correlation matrices presented in Tables 3-9 suggest that the Rivals ratings have the strongest relationship with a quarterback's performance in college, and the 247 Sports ratings follow close behind. However, there seems to be a considerable gap between those services and the ESPN ratings. The test statistics reported in Table 10 for Lee & Preacher's test allow the researchers to compare the correlations found in Tables 3-9. When comparing the Rivals ratings to the 247 Sports or ESPN ratings for a given performance measure, the alternative hypothesis was that the Rivals ratings have a stronger correlation with the performance measure than the other services' ratings. Thus, a significant positive test-statistic indicates that the Rivals ratings have a stronger relationship with the performance measure, while a significant negative test-statistic indicates that the other service's ratings have a stronger relationship with the performance measure. When comparing the 247 Sports and ESPN ratings for a given performance measure, the alternative hypothesis was that the 247 Sports ratings have a stronger correlation with

Table 4

Correlation matrix for the ACC

	Yards per Att	TD per Att	QB Rating	Rivals Rating	247 Rating	ESPN Rating
Yards per Att	1.000					
TD per Att	0.804***	1.000				
QB Rating	0.944***	0.898***	1.000			
Rivals Rating	0.499***	0.410**	0.478**	1.000		
247 Rating	0.533***	0.419**	0.518***	0.944***	1.000	
ESPN Rating	0.473**	0.413**	0.464**	0.878***	0.887***	1.000

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

Table 5

Correlation Matrix for the Big Ten

	Yards per Att	TD per Att	QB Rating	Rivals Rating	247 Rating	ESPN Rating
Yards per Att	1.000					
TD per Att	0.717***	1.000				
QB Rating	0.917***	0.806***	1.000			
Rivals Rating	-0.005	0.349*	0.040	1.000		
247 Rating	-0.049	0.279	-0.058	0.927***	1.000	
ESPN Rating	-0.162	0.198	-0.134	0.839***	0.844***	1.000

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

Table 6

Correlation Matrix for the Big XII

	Yards per Att	TD per Att	QB Rating	Rivals Rating	247 Rating	ESPN Rating
Yards per Att	1.000					
TD per Att	0.768***	1.000				
QB Rating	0.943***	0.867***	1.000			
Rivals Rating	-0.091	-0.307	-0.095	1.000		
247 Rating	-0.073	-0.272	-0.122	0.903***	1.000	
ESPN Rating	-0.015	-0.168	-0.118	0.602***	0.726***	1.000

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

Table 7

Correlation Matrix for the Big East

	Yards per Att	TD per Att	QB Rating	Rivals Rating	247 Rating	ESPN Rating
Yards per Att	1.000					
TD per Att	0.920***	1.000				
QB Rating	0.978***	0.947***	1.000			
Rivals Rating	0.343	0.470	0.360	1.000		
247 Rating	0.363	0.471	0.367	0.982***	1.000	
ESPN Rating	-0.080	-0.010	-0.028	0.820**	0.811*	1.000

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

Table 8

Correlation Matrix for the Pac-12

	Yards per Att	TD per Att	QB Rating	Rivals Rating	247 Rating	ESPN Rating
Yards per Att	1.000					
TD per Att	0.800***	1.000				
QB Rating	0.948***	0.870***	1.000			
Rivals Rating	0.317	0.247	0.165	1.000		
247 Rating	0.321	0.197	0.168	0.940***	1.000	
ESPN Rating	0.198	0.121	0.088	0.745***	0.829***	1.000

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

Table 9

Correlation Matrix for the SEC

	Yards per Att	TD per Att	QB Rating	Rivals Rating	247 Rating	ESPN Rating
Yards per Att	1.000					
TD per Att	0.809***	1.000				
QB Rating	0.957***	0.868***	1.000			
Rivals Rating	0.414**	0.411**	0.338*	1.000		
247 Rating	0.382**	0.357*	0.289	0.943***	1.000	
ESPN Rating	0.246	0.219	0.132	0.796***	0.814***	1.000

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

Table 10

Test Statistics for Lee & Preacher's (2013) Test of the Difference between Two Dependent Correlations with one Variable in Common

