The Bigger the Better?
An Analysis on the Effect of Conference Size on NCAA Football Team and Conference Profit

Trevor Abbott
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University of California, Berkeley
Advisor: Professor Aaron Edlin

Abstract
        Previous studies have shown that an institution's affiliation with an athletic conference can have significant effects on the school's reputation, prestige, and financials. Schools can benefit from associating with successful conferences through increased exposure to prospective students, alumni, and fans. Conference members seem to be compromising the academic and prestige reputations in suit of higher profits in the business of collegiate football. As football becomes more and more of a requirement to fund athletic departments, conference sizes have shown a trend towards twelve teams and fourteen or more in the future. This paper analyzes profits of Division 1 Football Bowl Subdivision schools since 2003 in order to determine that the profit-maximizing size of a college football conference is between eleven and twelve teams, justifying recent trends. This study furthers the theories of other authors who question the motives of conference realignment.

I. Introduction

      Economists and sports fans alike have witnessed the goliath expansion of college sports, and in particular college football. In 2011, the total revenue for 120 NCAA Football Bowl Subdivision (FBS) teams was almost three billion dollars for football alone. It has been said that the National Collegiate Athletic Association (NCAA) behaves as a cartel to control market power, especially in the sport of college football (Makofske, 2012). It controls entry and exit and monitors its members' actions. Teams are divided into eleven conferences of similar geographic, enrollment, and institution characteristics across the country. Conferences have been around since the late 1800's and created a regulated environment for competition where schools could affiliate with comparable institutions and establish rivalries. However, there are six power conferences: The Pac 10/12, the Southeastern Conference (SEC), the Big Ten, the Big Twelve, the Big East, and the Atlantic Coast Conference (ACC). These conferences, named BCS conferences, earn automatic bids to the most prominent bowl games and secure the largest TV contracts. Although these schools earn more revenue from these lucrative games and contracts, their costs continue to rise with increasing operating costs, steep game guarantees, and soaring coaching salaries, which usually result in high severance payments at some point. However, schools from the other five conferences have begun to climb the ranks of college football, securing berths in the BCS bowls, and ultimately, changing conferences to gain more athletic significance.

      NCAA football teams are under strong pressure to increase their revenues and profits. The gender equality policies of Title IX and the lack of revenue/negative profits in

many college sports have put a burden on football programs to fund their institution's

other athletic programs. In 2006, football accounted for 43% of athletic department

revenues while only 24% of expenses (Groza, 2010). In 2011, only about thirty percent of

schools made more than ten million dollars in football profit while over thirty percent

made either zero or negative profits.[1] As state funding for higher education decreases, this

increasing financial responsibility has caused institutions to take gambles on their football

programs to raise profits at any cost.

NCAA football conference realignment offers the benefits of higher potential

television revenues, more bowl games, and larger championship payouts (Weiner, 2011).

Prior studies have noted that conference changes keep institution types and geographic

location in consideration to keep homogeneity amongst the conferences, but recent

conference expansions seem to be financially driven. The Wall Street Journal quotes that

University presidents have "learned that nothing raises a school's profile, attracts out-of-

state students and rallies alumni like a winning football team" (Bachman, 2011). Affiliating

with the more competitive and prestigious conferences is a clear way to show that football

is a school's priority. In the near future, the top conferences will continue to grow while

the lesser ones shrink or collapse. After consecutive Top-10 finishes, TCU left the MWC for

the Big Twelve. Small conferences like the WAC have recently lost all its successful football

programs to the MWC to make the MWC more competitive. Profitable schools such as

Notre Dame do not see a need to affiliate with any conference and split revenues, and more

schools are beginning to view independency as an alternative. This study will analyze the

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[1] Department of Education, In 2003 Adjusted Dollars

effect of changes in size of the NCAA football conferences on the profitability of an individual school's football program and the profits of the conference itself.

II. Literature Review and Background Information

In *Institutional Ambitions and Athletic Conference Affiliation* (Sweitzer, 2009), the author studied how an institution's changes in athletic conferences and divisions linked with institutional aspirations beyond athletics. Division I and BCS conference schools commit a much higher amount of resources to their athletic departments, especially football, compared to smaller conferences or lower divisions. Schools would move up to higher divisions or to bigger conferences to benefit from associating with big money spectator sports in the big money arenas. Division II and III football teams are not as much of a priority to their institutions. They do not provide as much athletic aid or spend as much on massive facilities as Division 1; furthermore, they do not have comparable fan bases or media contracts to provide nearly as much revenue. He notes the financial risks involved with increasing the investment in athletics, but mentions the benefits from increased exposure. For example, joining a deeper conference or division can put a team on the more visited sections of ESPN's website, increasing visibility and public knowledge of the team.

