Rent Sharing and Gender Discrimination in Collegiate Athletics

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Working Paper No. 1307

June 2013

Supported by the Austrian Science Funds

FWF

The Austrian Center for Labor Economics and the Analysis of the Welfare State

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June 20, 2013

Abstract

In this paper, we analyze the effect of market power on the share of females in top management positions using data from a market in which some firms have market power due to an institutionalized cartel. We investigate collegiate athletics and interpret coaches as top-level managers or chief executive officers (CEOs). The causal link between market power and female employment is established by exploiting the existence of the Bowl Championship Series (BCS) as an exogenous shock. Our results show that an increase in the market share has a negative effect on females relative to males among coaches. We interpret this as clear evidence for Becker´s (1957) theory on employer discrimination. Only firms operating in an oligopolistic or otherwise not perfectly competitive environment can sustain a taste or cost of discrimination. Market power is necessary to let firms share rents with their workers, which they do in a discriminatory way.

Keywords: gender discrimination, market power
JEL Classifications: J71, L40

*We are grateful to Rene Böheim and Josef Zweimüller as well as seminar participants at the NOEG Meeting 2012 and University Linz for helpful discussions and comments. All errors and opinions are the authors' sole responsibility.

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We analyze a market in which some firms have market power due to an institutionalized cartel. In particular, we analyze whether universities in collegiate sports share rents with their coaches, and if so, whether these rents are equally distributed across female and male coaches. We interpret collegiate sports coaches as chief executive officers (CEOs). Head coaches in professional as well as collegiate sports have to make similar strategic and operative decisions as top-level firm managers. The university that is running the sports programs under the regulation of the National Collegiate Athletes Association (NCAA) is interpreted as a firm.[3]

Discriminatory rent sharing is, however, not uncommon, although the empirical evidence is not clear-cut. Ashenfelter and Hannan (1986) find a negative relationship between market concentration and female employment in a cross-section of US banks. Black and Strahan (2001) analyze whether rents fostered by regulation were shared with labor, and whether firms were discriminating by sharing these rents disproportionately with male workers. They find that average compensation and average wages for banking employees fell after states deregulated. Male wages fell by about 12 percent after deregulation, whereas women's wages fell by only 3 percent, suggesting that before deregulation rents were shared mainly with men. Women's share of employment in managerial positions also increased following deregulation. Black and Brainerd (2004) find that increased product market competition from international trade yields lower wage differences between female and male workers in the US manufacturing industries. In contrast to these findings, Cuñat and Guadalupe (2005) find a positive influence of product market competition on CEOs, executives, and workers. They identify a causal effect by exploiting currency fluctuations as a quasi-natural experiment.

To establish a causal link between the market share of a university and the share of female coaches in the sport programs, we exploit the existence of the Bowl Championship Series (BCS) in collegiate football. The BCS is a system to select collegiate football teams

[3] A similar approach is found in Romer (2006) who studies firms' maximization behavior using data of professional football teams. He interprets in his empirical framework a football club as a firm in a standard market.

into a series of five championship games (bowls) in order to determine a season's champion. Revenues generated by these championship games are shared among all BCS members. This will lead to a higher market share for these universities compared to those who are not automatic qualifiers. That is, the BCS resembles a cartel within the governance of the NCAA (Kahn, 2007). It should, therefore, have a clear positive influence on a university's market share, if it is a BCS member, as football is one of the major and most profitable collegiate sports. It should, however, have no impact on the share of female coaches employed by the university.

While it is certainly true that colleges who do not discriminate have lower costs, they are not able to exploit this cost advantage. The first reason is that discriminating firms enjoy the advantage of being a member of the BCS cartel. This will generate more revenues and lead to higher profits. These profits can then be reinvested by hiring more expensive coaches and continuing discriminatory hiring behavior. The second factor is that discriminating colleges essentially cannot be driven out of the market. If they face higher costs due to discriminatory behavior they might be less competitive, but they will never be forced to leave the market; they will just be forced to reduce cost.

The paper is organized as follows: Section 2 provides an introduction to the BCS and the institutional setting of collegiate athletics, section 3 introduces the data and outlines the empirical approach, sections 4 and 5 sum up the results, and section 7 concludes the paper.