	Yards per Att	TD per Att	QB Rating
Full Sample			
Rivals VS 247	0.237	1.166	0.968
Rivals VS ESPN	1.310*	1.426*	1.877**
247 VS ESPN	1.347*	0.883	1.526*
ACC			
Rivals VS 247	-0.556	-0.142	-0.666
Rivals VS ESPN	0.292	-0.032	0.155
247 VS ESPN	0.697	0.067	0.633
Big Ten			
Rivals VS 247	0.576	0.969	1.285*
Rivals VS ESPN	1.396*	1.398*	1.544*
247 VS ESPN	1.020	0.750	0.685
Big XII			
Rivals VS 247	-0.183	-0.372	-0.276
Rivals VS ESPN	-0.382	-0.725	-0.116
247 VS ESPN	-0.351	-0.648	-0.024
Big East			
Rivals VS 247	-0.195	-0.010	-0.069
Rivals VS ESPN	1.272	1.503*	1.172
247 VS ESPN	1.307*	1.470*	1.167
Pac-12			
Rivals VS 247	-0.055	0.663	-0.039
Rivals VS ESPN	0.778	0.807	0.487
247 VS ESPN	0.982	0.590	0.618
SEC			
Rivals VS 247	0.518	0.871	0.767
Rivals VS ESPN	1.416*	1.612*	1.683**
247 VS ESPN	1.188	1.194	1.328*

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

the performance measure than the ESPN ratings.

For the full sample and conference subsamples, there was no evidence in Table 10 that the 247 Sports ratings or the ESPN ratings significantly outperform the Rivals ratings in projecting a quarterback's collegiate performance. However, in the full sample and the Big Ten, Big

East, and SEC subsamples, there was much evidence that the Rivals ratings had a stronger correlation with quarterback performance than the ESPN ratings at the 10% significance level. Similarly, in the full sample and the Big East and SEC subsamples, there was also evidence that the 247 Sports ratings have a stronger relationship with quarterback performance than the ESPN ratings. Finally, in the Big Ten subsample, the correlation coefficient between the Rivals ratings and *QB Rating* was significantly higher than the correlation coefficient between the 247 Sports ratings and *QB Rating*. This, however, was the only statistical evidence in Table 10 of the Rivals ratings outperforming the 247 Sports ratings.

OLS Regressions

Lastly, Tables 11-13 present the results of the OLS regressions. All three tables show that quarterbacks in the Big XII conference produced more passing yards per attempt, other things equal. Similarly, quarterbacks in the Big XII and Pac-12 conferences produced more passing touchdowns per attempt and higher quarterback ratings. The comparison conference in the OLS regressions was the ACC. Thus, for example, Table 11 suggests that a quarterback playing in the Big XII conference would have a 9.792-point higher quarterback rating than a quarterback with the same Rivals rating who was playing in the ACC. These findings lend support to the notion that there are differences between athletic conferences that affect quarterback performance. After taking a quarterback's athletic conference into account, Tables 11 and 12 show that the Rivals and 247 Sports ratings had a significant correlation with all measures of quarterback performance, while Table 13 shows that the ESPN ratings only had a significant correlation with passing touchdowns per attempt.

Since each recruiting service calculates their rating differently, the regression coefficients for each service were difficult to compare. However, it was possible to compare the impact of a one-standard-deviation improvement in rating across the three services. Based on the descriptive statistics reported in Table 2 and the regression results, a one-standard-deviation improvement in a quarterback's Rivals rating was associated with him producing 0.211 more passing yards per attempt, 0.003 more passing touchdowns per attempt, and a 3.080-point higher quarterback rating. A one-standard-deviation improvement in a quarterback's 247 Sports rating was associated with him producing 0.205 more passing yards per attempt, 0.003 more passing touchdowns per attempt, and a 2.682-point higher quarterback rating. Similarly, a one-standard-deviation improvement in a quarterback's ESPN rating was associated with him producing 0.114 more passing yards per attempt, 0.002 more passing touchdowns per attempt, and a 1.146-point higher quarterback rating. Lastly, the R^2 values for the OLS regressions were always highest with the Rivals ratings included as an

Table 11

OLS Regression Results for the Full Sample with Rivals Rating as an Explanatory Variable

Variable	Yards per Att	TD per Att	QB Rating
Constant	1.223	-0.048	43.796
	(2.063)	(0.038)	(36.312)
Rivals Rating	1.089***	0.018***	15.874**
	(0.359)	(0.007)	(6.339)
Big Ten	-0.037	0.001	-1.007
	(0.214)	(0.003)	(3.438)
Big XII	0.493*	0.008*	9.792**
	(0.257)	(0.004)	(4.053)
Big East	-0.046	-0.004	-0.542
	(0.352)	(0.005)	(7.528)
Pac-12	0.254	0.007*	8.226**
	(0.208)	(0.004)	(3.641)
SEC	0.277	0.005	4.231
	(0.226)	(0.003)	(3.806)
R^2	0.115	0.124	0.129

Note: Robust standard-errors are in parentheses under the coefficients.
* $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

explanatory variable, and they were always lowest with the ESPN ratings as the recruit-rating explanatory variable. Thus, once again it appears that the Rivals ratings were slightly better than the 247 Sports ratings in projecting a quarterback's collegiate performance, and both the Rivals and 247 Sports ratings were much better than the ESPN ratings.

