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Bowl game participation and college football teams' subsequent on-field and recruiting success: a regression discontinuity approach

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Abstract

College football teams often lose money participating in postseason bowl games, yet rarely decline bowl invitations. One explanation is that colleges recoup their losses through increased state appropriations or alumni donations. In addition, coaches often claim that bowl games yield other benefits such as stronger recruiting or more on-field preparation for the subsequent season. This paper uses a regression discontinuity model to examine how college football teams' bowl games affects their subsequent on-field performance and recruiting success. The results find no evidence that playing in a bowl game benefits college football teams' recruiting or on-field success in the following season.

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1. Introduction

It is not surprising that college football teams coming off strong seasons choose to play in marquee bowl games like the Rose Bowl or Sugar Bowl because these games have large payouts and garner much publicity. However, it may be more surprising that many college football teams coming off 6-8 win seasons choose to play in less prominent bowl games such as the New Mexico Bowl or the Famous Idaho Potato Bowl even though these bowls have small payoffs and scant publicity. While it has been reported that many teams lose money playing in low-level bowls, often as a result of having to pay for tickets that they could not sell to their students, alumni, or other fans (Harris 2011; Rishe 2014), there is also evidence that bowl participation yields increased state appropriations to public universities (Humphreys 2006) and alumni donations (Baade and Sundberg 1996; Humphreys and Mondello 2007). Yet, it is essentially unheard of for teams to choose not to participate in a postseason bowl game.[1]

Football coaches also claim that bowls help with recruiting for future classes (McKinney 2016; Wagner 2019). There is an extensive literature on college football recruiting. Mirabile and Witte (2017) consider the role that a large array of factors play in college football recruits' school choices and conclude that some of the most important determinants are teams' on-field success, coaches' success over their career, facilities, and stadium capacity. However, bowl game participation is not included in their analysis. Evans and Pitts (2018) find that football recruiting is correlated with on-court college basketball success. Bradbury and Pitts (2018) analyzed the NCAA's allowing schools to fund the "full cost of attendance" in athletic scholarships and found that schools with larger costs of attendance improved their recruiting ranking after such payments were allowed. Bergman and Logan (2016) confirm that there is a positive correlation between schools' recruiting classes and their on-field success, but that failing to control for heterogeneity across schools biases the relationship between recruiting class quality and wins upward.

The previous research most relevant to this paper are Dumond et al. (2008) and Pitts and Evans (2016). Both papers find that schools banned from bowl participation had weaker rated recruiting classes, though it is not clear if the negative effect is caused by not being able to play in a bowl per se or by a more general negative stigma associated with sanctions for NCAA violations. Both papers also consider the effect of participating in a high profile bowl game (specifically, the Orange, Sugar, Fiesta, or Rose Bowls) on recruiting, but have contradictory findings. Pitts and Evans's (2016) results indicate that teams playing in a premier bowl attracted stronger recruiting classes; however, Dumond et al. (2008) found a negative relationship between recruiting class quality and participating in a high-profile bowl game. While both Dumond et al. (2008) and Pitts and Evans (2016) consider the benefit of playing in marquee bowl games and of receiving bowl bans, neither examines the more general effect of playing in any bowl game.

Football coaches also contend that the extra practice time and game experience arising from bowl game participation make their teams stronger in the subsequent season (Schlabach 2010). To date, however, there is no empirical analysis addressing coaches' claims that bowl participation improves team performance in the following season. If coaches' claims are indeed true, then losing money to participate in a less prominent bowl game could be viewed as an investment in a better future team.

[1] The only instance in the 2006-2014 period examined in this paper is Notre Dame in 2009 which declined to play in a lower-tier bowl following a 6-6 season that led to the firing of head coach Charlie Weis.

In hopes of better understanding college football teams' decisions to participate in potentially money-losing bowl games, this paper evaluates claims that bowl participation leads to better on-field performance or recruiting.