2 Collegiate Athletics and the BCS

Collegiate sports are highly popular in the United States. Especially, college men's basketball and football generate revenues easily comparable to professional sports (Kahn, 2007). Students participate in regulated athletic competitions in many different sports and dedicate substantial parts of their time to training and practicing. Most major sports are televised nationwide in the United States, and men's basketball and football generate

comparably large TV audiences, resulting in major TV contracts. While Division-I men's basketball features a 64-teams playoff system to decide a season's champion, Football Bowl Subdivision (FBS) football has no such playoff system. Since the year 1916, the NCAA football season culminates in a series of bowl games between college teams who had a successful season.[4] While in previous decades, the overall champion was determined by various rankings and polls, the BCS is the current championship format. It consists of a series of bowl games determining the NCAA football champion. The BCS started officially in 1998 with the intention to facilitate finding a champion in the top college football division. Before the introduction of the BCS, a seasonal champion of the then Division I-A football was determined by various computer rankings and polls, including the Associated Press Poll and the Coaches Poll. The BCS succeeded various earlier systems, which also featured agglomeration of colleges similar to the BCS.[5]

Under the current system,[6] the conference champions of the Atlantic Coastal, the Atlantic Coast Conference (ACC), Big 12, Big East, Big 10, Pac 10, and Southeastern Conference (SEC) are automatic qualifiers for a BCS bowl. During the time period covered by our data, the University of Notre Dame has a status of independence and is also an automatic qualifier, if it is in the top eight of the final BCS standings.[7] This ranking comprises three components: USA Today Coaches Poll, Harris Interactive College Football Poll, and an average of six computer rankings. It is published for eight consecutive weeks each season (starting in October), including the final standings on selection Sunday. All colleges from non-automatic qualifying FBS conferences have significantly smaller chances to play in a BCS bowl, as they face major disadvantages in the ranking system. The conference champions of Conference USA, the Mid-American Conference, the Mountain

[4]NCAA regulation define the conditions under which teams are allowed to play in a bowl game. These eligibility requirements state that a team has to win at least six games and is not allowed to have a losing record during the season.

[5]See Eckard (2011) for a detailed history.

[6]After the 2011/2012 season, BCS officials decided to change the current format and install a four-team playoff system. In addition to this, a major realignment took place and multiple colleges changed their conference affiliation. These changes do not affect our data and empirical approach.

[7]Consult the official webpage of the BCS at www.bcsfootball.org to get further information on the criteria and details of automatic qualification.

West Conference, the Sun Belt Conference, or the Western Athletic Conference (WAC) can potentially earn a berth in a BCS bowl game but they face stronger criteria.[8] While this criteria were reformed in 2006 to the benefit of non-automatic qualifying conferences, only one team from these conferences is granted automatic qualification in each year.[9] Since the installment of the BCS system, six non-BCS colleges ranked higher than BCS schools were invited to a BCS bowl. However, during this period 6 non-BCS colleges who fulfilled this criteria were left out. So, non-BCS colleges face a significant disadvantage under the BCS system.

The way the current championship format is structured leads to a situation where a subset of FBS colleges benefits from excessive revenues generated by the granted participation in BCS. This increases their share of the market consisting of FBS collegiate football and, through that, all collegiate athletics in the United States. Our data cover 64 seasons for BCS and 52 non-BCS colleges. Playing in a BCS bowl does not necessarily directly result in higher revenues, as teams have to incur high costs of participation. BCS conferences, however, are subsequently awarded the revenues from ticket sales, TV contracts, merchandising, and other potential revenue sources. They distribute it to their member colleges. Table 1 summarizes the distribution of BCS revenues to BCS divisions for academic years 2005/2006 through 2008/2009. All revenues from the BCS system are mostly distributed to BCS conferences and only a small share goes to non-BCS conferences, even if they send a team to a BCS bowl (Eckard, 2011).

Although their semi-professional character is often questioned (Kahn, 2007), collegiate athletics, per definition, differ from professional sports. However, the markets colleges and their athletic departments operate in are rather similar. Top-level colleges make substantial efforts to recruit athletes out of high school (Dumond, Lynch and Platania, 2008). As profit maximizers, their goal is to maximize profits but they have strong incentives to reinvest or give the profits to the administration or the coaches (Fort, 2000).