In the bigger perspective, being part of the Ivy League gives schools the most prestigious academic reputations where all its members compete in admissions selectivity, research activity, and faculty salaries. But when we also consider FBS football, the Big Ten combines the most prominent national athletics programs with leading research

institutions. Being part of a conference like the Big Ten imparts high prestige to its

member schools in both the athletic and academic realms. Institutions in the less academic

prestigious conferences such as the SEC, Big East, or Big Twelve are reputed leaders in

athletics. Thus, by switching conferences, schools can theoretically affect the level of

prestige associated with their institution. Institution and conference prestige can have

externalities on the school's athletic performance both on and off the field attracting top

athletes, faculty, students, and eventually money.

However, the college football landscape has been influenced by the power of

exposure and success. The conference scene began to evolve in 2003 when the ACC agreed

to add well-known football powers and moneymakers Virginia Tech, Miami, and Boston

College from the Big East. The bare Big East subsequently poached Conference USA's best

football teams adding South Florida, Louisville, and Cincinnati after a depleted 2004

season. Conference USA rearmed its conference by taking some of the best teams from the

WAC and MAC conferences. This phase of realignment took effect from 2003-2005 because

most changes take at least an academic year. During this initial phase, most switches had

geographic relations as a major factor in determining which conference to join. SMU and

Rice left the "Western" Athletic Conference to join the more Midwest oriented Conference

USA while Utah State, Idaho, and New Mexico State joined the WAC which had similar state

institutions. After going 2-9 and 1-11 in 2003 and 2004, the Big East forced Temple out in

order to incorporate the more prominent 9-3 Connecticut team as its eighth member.

After about five years of stability, the college football world has been turned upside down again with more drastic conference changes. The success of smaller schools such as TCU and Boise State has stirred the non-BCS conferences around. Boise State left the WAC for the MWC in order to compete against tougher competition such as TCU, have less conference games to play more non-conference games against BCS conference teams, and therefore have a better chance to climb the rankings into a top-tier revenue generating bowl game. Big football schools such as Nebraska broke rank by leaving the Big Twelve for the Big Ten. The uncertainty of some potential members joining or leaving the Big Twelve caused Colorado to leave for the Pac-10 and create the Pac-12. The Pac-12 also supposedly reached out to football powerhouse schools outside of its geographic region such as Texas and Oklahoma in order to make a Pac-16 mega-conference. The Big Ten now ironically had twelve teams while the Big Twelve had only ten. Conferences like the Big Ten not only offered a reputation of academic prestige with all Association of American Universities members, but also had almost twenty million dollars to disperse amongst its members in a new media network deal (Schlabach, 2010). Table 1 shows all changes that happened from 2004-2011.

Table 1: Changes Since 2004

Year	Team	Prior Conference	New Conference	New Size
2004	Miami (FL)	Big East	ACC	11
2004	Virginia Tech	Big East	ACC	11
2004	Connecticut	Independent	Big East	7
2004	Troy	Independent	Sun Belt	9
2004	Florida Atlantic	FCS	Independent	1
2005	Boston College	Big East	ACC	12
2005	South Florida	Conference USA	Big East	8
2005	Louisville	Conference USA	Big East	8
2005	Cincinnati	Conference USA	Big East	8
2005	Temple	Big East	Independent	1
2005	FIU	FCS	Sun Belt	8
2005	Florida Atlantic	Independent	Sun Belt	8
2005	New Mexico State	Sun Belt	WAC	10
2005	Idaho	Sun Belt	WAC	10
2005	Utah State	Sun Belt	WAC	10
2005	Tulsa	WAC	Conference USA	12
2005	SMU	WAC	Conference USA	12
2005	Rice	WAC	Conference USA	12
2005	UTEP	WAC	Conference USA	12
2005	UCF	MAC	Conference USA	12
2005	Marshall	MAC	Conference USA	12
2005	TCU	Conference USA	MWC	9
2007	Temple	Independent	MAC	13
2008	WKU	FCS	Independent	1
2009	WKU	Independent	Sun Belt	9
2011	Colorado	Big 12	Pac 10	12
2011	Utah	MWC	Pac 10	12
2011	Nebraska	Big 12	Big 10	12
2011	BYU	MWC	Independent	1
2011	Boise State	WAC	MWC	8

The success of the SEC with its twelve-team system started a trend towards twelve

or more teams around the country. A twelve-team conference now splits up its members

into separate divisions of six, and the NCAA requires twelve-team conferences to hold an

additional conference championship game. This mandated extra game leads to increased

revenues for the conference as a whole. Conferences with ten or fewer teams were able to

play all the other teams in its conference every year while conferences with twelve or more

were only able to play the five or six in its division, and only three or fewer teams from the

other division. Twelve-team BCS conferences such as the Pac-10/12 and Big Ten were able

to establish lucrative television contracts as a result of capturing even larger television

markets with the additional schools and states. The Pac-10 acquisitions incorporated the sixteenth and thirty-first largest television markets and twenty-four more games to its inventory (Miller, 2010).