2. Data

This paper uses three measures of team performance to assess the claim that bowl participation increases on-field success in the following season: wins by team i in year t, the per game point differential by team i in year t, and the Simple Rating System (SRS) value for team i in year t. Wins are a team's ultimate goal but they are a crude indicator of team strength because they do not differentiate between close wins and blowout wins. In any given season, some teams will have several close wins (losses); therefore, these teams' won-loss records will overstate (understate) their quality. Since wins can be a misleading indicator of team performance, an alternate measure of teams' strength is their per game point differential. A team with several close wins (losses) is unlikely to have a large positive (negative) per game point differential so per game point differential should be a better measure of these teams' overall quality. However, per game point differential does not control for the strength of the opposing teams; two teams with the same per game point differential may not be equally good if one plays a challenging schedule (perhaps in one of the major conferences such as the SEC) while the other plays a weaker schedule. The third measure of team performance, SRS, adjusts the per game point differential to account for teams' strength of schedule. Data for all three measures are obtained from sports-reference.com's college football website (sports-reference.com/cfb). Descriptive statistics are presented in Table 1.[2] The dataset includes all Football Bowl Subdivision (FBS) teams over the period 2006-2014; there are 1,087 observations.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.
Wins	6.67	3.09	0	14
Point Differential	1.33	11.33	-31.1	39.5
SRS	0.69	9.99	-23.53	25.37
247 Rating	167.01	60.74	16.3	324.62

As noted earlier, the paper also examines the relationship between bowl participation and recruiting success. The quality of each program's recruiting class for a given year is obtained from 247sports.com which aggregates ratings of individual recruits into an overall yearly rating for each college football program. Because of some changes in NCAA recruiting regulations, the period used for the analysis is 2006 to 2014. More recent data are available, but beginning in 2015 the NCAA started allowing schools to provide the so-called full cost of attendance as part of their scholarship offers. As documented by Bradbury and Pitts (2018), this rule change created substantial variation in the cash assistance that programs provided recruits and, moreover, that this supplemental aid was correlated with programs' recruiting success in 2015. Having this paper's sample period end in 2014 avoids any potential confounding arising from the NCAA's full cost of

[2] Since each game is zero sum (i.e., if one team wins by three points, its opponent loses by three points), it might be expected that the mean values for point differential and SRS would be zero. However, FBS teams play a few games against non-FBS teams (e.g., Football Championship Subdivision members). Because teams outside the sample are in lower tiers of competition, it is not surprising that Point Differential and SRS have means slightly above zero.

attendance rule change. Ending the sample in 2014 also avoids two other potentially confounding factors. One is bowl eligibility rules were changed in 2015 and a few teams with only five wins played in bowl games in 2015 and 2016. The other is an early signing period introduced in 2017 which fell in December before many bowl games had been played; however, this change might not have had a large effect on recruiting because bowl game invitations had been issued prior to the early signing window.

3. Empirical Analysis

This paper uses a regression discontinuity (RD) approach to assess the recruiting and subsequent season on-field performance benefits that college football programs obtain from playing in postseason bowl games. The basic RD model is

$$Y_{it} = \beta_0 + \beta_1 BOWL_{it-1} + \beta_2 WINS_{it-1} + \varepsilon_{it} \quad (1)$$

In this specification, Y is one of the previously discussed measures of team i's on-field success or recruiting performance in year t: wins, per game point differential, SRS, or 247 recruiting class rating.

WINS is the number of wins team i had in year t-1. In the jargon of RD models, WINS is the assignment variable because the number of wins determines whether a team plays in a bowl game. In the 2006-2014 period analyzed in this paper, teams had to have at least six wins to be bowl eligible. Hence, the dummy variable BOWL takes a value of one if team i had six or more wins in year t-1. The estimated coefficient on BOWL is interpreted as the estimated jump in program performance (Y) after controlling for any correlation with previous year wins.

One complication is there is no guarantee that a team with six or more wins receives a bowl invitation; six wins is only a minimum threshold. Indeed, in every year in the sample, there was at least one bowl-eligible team that did not participate in a bowl game. As a result, the empirical approach is known as a *fuzzy* RD because the assignment variable WINS does not perfectly predict bowl game participation. I return to this issue in the next section.

Estimation results are presented in the top panel of Table 2. The first three columns present results for the on-field performance measures and the fourth column contains results for the 247 rating. In all cases, the bowl effect is not statistically different from zero. Previous year wins do matter; an additional win in the previous year is associated with about 0.6 wins in the subsequent year, a point differential increase of about 2.3 points per game, and a roughly 9 point increase in the 247 rating.