[8] Consult www.bcsfootball.org for more details.

[9] For the purpose of simplification, colleges from automatically qualifying conferences will be called BCS colleges, and others, non-BCS colleges.

This could potentially improve success on the field of play. Success on the field should increase the popularity of the college and attract more students in return. In the process, they will generate revenues, as they meet high demand for collegiate sports competitions in the United States. While any excess revenues in a professional league setting would go to team owners, the generated net-revenues in NCAA sports are reinvested or used to attract and hire more expensive (and better) coaches. In the data, we see that in the academic year 2009/2010 FBS football head coaches had a basic salary of about $400,000 in non-BCS colleges and $750,000 in BCS colleges. The average total income of a football head coach in the same year, including bonuses and non-monetary compensation, was $620,000 in non-BCS colleges and just over $6.2 million in BCS colleges.

The 64 BCS colleges in our data account for about 75 percent of all revenues[10] generated among all DIV-I colleges. All BCS colleges, on average, occupy about three quarters of the overall revenues generated in a season. Figure 2 plots football revenues, average revenues from all other sports, and unallocated (to a certain sport) revenues for BCS and non-BCS colleges. We see that BCS colleges generate significantly higher revenues with their football team compared to all other revenue components. The share of football revenues of grand total revenues is disproportionately higher for BCS colleges. The considerably higher revenues from football will drive up total revenues of BCS colleges and increase their market share, that is, their rent sharing potential. Moreover, their average football revenues clearly exceed their football expenditures, resulting in net profits. While non-BCS colleges make net profits from all other remaining sports, BCS colleges incur a net loss out of this revenue source. In contrast to non-BCS colleges, they also have higher unallocated expenditures than unallocated revenues. Net profits from football can be used to balance out these net losses, while the remaining revenues can potentially be

[10] All revenues are attributable to intercollegiate athletic activities. This includes revenues from appearance guarantees and options, contributions from alumni and others, institutional royalties, signage and other sponsorships, sport camps, state or other government support, student activity fees, ticket and luxury box sales, and any other revenues attributable to intercollegiate athletic activities.

used to cover the cost resulting from discriminating for male coaches and paying higher coaches´ wages.

The relevant market of interest is the nationwide market for collegiate athletics in the United States. It consists of fan demand including merchandizing, team apparel sales, television revenues, gate revenues, and sponsorship revenues. It is quantified by the sum of revenues of all colleges in the data. We interpret the colleges as our firms who produce the good collegiate sports. The consumers are the fans and TV audiences. Within this relevant market, colleges from automatically qualifying conferences can be interpreted as members of a quasi cartel. They have the potential to exploit their market power and gain a significant advantage over non-BCS schools. Eckard (2011) finds clear evidence that the BCS system resembles a cartel, as automatic qualifying colleges have various advantages relative to non-automatic qualifying ones. For example, they receive a share of higher television contracts for BCS bowls.

Concerning other characteristics, we measure a significant difference in size of BCS and non-BCS colleges but no significant difference in structural settings. Both types of colleges, on average, have similar numbers of sport, with BCS colleges offering about 12 sports and non-BCS, 10. Additionally, it is the case that the number of football coaches in BCS colleges is, on average, exactly equal to the equivalent number on non-BCS colleges. All of the football head and assistant coaches of FBS football programs are male. Consequently, changes in revenues generated by football programs should not have an influence on the composition of the overall coaching staff of a certain college.

3 Empirical Strategy and Data

In our data, we observe a form of oligopolistic competition with BCS schools acting like a cartel. Increased market power may enable them to share rents and may also enable them to share their rents disproportionally across male and female coaches. Rent sharing will arguably lead to higher salaries for both female and male coaches. Firm owners may also

discriminate in the sense of Becker and may hire relatively more male coaches than female ones. Discriminating against female coaches will then lead to relatively higher salaries for male coaches, as discriminating universities will draw from the smaller pool of male coaches. In the descriptive statistics, we see that average head coach and assistant coach salaries for both sexes are considerably higher for BCS colleges. While some of this can be explained by size effects, cost effects due to discrimination should also play a role.