Discussion

The findings in this study have implications for all individuals associated with recruiting in college football. At the simplest level, it is useful for scouts and coaches to know that the Rivals ratings have been better at projecting a quarterback's college performance. While it is unlikely that this would ever be the primary factor driving a coach's decision to offer an athletic scholarship, especially to players with elite talent, it is not inconceivable that such things do influence the recruitment of a player at some level. Coaches and scouts with less experience might be more apt to rely on ratings. Similarly, coaches and scouts at schools with fewer resources might be forced to be more reliant on the ratings provided by recruiting services. Also, coaches at all institutions face limited resources. Thus, even coaches at universities with significant resources may use recruiting ratings when deciding where to focus

Table 12

OLS Regression Results for the Full Sample with 247 Rating as an Explanatory Variable

Variable	Yards per Att	TD per Att	QB Rating
Constant	4.046***	0.001	90.075***
	(1.176)	(0.020)	(20.547)
247 Rating	3.792***	0.058**	49.665**
	(1.303)	(0.022)	(22.897)
Big Ten	-0.027	0.001	-0.943
	(0.215)	(0.003)	(3.463)
Big XII	0.523**	0.008*	10.066**
	(0.255)	(0.004)	(4.033)
Big East	-0.101	-0.005	-1.296
	(0.350)	(0.005)	(7.545)
Pac-12	0.292	0.008**	8.764**
	(0.207)	(0.004)	(3.636)
SEC	0.270	0.005	4.196
	(0.228)	(0.003)	(3.867)
R^2	0.109	0.112	0.118

Note: Robust standard-errors are in parentheses under the coefficients.
* $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

their recruitment efforts of otherwise similar players. A practical implication of this study's findings is to assist a less-experienced coach who likes multiple quarterbacks in a recruiting class equally and feels that he is equally likely to sign each of these quarterbacks. Essentially, he is unsure about where to focus the majority of his recruitment efforts. Suppose Quarterback A has the highest 247 Sports rating, Quarterback B has the highest ESPN rating, and Quarterback C has the highest Rivals.com rating. Surely the coach should attempt to recruit all of these players, but our study suggests that, at least at the margin, he should put more resources into recruiting Quarterback C since this player has the highest Rivals.com rating.

There is much fan excitement surrounding college football recruiting, and fan expectations are a driving force behind ticket sales to college football games (Borland & MacDonald, 2003). There are often cases in which a player or team's recruiting ranking varies greatly across the various recruiting services. Considering the importance given to the quarterback position by many fans, the results of this study could help fans make more informed decisions regarding season-ticket purchases. Marginal economic impacts aside, the results of this study can certainly serve to energize or dampen the expectations of fans regarding the future success of their school's football program. That is, the results simply add to

Table 13

OLS Regression Results for the Full Sample with ESPN Rating as an Explanatory Variable

Variable	Yards per Att	TD per Att	QB Rating
Constant	5.473***	0.015	115.252***
	(1.387)	(0.022)	(23.743)
ESPN Rating	0.025	0.0005*	0.251
	(0.018)	(0.0003)	(0.304)
Big Ten	-0.066	0.0006	-1.530
	(0.220)	(0.003)	(3.539)
Big XII	0.463*	0.008*	9.124**
	(0.256)	(0.004)	(3.539)
Big East	-0.095	-0.005	-1.109
	(0.376)	(0.006)	(7.922)
Pac-12	0.276	0.007*	8.563**
	(0.218)	(0.004)	(3.776)
SEC	0.241	0.005	4.063
	(0.251)	(0.004)	(4.210)
R^2	0.069	0.087	0.090

Note: Robust standard-errors are in parentheses under the coefficients.
* $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$

a college football fan's enjoyment of the sport.