It is common for RD results to be shown graphically to see if jumps in the outcome variable(s) are evident at the discontinuity. Figures corresponding to Panel A of Table 2 are shown in the Appendix. Each diagram contains fitted lines over the ranges of 0-5 wins and 6 or more wins. If bowls benefit team performance in subsequent seasons, then there should be a jump at 6 wins in Figures 1-3 but none is evident. Likewise, there is no indication of a jump in 247 ratings at 6 wins in Figure 4. Inspection of Figures 1-4 suggests there might be small changes in the slope of the fitted line about the bowl eligibility threshold of six wins, but modifying the basic RD model with an interaction term that would allow for differing slopes indicates no statistically significant change in the fitted lines' slope.

To allow for the possibility that bowls affect the gradient between wins and the on-field performance and recruiting outcome variables, Table A1 reports results the obtained from allowing

the slope of the fitted lines over 0-5 wins and over 6 or more wins to have different slopes. The top part of the table repeats Panel A from Table 2 for reader convenience; the bottom part of Table A1 has the modified specification. The key variable, BOWL*WINS, is not statistically different from zero for any of the four specifications.

Table 2: Fuzzy RD Estimation Results

Panel A: No School Fixed Effects

	Dependent Variable			
	Wins	Point Diff.	SRS	247 Rating
BOWL(t-1)	-0.34	-1.43	-1.31	-2.77
	(0.28)	(1.02)	(0.90)	(6.14)
WINS(t-1)	0.61**	2.36**	2.07**	8.96**
	(0.05)	(0.16)	(0.14)	(0.97)
Constant	6.53**	0.85	0.36	163.69**
	(0.17)	(0.61)	(0.54)	(3.69)
R2	0.32	0.35	0.34	0.19

Panel B: With School Fixed Effects

	Dependent Variable			
	Wins	Point Diff.	SRS	247 Rating
BOWL	-0.13	-0.41	-0.32	3.67
	(0.29)	(0.99)	(0.72)	(3.03)
WINS(t-1)	0.24**	1.00**	0.66**	0.97
	(0.05)	(0.17)	(0.13)	(0.53)
Constant	7.01**	3.51	-0.23	72.74**
	(0.81)	(2.83)	(2.05)	(8.60)
R2	0.47	0.52	0.68	0.85

Parentheses contain standard errors; ** denotes p<0.01 and * denotes p<.0.05.

An obvious concern about the basic RD model is that it has no controls for factors that might vary systematically across institutions. The football programs at, say, Alabama and Georgia are fundamentally different from those at, say, Eastern Michigan and Louisiana-Monroe. To control for systematic differences across schools, Panel B of Table 2 reports RD results with school fixed effects added to the models. The effect of bowl eligibility remains small and statistically insignificant in all four specifications. The marginal effect of a win is considerably smaller in all four models with school fixed effects included, but remain statistically significant in all models except the 247 rating model.

4. Robustness Checks

Return now to the issue of some teams having six or more wins but not being invited to participate in bowl games. (Recall that only once in the 2006-2014 did a team voluntarily decline to participate in a bowl game.) There are 58 such instances, or approximately six per year, in the sample period used for this paper. Although the exact number varies slightly from year-to-year, there are about 120 FBS teams each year from 2006-2014 so roughly 5% of observations are misclassified based on having sufficient wins for bowl participation. Most occurrences are teams

such as Louisiana-Lafayette, San Jose State, and Toledo from weaker conferences. However, there are also a few instances of prominent programs having six or more wins but not being invited to a bowl because of NCAA sanctions; examples include Penn State (2012 and 2013), USC (2011), and UNC (2012).

Since most of the misclassified observations are relatively weak teams that are at or just above the 6-win eligibility threshold, have smaller per game point differentials (both raw and adjusted for strength of opponents), and lower 247 ratings, the misclassifications might be expected to bias the estimated bowl effect downward in the fuzzy RD framework. To address this concern, this section presents several robustness checks to determine if the previous section's results are attributable to the misclassified observations.