The underlying data consist of institution-level data of NCAA DIV-I colleges from academic years 2006/2007 through 2009/2010. The data were provided by the US Department of Education.[11] All observed educational institutions in our data set are members of the *Football Bowl Subdivision* (formerly known as Division I-A). This set of colleges represents the top tier in collegiate athletics and is divided into various conferences, mostly defined by location or historic factors. Conference affiliation also divides all colleges into two groups defined by their status within the aforementioned BCS system.

Our analysis is based on the following regression equations

$$Y_i = \beta_0 + \beta_1 \overline{\text{Marketshare}}_i + \xi' \cdot \mathbf{X} + \varepsilon_i, \tag{1}$$
$$\text{Marketshare}_i = \pi_0 + \pi_1 BCS + \phi' \cdot \mathbf{Z} + \nu_i,$$

where Y_i is replaced by various measures of (female) wages and (female) employment among top-tier collegiate athletic coaches. To assess the influence of a college's market power on these measures, we estimate all our models with two-stage least-squares using the BCS membership as an instrument.

BCS is a binary variable indicating if a colleges is a BCS school (1) or not (0). The vector X is a set of control variables including year and state fixed-effects. We include several variables controlling for university (in our context firm) characteristics. We control for the sum of total athletics-related student aids, the share of these student aids going to female participants, the number of total participants, the share of female participants, the

[11] All data downloaded from http://ope.ed.gov/athletics.

number of teams and the share women teams of all teams. In order to control for "gender characteristics" of colleges, we also control for the share of head coach and assistant coach salaries going to female sports as well as the share of all recruiting costs the university dedicates to recruit female athletes out of high school. We include state fixed-effects in order to control for the characteristics of the regional market a college competes in. Our results present two different specifications: a narrow specification covering only size characteristics and a broad specification controlling for additional university characteristics. Tables 2 and 3 present descriptive statistics of all dependent variables measuring wages and the share of female employment. Table 4 presents descriptive statistics of the explanatory variables.

For our identification strategy to work, it must be the case that being a BCS college is conditionally random. We argue that the BCS is not a systematic cartel of schools with discriminatory preferences with regards to their coaching staff. It is crucial to note that BCS membership only applies to the football programs of all colleges in our data and membership should not be systematic in terms of the characteristics of other sports programs in those colleges. The only defining factors whether a college is a BCS member are size and the location. Larger athletic departments are more likely to have a football program competing in a BCS conference. Considering the names of many conferences, location is an obvious factor, as conferences were initially formed as regional collections of colleges.

In order to make our identification strategy even more powerful, we omit all football coaches from our measures used as dependent variables. This will ensure that there is no direct channel of BCS membership on the composition of the coaching staff of a certain college. This could also be done for the variables measuring coaches' wages, but we lack information on the salaries of assistant coaches assigned to football programs.

4 Evidence for Rent Sharing

Collegiate sports is a specific industry that has an interesting feature: players, that is, the workers in a standard industry, are not compensated financially in the form of a normal wage. This is prohibited by NCAA statutes, which define student athletes as amateurs who are not allowed to receive any monetary or non-monetary form of compensation exceeding regulated student sports scholarships.[12] Coaches, however, are fully eligible for monetary compensation. The wages of top-level NCAA football coaches are easily comparable to the ones being paid in other professional sports in the United States. Due to these characteristics of collegiate sports, rents that the colleges (i.e., firms) generate should predominantly be shared with the coaches. We should, therefore, see coaches´ wages - and especially head coaches´ wages - increase if colleges are able to extract rents from the market.

Obviously, one has to consider possible legislative barriers for discrimination in the underlying institutional setting. A significant part of the 1972 Education Amendment of the 1964 Civil Rights Act is Title IX. Title IX states that any educational institution that receives federal funds must not discriminate on the basis of gender. While this might potentially prevent discriminatory rent sharing practices by NCAA colleges, it is important to note that Title IX does not call for equal (or proportional) expenditures for each gender (Grant et al., 2008). This leaves two potential channels for discriminatory rent sharing that we can identify in our data: coaches´ wages as well as the ratio of female to male coaches.

[Table 5 about here]

Table 5 presents the results from estimating model 1. We use the log of average head as well as assistant coaches of all colleges in our data. The results show that an increase in a college's market share by 1 percentage point will cause an increase of head coach wages

[12] NCAA regulations to be found at http://www.ncaa.org/wps/wcm/connect/public/ncaa/resources

by about 1.4 and assistant coach wages by about 0.9 percentage points. Both results are robust and highly significant at the 1-percent level.