The realignment in search for profits has not stopped since 2011. In 2012, the Big Twelve lost two more schools to the SEC and replaced them with TCU and West Virginia from the Big East. Several Division 1-A Football Championship Series (FCS) schools are moving up to the FBS. More big football schools are leaving less profitable and smaller conferences such as the Big East to strengthen the weakening ACC in order to replicate the SEC, Big Ten, and Pac-12 success. The SEC and Big Ten plan to reach sixteen members in the near future and Conference USA and the MWC have announced plans to join together to create a twenty-five team conference. As teams look to raise profits and gain exposure, conferences are looking to expand into newer markets and raise their own bottom line regardless of geographic determination. Ironically, San Diego State plans to join the Big "East" in 2013. In the midst of all this realignment, what number of teams yields the highest profits for the teams and the conference as a whole?

In *The 2010 NCAA Division 1 Conference Realignment: Analyzing the Maximizing-Satisficing Paradox Using Institutional Data* (Weiner, 2011), Brad Weiner examines the relationship between profit and prestige maximizing behavior and the conference realignment that occurred in 2010. His results show that conferences forgo "peer group prestige for financial gain or athletic success" (Weiner, 2011). The researcher included all sports rather than only football. He focuses on organizational theories of upward

aspiration with associating with highly regarded peers. To analyze institutional overall

"prestige" some variables accounted for were enrollment, educational quality, and research

productivity. His results showed that there is a prestige-maximizing paradox where most

institutions maximized their prestige by moving into the new conferences while a "majority

of inviting conference members accepted less prestigious institutions as an economically

rational, if not ideal, outcome" (Weiner, 2011). 72 percent of the schools in the sample

were now in the bottom half of the new conference's prestige rankings. Utah and Colorado

maximized themselves the most by joining the Pac-10 with a majority of measures below

the median values. The Pac-10 initially courted the University of Texas at Austin, which

would have maximized both prestige and profit for the Pac-10 by becoming the twelfth

member, but Texas declined. Utah was "lucky" to secure the final spot. The only school

with a FBS football team that increased the conference's prestige during the realign was

Nevada. The Big Ten's addition of Nebraska had the "highest percentage of satisficed

measures and represents the most apparent willingness to compromise conference

academic prestige for athletic improvement" while the Pac-10's additions were second

(Weiner, 2011). The author also studies the conferences that did not make changes; the Big

Twelve, now reduced to ten teams, maintained 63.3% of its median prestige values while

increasing each institution's share of the conference revenues.

In *NCAA Conference Realignment and Football Game Day Attendance* (Groza, 2010),

Mark Groza tested the impact of conference changes on institution's football game

attendance. Since football programs generate the majority of revenue through ticket sales,

he focuses on game day attendance as a measure schools would want to maximize.

Attendance is also a proxy for other revenues as large fan bases can lead to more merchandise and sponsorship deals, and also be invited to the more prominent bowl games. Furthermore, the NCAA actually requires for all FBS schools: "Once every two years on a rolling basis, the institution shall average at least 15,000 in actual or paid attendance for all home football games" (NCAA, 2009). Although the academic reputation of the university is important even in college athletics, "financial obligations are making the business side of collegiate athletics of growing importance" (Groza, 2010). The result is accomplished by increasing revenues which can be done by promoting the profile of the school's revenue generating sports: football and men's basketball (Groza, 2010). The article examines how the schools that realigned in 2004-2006 were among the top of their prior conferences in terms of Sagarin Computer Ratings and systematically hierarchical. Groza claims that "all of the programs that voluntarily changed conference affiliation moved into a seemingly 'better' football conference" with larger average attendance, more bowl games, and higher average Sagarin Ratings (Groza, 2010). Using both OLS and a Tobit estimation, the empirical findings suggest that the reputation of the conference, particularly the variable of how many bowl games the opposing conference team has historically participated in, is significant on game day attendance. By moving into that "better" conference, the schedule became stronger with more historically prestigious teams, and resulted in increased game day attendance, which leads to further revenues.