4.1 Repeating RD with Misclassified Observations Dropped

First, the RD estimation is repeated with the misclassified observations deleted. Results of this exercise, both with and without school fixed effects, are reported in Table 3. Consistent with the expectation that misclassified bowl participation biases the bowl effect downward, the estimated coefficients on BOWL in Table 3 are generally larger than their counterparts in Table 2 (the one exception is the 247 rating model with school fixed effects included). However, all of the estimated coefficients on BOWL remain statistically insignificant so the misclassified schools in the fuzzy RD do not affect the conclusion that bowl participation does not affect teams' on-field performance or recruiting classes in the subsequent year.

Table 3: RD with Misclassified Observations Excluded

Panel A: Without School Fixed Effects

	Dependent Variable			
	Wins	Point Diff.	SRS	247 Rating
BOWL	-0.09	-0.55	0.13	5.74
	(0.30)	(1.09)	(0.96)	(6.54)
WINS(t-1)	0.57**	2.23**	1.87**	7.75**
	(0.05)	(0.17)	(0.15)	(1.02)
Constant	6.44**	0.52	-0.16	160.54**
	(0.18)	(0.63)	(0.55)	(3.77)
R2	0.32	0.36	0.36	0.20

Panel B: With School Fixed Effects

	Dependent Variable			
	Wins	Point Diff.	SRS	247 Rating
BOWL	0.10	0.27	0.20	2.37
	(0.31)	(1.06)	(0.76)	(3.26)
WINS(t-1)	0.21**	0.89**	0.58**	1.12*
	(0.05)	(0.18)	(0.13)	(1.02)
Constant	6.86**	3.09	-0.55	73.56**
	(0.82)	(2.82)	(2.04)	(3.77)
R2	0.48	0.54	0.69	0.85

Parentheses contain standard errors; ** denotes p<0.01 and * denotes p<.0.05.

4.2 Estimation Based on Actual Bowl Participation

The second robustness check focuses on actual bowl participation rather than bowl eligibility to estimate the following model:

$$Y_{it} = \beta_0 + \beta_1 PLAYEDBOWL_{it-1} + \beta_2 Y_{it-1} + \varepsilon_{it} \quad (2)$$

As before, Y is one of the measures of performance: wins, point differential, SRS, or recruiting class rating. The dummy variable PLAYEDBOWL takes a value of one for all teams that played in a bowl game. The lagged value of the relevant performance measure is included to control for team quality. The model is estimated both with and without school fixed effects similar to the results reported in Tables 2 and 3.

The results are reported in Table 4. In none of the eight sets of results is bowl participation positively related to team performance in the subsequent season. These results are also consistent with the RD results; hence, the results reported in Table 2 are not an artifact of the fuzzy RD estimation method. In all specifications except the recruiting ratings model with institution fixed effects, lagged performance is positively related to current performance. This isn't surprising since teams that are good one year are also typically pretty good the following year. For example, teams do not typically lose all of their starting players and top reserves from one season to the next.

Table 4: Analysis Based on Actual Bowl Game Participation

Panel A: Without School Fixed Effects

	Dependent Variable (Y)			
	Wins	Point Diff.	SRS	247 Rating
PLAYEDBOWL	0.18	1.25	-1.26*	3.88
	(0.27)	(0.78)	(0.60)	(2.44)
Y(t-1)	0.54**	0.59**	0.78**	0.82**
	(0.04)	(0.04)	(0.03)	(0.02)
Constant	3.02**	-0.05	0.97*	33.21**
	(0.20)	(0.51)	(0.39)	(3.36)
R2	0.32	0.40	0.56	0.82

Panel B: With School Fixed Effects

	Dependent Variable (Y)			
	Wins	Point Diff.	SRS	247 Rating
PLAYEDBOWL	0.21	0.76	0.58	0.16
	(0.28)	(0.79)	(0.60)	(2.18)
Y(t-1)	0.20**	0.28**	0.24**	-0.09
	(0.05)	(0.04)	(0.04)	(0.05)
Constant	5.60**	2.35	-0.38	114.62**
	(0.95)	(2.94)	(2.30)	(7.16)
R2	0.47	0.54	0.69	0.94

Parentheses contain standard errors; ** denotes p<0.01 and * denotes p<.0.05.

4.3 Analyzing Only Six-Win Teams

As a third robustness check, this section reestimates model (2) with the sample confined to six win teams. Because the sample is considerably smaller (86 observations) and many schools have only one six-win season during the 10-year sample period, fixed effects are not included in the estimation.