[Table 6 about here]

Another channel of rent sharing in our industry could be the actual size of the coaching staff that is employed by a university. In order to test this, we estimate model 1, using the absolute numbers of head and assistant coaches as the dependent variables. Table 6 presents the results: While there is no evidence for a causal relationship between market size and the number of head coaches, neither male nor female, there is strong evidence concerning assistant coaches. We estimate that an increase of 1 percentage point of market share causes an increase of the overall number of assistant coaches by 17. Splitting the assistant coaches up in female and male assistants, we find that the effect on the number of male assistants is more than three times that of female assistants: an increase of 12.8 percentage points compared to 4 percentage points.

These results indicate that the universities do have rents to share. The unique characteristics of the underlying industry, colleges can only share rents with coaches. Our estimation results provide evidence that they do this by increasing the number of coaches, as well as paying a higher salary.

5 Distribution of Rents

We estimate a broad and narrow specification of our empirical model, using different dependent variables as measures of the representation of female coaches in universities. We analyzed the influence of a college's share of the total revenues generated by all colleges on the share of coaches that are female. Additionally, we analyzed how the revenues generated in football influence the coaching staff in terms of gender.

[Table 8 about here]

Our results indicate that we have a significant and negative effect of an increased share of the overall revenues in the market on (1) the share of female head coaches (HC) of all coaches, (2) the share of female full-time assistant coaches (AC) of all assistant coaches, (3) the share of all female full-time coaches of all coaches, (4) the share of female assistant coaches coaching women, (5) the share of full-time female coaches of total coaches, (6) the share of all female university employed coaches of all coaches, and (7) the share of all female university employed coaches of all female coaches. Being a BCS college turns out to be a strong instrument in the narrow specification, as it yields a Kleibergen and Paap (2006) F-statistic of over 53 in the first stage. If we control for average wages of head coaches and assistant coaches, the results are confirmed and the estimated coefficients are even stronger.

Our results present clear evidence that the lower representation of female coaches can be explained by the excess revenues generated by BCS football programs. The BCS systems makes discriminating for gender on the level of coaches affordable. This interpretation is emphasized by the fact that a higher share of the market increases the share of male coaches coaching women teams by about 15 percentage points. In the broad specification, controlling for average coach salaries, we also find that the percentage of female head coaches coaching women teams decreases substantially by almost 39 percentage points. Increased market shares will lead to rent sharing within colleges' athletic departments and drive out female coaches. Another interesting finding is that share of female coaches that are employed by the university declines, both as a share of total (2 percentage points) and of female coaches (6.5 percentage points). This is another way colleges are discriminating against female employees on the coaching level. The type of employment seems to be a factor as well, as our results indicate that the amount of female full-time employed coaches does decline by just over 5 percentage points as well.

6 Additional Evidence and Robustness

As a robustness check of the results presented above, our next step is to analyze the influence of market share on female full-time employment. It is a well documented fact that the share of part-time employment is higher among women than among men. Associated with part-time work is a considerable gap in hourly wages that was shown to be widening over the last decades (Bardasi and Gornick, 2008; Manning and Petrongolo, 2008). In our data, we can identify head and assistant coaches that are assigned only part-time to a certain collegiate sports program or team. We consequently constructed a measure of the share of female coaches (head as well as assistant coaches) of all coaches of a college. We use this measure as the dependent variable and regress it on two sets of control variables employing a 2SLS model.

The results, presented in table 10, indicate that the share of female coaches that are employed full time decreases as the market share of a college increases. We find that a 1-percentage-point increase in the market share will decrease the share of female full-time head coaches of all head coaches by about 5 percentage points. Additionally, we estimate a decrease of just over 8.7 percentage points of female assistant coaches who are assigned full-time to a program of all assistant coaches. However, this result is not statistically significant anymore if we add the full set of control variables to our estimated model. The overall share of female full-time employed coaches of all coaches is estimated to decrease by about 7 percentage points.