This paper is influenced by UNC Charlotte's Dr. Craig Depken's *Realignment and Profitability in Division IA College Football* (Depken, 2005), which estimated the optimal size of a college football conference from 1993 to 2003. His study is written in response to

the early conference realignment, where the Southwest Conference merged with the Big

Eight to form the Big Twelve. He notes the Big Twelve and ACC expansion as the trend of

the time to form twelve-team conferences. As some teams have continued success while

others do not, teams with higher drawing power leave to reduce conference disparity, and

create a theory of conference churning and evolution (Depken, 2005). His hypothesis

based on this evolution is that conferences should be yielding more profit over time and

that a twelve-team conference is the optimal number. The analysis assumes that the NCAA,

working as a cartel, allows conferences to maximize profits by setting marginal revenue

equal to marginal costs at the conference level. Since the conference members as a whole

determine the number of members, negative and positive externalities are internalized and

joint profit is maximized. The test estimates quadratic average revenue per attendee and

average cost per attendee curves to determine the maximum value.

According to Depken, an eight-team conference for example would be able to play

every team, which could generate considerable fan interest through increased rivalries.

Furthermore, if schools are related geographically, it is more likely that fans would travel to

away games. But if we take a fourteen-team conference like the SEC is today, there would

be no scheduling possibilities to play every conference member like the eight-team

schedule. With the larger conference of twelve, fourteen, or even sixteen teams, teams'

schedules could lose intense rivalries and increase the geographic distance between the

members, thus decreasing fan interest and game day attendance. For example, storied

programs Florida and Alabama are in separate divisions in the SEC and might only play

each other once every three years and California now only plays either Arizona or Arizona

State every year instead of both. As a result, as the number of schools increases, total revenue could still increase with having a conference championship game, less non-conference games meaning less guarantees paid, and more chances for a bowl appearance by winning the minimum six games. Less schools in a conference reduces the chance to win the minimum six games for a bowl birth, but are likely to have lower costs. Football operating expenditures should increase with more teams in the conference as the geographic region of the conferences usually expands. Teams now not only have to travel longer distances to their opponents, but also recruiting expenditures to these newly included regions might now increase.

Depken's results from the earlier time period suggests that the size of a conference is positively correlated to the average revenue but size-squared is negatively correlated to average revenue, and inversed for average costs. In this first model, he discovered that the optimal approximate number is about ten teams. Controlling for competitive balance in another model, the optimal number rose to 11.35 with the twelve teams hypothesis unable to be rejected. Removing the SEC and Big Twelve from his sample set, his results were similar to the first model. Due to the impossibility of having half of a team, rounding up gives us the optimal number of teams somewhere between eleven and twelve amongst all his models. Assuming the NCAA acts as a cartel and accommodates these conference changes, conferences would prefer to have twelve teams rather than eleven in order to host the mandated conference championship game and add more overall revenue.

III. Data

The data used in this paper consists of 1040 observations of the 120 individual FBS

football teams from the 2003 season through the 2011 season adjusting for teams that

became FBS teams during the period. The revenue and enrollment data are publicly

available by the U.S. Department of Education (www.ope.ed.gov/athletics/index.aspx) due

to the Equity in Athletics Disclosure Act (EADA) that requires all schools to disclose their

athletic department financial reports. The dataset disregards the military academies

because they are not required to adhere to the EADA. Win records and conference

affiliation was found through the NCAA (www.ncaa.org). Attendance statistics are also

available through the NCAA. In models requiring attendance data, 2004 has been omitted

because attendance was not reported that year. Models that require enrollment disregard

Tulane in 2005 and the Conference USA due to Hurricane Katrina and Tulane's zero

enrollment during the 2005 season. Furthermore, since Air Force is the only military

academy that is a member of a conference, the MWC is omitted from models that are not

weighted by attendance or enrollment. The University of Maryland-College Park did not

submit EADA data for 2005-2007 and therefore is omitted from the dataset, as well as the

ACC from models that are also not weighted by attendance or enrollment. All dollar

amounts are adjusted and now reported in 2003 dollars.

Football team revenues can include:
- Ticket Sales
- Student Fees
- NCAA and Conference Distributions
- Private Contributions
- Direct Institutional Support
- Direct State or Government Support
- Game Guarantees Received
- Media Rights
- Game-Day Revenues
- Sponsorship Royalties
- Sports Camp Revenues
- Endowment and Investment Income
- Other Undisclosed Income

All contributions and fees must be allocated specifically to the football team by the school to be considered as football revenue. Most are allocated to the athletic department as a whole and not to a specific sport. NCAA and conference distributions include revenue received from participation in bowl games. The NCAA distributes income received to its members since the NCAA operates as a non-profit governing body. The football conferences also disperse the revenue from media rights, sponsorships, etc. Game guarantees are revenues received in contract by playing another team at their school. Many of the non-BCS conference teams receive large guarantees in agreement to schedule and travel to more prestigious football teams who are more likely to win. Game-day revenues include parking, concessions, novelty sales, and program sales. Ticket sales and NCAA/Conference Distributions constitute the majority of a school's yearly football revenue.