Results are reported in Table 5. Note that the wins model cannot include lagged wins because the sample here is confined only to teams with six wins in the previous season. As with previous results, there is no statistically significant positive relationship between bowl games and any of the measures of team performance. The lagged performance measures are positively related to current performance as in the full sample analyzed in section 4.2.

Table 5: Analysis Based on Actual Bowl Game Participation (6-win teams)

	Dependent Variable (Y)			
	Wins	Point Diff.	SRS	247 Rating
PLAYEDBOWL	1.10	2.67	2.13	-1.83
	(0.58)	(2.03)	(1.54)	(6.70)
Y(t-1)		0.64**	0.99**	0.80**
		(0.21)	(0.13)	(0.06)
Constant	5.34**	-3.14*	-1.70	45.22**
	(0.40)	(1.46)	(1.11)	(7.89)
R2	0.04	0.11	0.45	0.90

Parentheses contain standard errors; ** denotes p<0.01 and * denotes p<.0.05.

5. Conclusion

The finding that bowl participation does not improve on-field performance or recruiting makes teams' participation somewhat puzzling since many teams lose money on bowl participation. One might expect more teams to decline to participate, especially in bowls with lower payouts, yet it is nearly unheard of for bowl eligible teams to decline bowl game invitations.

One possible explanation is that many coaches have salary bonuses tied to bowl participation. An institution declining a bowl invitation might risk angering its coach, but this just raises the question of why schools agree to bowl bonuses in contracts, don't base bonuses on bowl eligibility rather than actual participation, or decline a bowl invitation while still honoring coaches' bonuses.

Another possible explanation is that schools pay their bowl revenue, net of an allowance for travel expenses, into their conferences. Conferences then share the pooled funds among all conference members. If a school declines a bowl invitation in expectation of losing money, it might anger the other members of its conference. Bowl participation in this context can be viewed as a conference obligation and assessed as part of an overall calculation of the costs and benefits of belonging to a specific conference.

Lastly, there is the possibility that teams' recoup losses from higher state appropriations (for public colleges only) or alumni donations. Existing evidence on these relationships is now dated so these are areas ripe for additional research.

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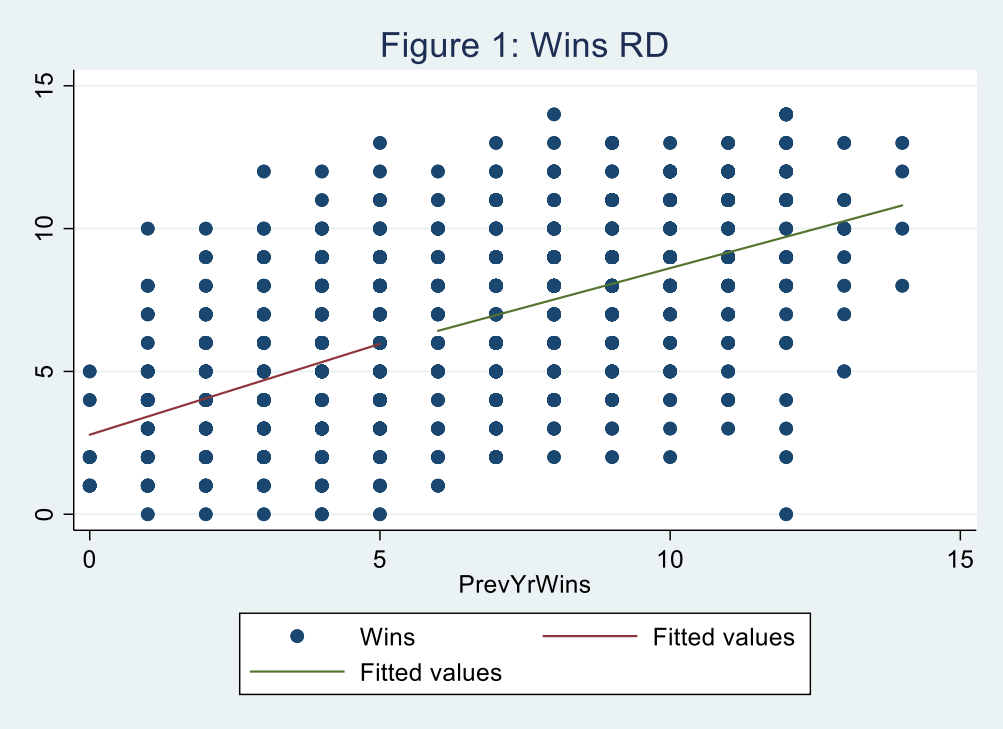
Appendix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15
PrevYrWins
Wins
Fitted values
Fitted values
Fitted values