[Table 10 about here]

We interpret these empirical findings as evidence for another form of discriminatory rent sharing. While an increase in market share does have a positive influence on female employment, it seems to manifest itself on a lower level. As the market share of a college, and consequently the rents, increases, the overall percentage of female full-time coaches of all coaches decreases. Control estimations show that there is no equivalent influence of

market share on male full-time coaches; we can, therefore, conclude that female coaches do benefit less from rents gained through an increase in market share.

As pointed out in the literature, part-time jobs are often less attractive low-wage jobs offering little opportunity for career progression (Gregory and Connolly, 2008). We show that an increase in the market share will lead to a situation where the universities (firms) share the rents in a discriminatory way by increasing the share of part-time employed female coaches.

The third and final step of our empirical analysis focuses on the number of female coaches that are employed full time at the university. We are interested in the influence of a college's market share on the representation of female coaches that are employed full time at the university. We construct three different measures as dependent variables: the share of female full-time university-employed coaches of (a) all coaches, (b) all female coaches and (c) all female fulltime university employed head coaches of all coaches. Using these measures as dependent variables in our model 1 yields the results presented in table 11.

[Table 11 about here]

Again, we find a clear negative effect of larger market share on female employment. Our findings suggest that the share of female full-time university-employed coaches of all coaches decreases by about 7.4 percentage points as a result of a 1-percentage-point increase of the college's market share. However, we find no effect of the market share on the share of female full-time university-employed coaches of all *female* coaches. In contrast to this, we do find a negative effect of market share on the share of female full-time university-employed *head coaches* of all female coaches of about 7.7 percentage points. This result is only marginally statistically significant at the 10-percent level.

7 Summary and Concluding Remarks

In this paper, we analyze the causal effect of market power on the share of females in top management positions. We use specific data from collegiate sports that provide a situation where some universities have considerable market power due to the BCS, an institutionalized cartel. In particular, we analyze whether universities in collegiate sports share rents with their coaches, and whether these rents are equally distributed across female and male coaches.

Our analysis shows that in this specific market, universities–that is, firms–are able to share rents in a discriminatory way. We show that an increase in a university's market share has a negative effect on female head coaches relative to male head coaches in terms of wages. In addition to this, we find that female coaches for women sports are crowded out by male coaches as the market share of a university increases. While one could argue that the male coaches might in general be more productive, this is a very weak argument, as women coaches should actually be a better and more productive fit for female athletes. Our analysis further shows a negative influence of the market share on female full-time employment. We also find that the share of female coaches who are assigned full time to a team decreases, which reduces the resources allocated to female sports. In addition, we also find that an increase in a university's market share has a negative effect on the share of female coaches that are employed full time at a university. This increases the relative number of female part-time coaches.

We interpret our results as clear evidence for Becker´s (1957)'s theory on employer discrimination. Only firms with market power can sustain the cost disadvantages resulting from discriminating against a certain type of employee. The results show that cartels–per se illegal under the Sherman Act in regular product markets–enable firms to share rents in a discriminatory way.

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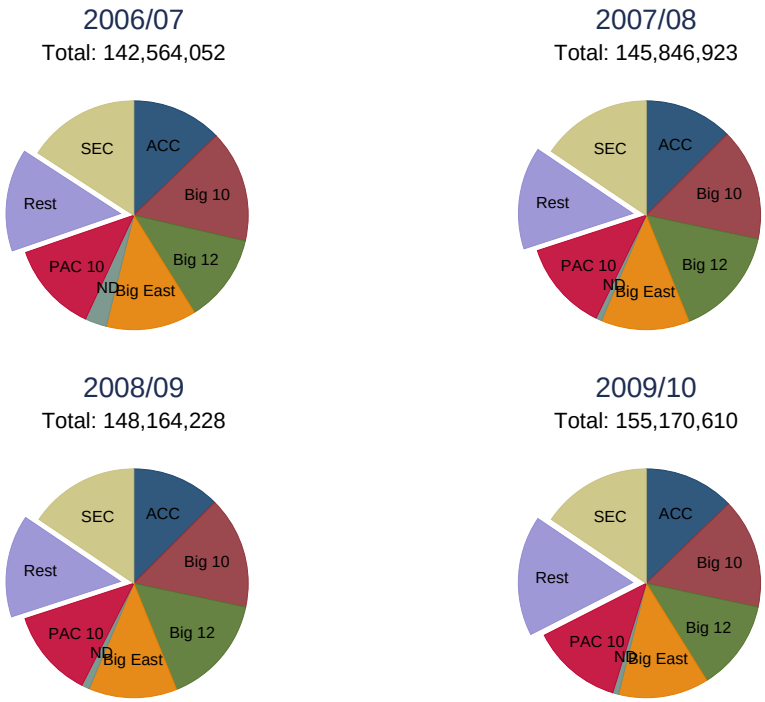
A Appendix: Tables and Figures