Football team expenses can include:
- Athletic Student Aid
- Game Guarantees Paid
- Coach and Team Staff Salaries
- Team Administrative Salaries
- Severance Payments
- Recruiting
- Team Travel
- Equipment, Uniforms, and Supplies
- Game-Day Expenses
- Fund Raising, Marketing, and Promotion
- Sports Camp Expenses
- Direct Facilities, Maintenance, and Rental Fees
- Spirit Groups
- Indirect Facilities and Administrative Support
- Medical Expenses and Medical Insurance
- Membership and Dues
- Other Operating Expenses
- Transfers to Institution

Other operating expenses include non-team travel, business insurance, equipment leases, etc. Transfers to the institutions constitute the sports contributions to the universities and athletic departments. The majority of football expenses are in student aid, guarantees paid, coach and team salaries, administrative salaries, and direct facilities, maintenance, and rental fees.

IV. Model

Different from Depken's tests, Models 1 through 4 try to determine how conference

size affects each school's individual profits, revenues, and costs. With all the team

financials over the nine-year period, I created variables for each school and year:

- Team Profit

- Team Enrollment

- Team Attendance

- Team Winning Percentage

Table 2: Individual School Variables

Variables	Mean	Minumum	Maximum
Team Profit (in Millions)	$6.90 (10.9)	-$5.74	$63.7
Attendance	285,573 (187,109)	20,874	897,431
Enrollment	17,297 (7,880)	2,461	50,394
Win Percentage	.51 (.22)	0	1
Conference Size	10.81 (1.68)	7	14
Year		2003	2011

All models are OLS with robust standard errors. Unique to my models, I also repeated each

model with another equation to account for fixed effects since I assumed that there must be

schools with profits patterns that do not change over the time period of analysis. For

example, Texas might always get a significant amount of booster money from certain

alumni regardless of what conference they are in or how many games they win. Oregon

receives a significant amount of revenue in contributions from its alumnus, Nike founder

Phil Knight.

The following regressions were determined for each school:

Equation 1:

$$Y_{it} = \beta_0 + \beta_1 Conference\ Size_{it} + \beta_2 (Conference\ Size_{it})^2 + \beta_3 Win\ Percentage_{it} + \mu_{it}$$

Equation 2: Accounting for Fixed Effects

$$Y_{it} = \beta_0 + \beta_1 Conference\ Size_{it} + \beta_2 (Conference\ Size_{it})^2 + \beta_3 Win\ Percentage_{it} + \alpha_i + \mu_{it}$$

Model 1 uses these variables to determine Y_{it} as Team Profits as a measure of conference

size, conference size squared, and winning percentage. In order to weigh schools like Texas

who make over 80 million dollars a year with massive stadiums with schools who make

only five million in much smaller stadiums, I weighed each school similarly to Depken's

model by creating ratios with attendance, but also now with enrollment and expenses and

substituting these variables for Y_{it} in Models 2-4 (Data in Table 7 of Appendix):

- Profit/Team Attendance

- Profit/Team Enrollment

- Profit/Expenses (Profit Margin Ratio)

The inclusion of enrollment is because the size of a student body could reflect the majority

of a team's fan base. In order to account for on-field success as a factor that determines

game attendance, I included a variable of teams' winning percentages. Losing teams might

discourage fan attendance, reducing ticket sales and associated revenues. I did not account

for wins rescinded by the NCAA for infractions to USC, Penn State, and UNC because they

were assessed seasons later and did not affect that year's profit. These models consisted of

using OLS with robust standard errors to correct for heteroskedasticity with conference

size, conference size squared, and winning percentage.

In order to measure conference profitability, I aggregate each team's values into its

respective conference to create yearly conference variables.

- Total Conference Profit

- Total Conference Attendance

- Total Conference Enrollment

Table 3: Conference Variables

Variables	Mean	Minumum	Maximum
Conference Profit (in Millions)	$79.70 (96.2)	-$23.0	$321
Attendance (in Millions)	2.96 (1.82)	.52	6.53
Enrollment (in Thousands)	180.28 (62.34)	72	329.1
Conference Size	10.49 (1.74)	7	14
Year		2003	2011

Two more equations were developed to determine the relationship between profitability

and conference size. Again we also use a separate equation to account for fixed effects that

a conference might have. This could be prestige, market power, etc.

Equation 3:

$$\sum_{i=1}^{I} Y_{it} = \beta_0 + \beta_1 Conference\ Size_{it} + \beta_2 (Conference\ Size_{it})^2 + \mu_{it}$$

Equation 4: Accounting for Fixed Effects

$$\sum_{i=1}^{I} Y_{it} = \beta_0 + \beta_1 Conference\ Size_{it} + \beta_2 (Conference\ Size_{it})^2 + \alpha_i + \mu_{it}$$

where "'i" indexes the schools in that conference.