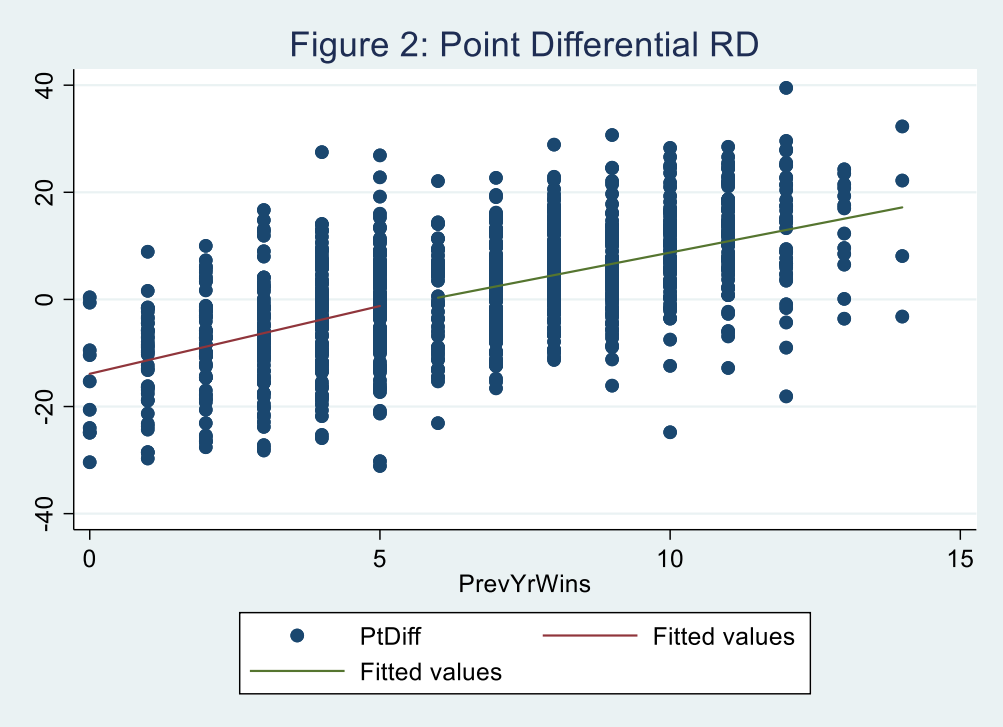
Figure 2: Point Differential RD
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0
5
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15
PrevYrWins
PtDiff
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Fitted values