The recruiting services themselves may also be interested in the findings reported in this study. This would seem to be particularly true for ESPN. Of the three recruiting services examined in the study, ESPN has the least experience. 247 Sports began providing ratings for high-school football players in 1999 and Rivals began doing this in 2002. However, ESPN did not enter into this arena until 2006. This may help to explain the findings. In addition, Rivals' and 247 Sports' primary focus is providing recruiting services, while ESPN is a media conglomerate engaged in numerous other activities. Their multitude of resources could prove beneficial in the future if they decide to increase their efforts at evaluating high-school football players. Currently, however, they appear to be lagging behind industry leaders in this particular area.

Lastly, none of the recruiting services' ratings were correlated with any measure of a quarterback's rushing performance in college. With the advent of the spread offense in college football, quarterbacks who excel at both passing and rushing have become more valuable (Palazzolo, 2016). Thus, all three recruiting services examined in this study are currently poor at projecting an increasingly important aspect of a quarterback's skill set in

college.

Summary and Conclusion

Summary

The authors investigated the ability of the Rivals, 247 Sports, and ESPN recruiting ratings to project collegiate performance for high-school quarterbacks. Specifically, the study sought to determine which recruiting service's ratings have the strongest correlation with various career measures of quarterback performance over the period 2006-2012. Three measures of career college-performance were collected for each quarterback – passing yards per attempt, passing touchdowns per attempt, and quarterback rating. Lee & Preacher's (2013) calculation for the test of the difference between two dependent correlations with one variable in common was used to determine if there was a statistically significant difference between the recruiting services' correlations with the performance measures. In addition, multiple OLS regressions were estimated that regressed each performance measure on a quarterback's rating and conference affiliation. The results of Lee & Preacher's procedure and the OLS regressions suggest that the Rivals recruiting ratings for quarterbacks has been the most accurate in projecting collegiate performance. The quarterback ratings from 247 Sports follow closely behind Rivals in their ability to project a high-school quarterback's performance in college. However, there appears to be a sizeable gap between the performance of the other two recruiting services and the ESPN ratings for quarterbacks.

Conclusion

The primary limitation of this study is that only quarterbacks are analyzed in this sample. The findings could be different if other positions were examined. Thus, these findings do not apply to the evaluation of running backs, wide receivers, offensive or defensive linemen, linebackers, or defensive backs. Future research should consider comparing the recruiting service ratings for other positions at which performance can be evaluated. Future research might also consider the importance of the various recruiting service ratings in more important aspects. For example, to what extent are recruiting rankings correlated with season ticket sales and does it vary by recruiting service? This would be important information for athletic directors and others involved in the administration of college football programs. Essentially, for any aspect in which recruiting ranking is determined to be an important factor affecting outcomes for college football programs, it is useful for programs to know which recruiting service is best at projecting the desired outcome. As for this study, the results are useful for college football coaches and scouts in their evaluations of high-school quarterbacks. They can also be important in informing fan expectations. Lastly, they are useful as a form of self-evaluation to the recruit-

Notes

1. While the academic literature is conclusive regarding the usefulness of recruiting ratings in projecting athlete performance, there of course are exceptions. That is, players with high ratings from multiple recruiting services may fail to meet expectations. These players are commonly referred to as busts (Siemon, 2017).

2. All-American honors are bestowed upon the players voters believe are the best individual players at their respective positions.

3. FBS universities include schools belonging to the American Conference, ACC, Big Ten, Big XII, Big East, Conference USA, Mid-American Conference, Mountain West Conference, Pac-12, SEC, and Sun Belt in addition to the University of Massachusetts, Army, Brigham Young University, Liberty University, Notre Dame, and New Mexico State.

4. FCS universities include schools belong to the Big Sky, Big South, Colonial Athletic Association, Great West, Ivy, Mid-Eastern Athletic, Missouri Valley, Northeast, Ohio Valley, Patriot League, Pioneer, Southern, Southland, and Southwestern Athletic conference in addition to Hampton University, North Alabama, and North Dakota.

5. Power 5 universities included those schools belonging to the ACC, Big Ten, Big XII, Pac-12, and SEC in addition to Notre Dame.

6. Some players transfer to other schools during their collegiate careers. These players were not excluded from the full sample as long as they played their entire careers at one of these six major athletic conferences or at Notre Dame. If a quarterback played any of their collegiate career at a school outside of one of these six conferences, then they were excluded from the sample.

7. Other measures of rushing performance were also considered, but none of the three recruiting service ratings had a significant correlation with any measure of a quarterback's rushing performance in college.

8. The conference subsamples only included quarterbacks who played their entire careers in one athletic conference. Quarterbacks who transferred between conferences were excluded from these subsamples. Thus, the sum of the observations for the conference subsamples does not equal the total number of observations.

ing services themselves.

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