Using these equations, we determined the correlation between the following dependent

variables with those in the equations above in Models 5-8 (Data in Table 8 of Appendix):

- Total Conference Profit

- Total Conference Profit/ Total Conference Attendance

- Total Conference Profit/ Total Conference Enrollment

- Total Conference Profit/ Total Conference Expenses (Profit Margin Ratio)

Table 4: List of Models

Model	Dependent Variable
1	School Total Profit
2	School Profit/Attendance
3	School Profit/Enrollment
4	School Profit/Expenses
5	Conference Profit
6	Conference Profit/Attendance
7	Conference Profit/Enrollment
8	Conference Profit/Expenses

In order to examine the effects of conference size on the different profit variables,

we differentiated the equations with respect to change in conference size.

Equation 5:

$$\frac{\partial y}{\partial Conference\ Size} = \beta_1 + 2\beta_2 Conference\ Size$$

Setting this equation equal to zero would allow us to find the maximum values. We discovered that in the majority of the models, a school's profit was positive correlated to the amount of schools in its conference and negatively correlated with the conference size squared. With β_1 positive and β_2 negative, schools' profits initially increased until they reached a maximum value. Only in two models that used Equation 2 to account for fixed effects, were the correlations reversed and β_1 negative and β_2 positive. Using Equation 5 would now provide the minimum value and the values were disregarded.

V. Results

The tables below are the results of the regressions created for the multiple outcome variables. Table 5 shows the models that determined the effect of conference size on individual school profitability. Using Equation 5, I determined the profit maximizing size for the schools and conferences included below in the bottom row.

Table 5: Effect on School Profits

Model		1 -Total Profits (Report in Millions)		2 - Profit/Attendance		3 - Profit/(Student Enrollment)		4 - Profit/Expenses Ratio	
Equation		1	2	1	2	1	2	1	2
Variables		Coefficients		Coefficients		Coefficients		Coefficients	
β_1	Conference Size	23.70***	0.12	68.04***	-2.38	1024.63***	-9.24	1.98***	.17
		(1.72)	(.82)	(4.89)	(6.49)	(81.21)	(55.9)	(.14)	(.12)
β_2	(Conference Size)^2	-1.07***	-0.0090	-3.16***	0.13	-46.02***	0.23	-.091***	-0.0094
		(.08)	(.04)	(.23)	(.31)	(3.82)	(2.64)	(.006)	(.0058)
β_3	Win Percentage	17.0***	2.18***	30.72***	6.41**	795.83***	168.72***	0.99***	0.073
		(1.40)	(.67)	(3.20)	(2.90)	(61.41)	(56.31)	(.092)	(.067)
β_0	Constant	-130	5.51	-358.80	21.17	-5648.2	315.57	-10.55	-.30
		(8.94)	(4.21)	(24.84)	(33.6)	(419.14)	(300.56)	(.70)	(.63)
Fixed Effects?		☒	☑	☒	☑	☒	☑	☒	☑
Profit Maximizing Size		11.11	6.95	10.75	N/A	11.14	N/A	10.89	10.21
*** Denotes significant at 1% level ** Denotes significant at 5% level * Denotes significant at 10% level									

Table 6 below shows the results of the regressions that determined the effect of conference size on the conference's profitability as a whole.

Table 6: Effect on Conference Profits

Model	5 - Total Profits (Report in Millions)		6 - Profit/Attendance		7 - Profit/(Student Enrollment)		8 - Profit/Expenses Ratio	
Equation	3	4	3	4	3	4	3	4
Variables	Coefficients		Coefficients		Coefficients		Coefficients	
β_1 Conference Size	278*** (55.40)	13.2 (22.8)	69.9*** (9.96)	4.14 (7.92)	1009.71*** (231.23)	60.84 (35.51)	1.86*** (.36)	0.188 (.082)
β_2 (Conference Size)^2	-12.4*** (2.64)	-0.31 (1.12)	-3.23*** (.47)	-0.12 (.38)	-44.66*** (11.12)	-2.63 (1.76)	-0.085*** (.017)	-0.0095 (.004)
β_0 Constant	-1430 (283)	-24.8 (114)	-353.27 (50.93)	-14.47 (41.14)	-5224.24 (1174.25)	-21.57 (185.85)	-9.50 (1.85)	-0.43 (.47)
Fixed Effects?	☒	☑	☒	☑	☒	☑	☒	☑
Profit Maximizing Size	11.21	21.28	10.81	16.60	11.30	11.56	10.98	9.85
*** Denotes significant at 1% level ** Denotes significant at 5% level * Denotes significant at 10% level								