Figure 3: RD for SRS

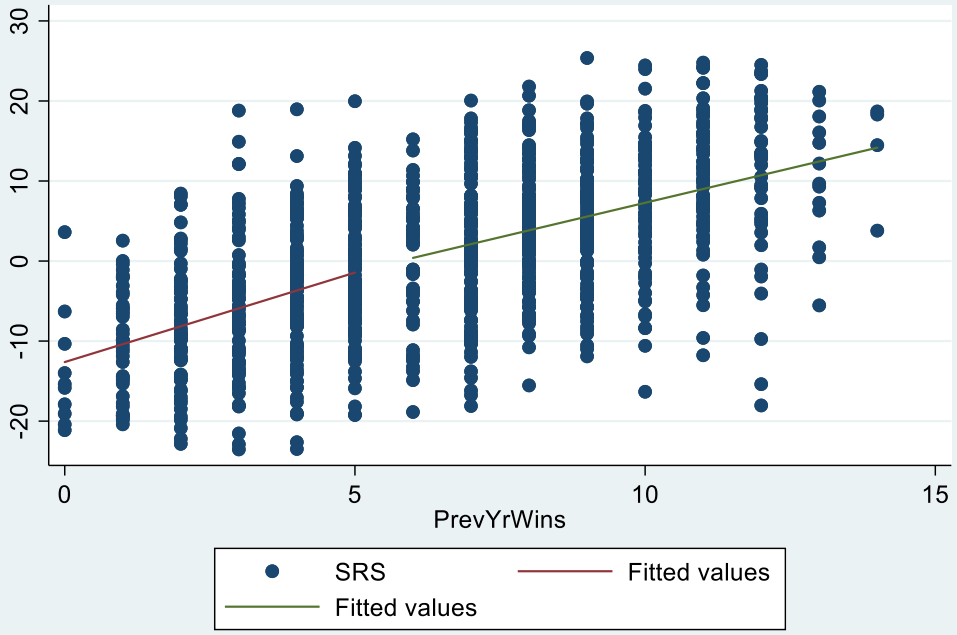

Figure 4: 247 Rating RD

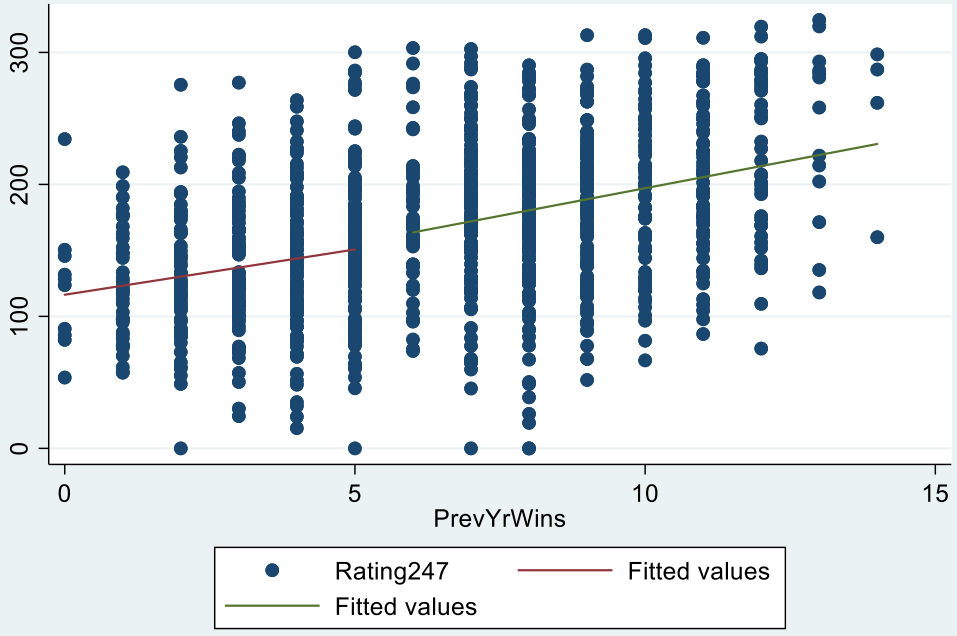

Table A1: Fuzzy RD Estimation Results Allowing Different Slopes

Panel A: Not Allowing Slopes to Vary (Repeated from Table 2)

	Dependent Variable			
	Wins	Point Diff.	SRS	247 Rating
BOWL(t-1)	-0.34	-1.43	-1.31	-2.77
	(0.28)	(1.02)	(0.90)	(6.14)
WINS(t-1)	0.61**	2.36**	2.07**	8.96**
	(0.05)	(0.16)	(0.14)	(0.97)
Constant	6.53**	0.85	0.36	163.69**
	(0.17)	(0.61)	(0.54)	(3.69)
R2	0.32	0.35	0.34	0.19

Panel B: Allowing Slope to Vary with BOWL

	Dependent Variable			
	Wins	Point Diff.	SRS	247 Rating
BOWL(t-1)	-0.38	-1.72	-1.59	0.64
	(0.31)	(1.11)	(0.99)	(6.73)
WINS(t-1)	0.64**	2.53**	2.24**	6.93**
	(0.09)	(0.32)	(0.28)	(1.91)
BOWL*WINS	-0.04	-0.23	-0.23	2.73
	(0.10)	(0.37)	(0.33)	(2.22)
Constant	6.60**	1.30	0.79	158.42**
	(0.26)	(0.93)	(0.83)	(5.65)
R2	0.32	0.35	0.34	0.19

Parentheses contain standard errors; ** denotes p<0.01 and * denotes p<.0.05.