In all the models that did not account for fixed effects, the variables were deemed significant at the 1% level. In all models that did account for fixed effects, the conference size variables' test statistics and p-values deemed them insignificant on all levels. Without including fixed effects and noting only the models that used Equation 1 and Equation 3, the highest profit maximizing size we saw was 11.3 in Model 7, which focused on conference level profits normalized by student enrollment. The lowest size we saw was 10.75 in Model 2, which estimated team profits per home game attendee. Using Equations 2 and 4, which do account for fixed effects, we were not able to determine profit-maximizing values for Models 2 and 3. Placing an upper bound of twelve to thirteen games in a season could possibly determine a maximum conference size for these models. Considering all models and equations, the highest was 21.28 teams in Model 5 (Conference Total Profits) and 6.95 in Model 1 (Individual School Profits) as the lowest. Twenty-one teams would seem irrational because it would require a conference to be split into three or four sub-divisions.

Every model not accounting for fixed effects showed that conference size has a

comparable effect on a school's and conference's profitability by resulting in similar profit-

maximizing values. The profit-maximizing values for conference outcome variables were

higher than the school's profit-maximizing size for its respective model. This could be

because there are large conferences with twelve teams such as the SEC and Big Ten.

Removing them from the sample would most likely reduce the profit maximizing size as it

did in Depken's. Although Model 1 accounts for winning percentage, Models 1 and 5

showed that conference size has similar effects on a school's and a conference's

profitability disregarding fixed effects with β_1's of 23.70 and 278 and β_2's of -1.07 and

-12.4, which resulted in profit maximizing sizes of 11.11 and 11.21. The largeness of Model

5's coefficients is due to it being the conference's total profit as a whole rather than one

member. However, with total profits as the outcome variable but accounting for fixed

effects, Models 1 and 5 displayed opposite effects with the largest and smallest values. In

Models 2 and 6 that normalize profits by attendance, we saw very similar β_1 and β_2

coefficients and profit maximizing sizes of 10.75 and 10.81, which were the lowest values

in models not accounting for fixed effects. This shows that conference size has almost

identical effects on an institution's and conference's profitability. It could also support the

theory that attendance is an effective proxy for revenues and also an indicator that

conference size might negatively impact attendance. Models 3 and 7, which normalize

profits by enrollment showed the same trends as attendance (Models 2 and 6) but resulted

in the highest profit maximizing values for models not accounting for fixed effects. This

could be because some of the largest student bodies are the most profitable schools.

Models 4 and 8, which used a ratio of profits divided by expenses, again displayed similar

effects of conference size on profitability, but in both the model accounting for fixed effects and the model that did not.

Models 4 and 7 resulted in the smallest range and least differential in profit-maximizing values (10.21-10.89, 11.30-11.56) between using the equations not accounting for fixed effects and the one that did. The mean profit maximizing value, which accounts for all profit-maximizing results, is 11.78. To calculate a 95% confidence interval with all the values and equations, we get a Standard Deviation of 3.37 and an interval of [9.99,13.53]. Disregarding the highest and lowest values as outliers, interestingly both the fixed effects equations on Total Profits alone, averaging the values now gives us a mean value of 11.37.

VI. Conclusion

The results conveyed that bigger is not necessarily better in the game of college football. Realistically there cannot be a partial team in a conference with the average profit-maximizing conference size at 11.37 and 11.78. Rounding down to eleven is skeptical because there has not been an eleven-team conference since the ACC in 2004, which added a twelfth in 2005. Depken's model also came to a conclusion of eleven teams. He assumed that a conference would add a twelfth team to its conferences to reach the minimum twelve teams in order to have a conference championship game. In my model, both ten and twelve lie within the confidence interval which is conclusive of the trends we have seen recently. With 13.5 being the upper bound, we can rationally round up to fourteen because of no partial teams to accept the future trends to fourteen teams. The

SEC, now fourteen, plans to reach sixteen soon and the Big Ten and ACC recently announced expansions to fourteen. Our tests show that the future trends of sixteen teams are not within the confidence interval and would earn less profit as a result of increased size. This could be due to the rising costs caused by furthering the distance between schools, the expansion of the recruiting region, or the bidding war and competition between coaching salaries with more "rivals." Revenues could be declining as rivalries lose their intensity and could be related to the loss of prestige a conference might experience either by losing a top school and replacing it with less significant school, or just acquiring less worthy schools in the interest of size.

As many of these power conferences began to pick the "best" from the smaller conferences, we wonder what will be left? As more instability rises, other conferences like the Pac-10/12 will look to acquire any "profitable football" team like a Boise State before another conference does first, which might compromise the academic prestige of the conference (Weiner, 2011). What is also interesting to note is that an independent team like Notre Dame is still able to create a high profit margin without a conference. Their TV contract with NBC continues to give them all the revenue they need (Table 9). Will other teams look to mimic them? Or will a big-time conference invite them with an offer they cannot refuse. In our society, colleges have begun to operate as businesses and college football is just another source of crucial revenue. College football conferences will continue to expand to include the most successful football teams under the illusion of more profits.

VII. Limitations and Future Research

There are potentially many factors that could attribute to a team's revenue and subsequently the conference's. There are so many different sources of revenue rather than just game attendance or student fees from enrollment that can change from year to year. Variables could be included to account for how each bowl game pays out different amounts and also to measure the competitive balance of each conference. An additional variable for playing and winning a conference championship could also be included to further winning percentage. Similar to the limitations of Groza's study and what he calls the "honeymoon effect," this study could be limited by the lack of time that has elapsed since major conference changes such as the Pac-12, Big Twelve, and Big Ten changes in 2011.

Conference realignment is by no means over. In 2012, we saw many teams move and the largest conference that never changed in our samples, the SEC, expand. Every month another team announces a change in this contest to create the strongest, most profitable conference. This could be an ongoing study for the next several years as we await the first mega-conference of almost twenty-five teams. Below in Table 10 are the announced future changes. More recently, the NCAA announced that there would be a four-team playoff beginning in 2014 that would change the system of BCS bowls. Experts believe that the potential revenues to be made from this change "would dwarf what schools make from bowls" currently (Bachman, 2012). With a playoff system, there could be ramifications that diminish the meaning and importance of each single week in college football, as the regular season is now not as vital in order to get to the championship. Without this notion of everything being on the line week in and week out, viewership could

be affected. The world of college football is being overwhelmed with big time business, which raises further questions on the payment of college athletes. Realignment also usually includes a move in all sports. We could then look to test the other revenue generating sport, basketball.

Appendix

Table 7: All School Statistics

Variables	Mean	Minumum	Maximum
Profit (in Millions)	$6.90 (10.9)	-$5.74	$63.7
Profit/Attendance	$14.06 (22.54)	-$76.16	$105.67
Profit/Enrollment	$330.70 (504.39)	-$1,229.95	$2,115.83
Profit/Expenses	.48 (.74)	-.84	3.8

Table 8: All Conference Statistics

Variables	Mean	Minumum	Maximum
Profit (in Millions)	$79.70 (96.2)	-$23.0	$321.0
Profit/Attendance	$14.90 (17.36)	-$23.36	$61.94
Profit/Enrollment	$319.18 (390.64)	-$105.32	$1,467.92
Profit/Expenses	.50 (.59)	-.43	1.76

Table 9: Notre Dame Statistics

Variables	Mean	Minumum	Maximum
Profit (in Millions)	$34.3 (5.79)	$26.0	$41.8
Profit/Attendance	$67.53 (10.14)	$52.58	$84.52
Profit/Enrollment	$8,344 (52.82)	$8,260	$8,422
Profit/Expenses	2.04 (.49)	1.18	2.6

Table 10: Future and Announced Conference Changes

Announced Changes			
Year	Team	Prior Conference	New Conference
2012	South Alabama	FCS	Sun Belt
2012	UTSA	FCS	WAC
2012	Texas State	FCS	WAC
2012	Massachusetts	FCS	MAC
2012	Hawaii	WAC	MWC
2012	Fresno State	WAC	MWC
2012	Nevada	WAC	MWC
2012	TCU	MWC	Big 12
2012	Texas A&M	Big 12	SEC
2012	Missouri	Big 12	SEC
2012	Temple	MWC	Big East
2012	West Virginia	Big East	Big 12
2013	Georgia State	FCS	Sun Belt
2013	Syracuse	Big East	ACC
2013	Pittsburgh	Big East	ACC
2013	San Diego State	MWC	Big East
2013	Boise State	MWC	Big East
2013	Houston	Conference USA	Big East
2013	Memphis	Conference USA	Big East
2013	UCF	Conference USA	Big East
2013	SMU	Conference USA	Big East
2013	FIU	Sun Belt	Conference USA
2013	North Texas	Sun Belt	Conference USA
2013	Utah State	WAC	MWC
2014	Maryland	ACC	Big 10
2014	Rutgers	Big East	Big 10
2014	Florida Atlantic	Sun Belt	Conference USA
2014	Tulane	Conference USA	Big East
2014	East Carolina	Conference USA	Big East
2014	Middle Tennessee	Sun Belt	Conference USA
TBA	Louisville	Big East	ACC
TBA	MWC and Conference USA to Join Together		

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