Table 1: BCS Revenues and Payouts by Conferences

	2005/06	**2006/07**	**2007/08**	**2008/09**	**2009/10**
BCS Revenue	**125,893,334**	**142,564,052**	**145,846,923**	**148,164,228**	**155,170,610**
Distributions:					
Notre Dame	14,866,667	4,500,000	1,316,971	1,331,860	1,352,565
Big 10	21,094,444	22,588,675	22,824,992	23,172,725	24,287,058
Southeastern	16,594,444	22,588,675	22,824,992	23,172,725	24,287,058
Big 12	16,594,445	18,088,675	22,824,992	23,172,725	19,787,058
Pacific 10	16,594,445	18,088,675	18,324,992	18,672,743	19,787,058
Atlantic Coast	16,594,444	18,088,675	18,324,992	18,672,725	19,787,058
Big East	16,594,444	18,088,675	18,324,992	18,672,725	19,787,058
Remaining Payouts	6,960,001	20,532,002	21,080,000	21,296,000	26,095,697

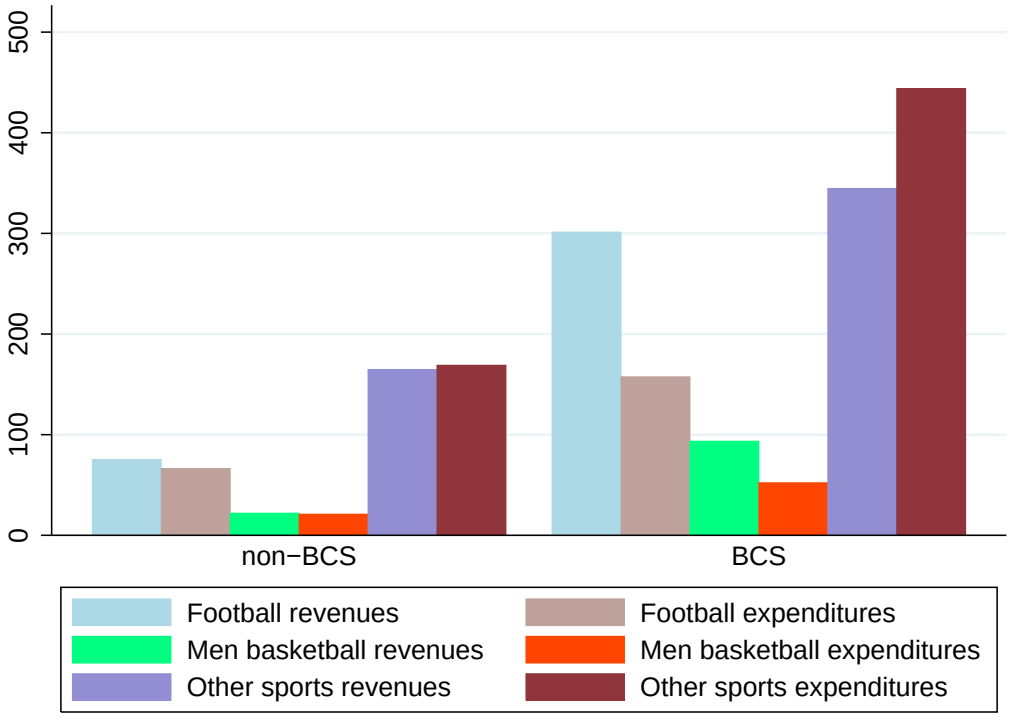
Source: NCAA. All values in current US Dollars.

Figure 1: BCS Total Revenues and Payouts.



Source: NCAA. All values in current US Dollars.

Figure 2: Average College Revenues Categories over BCS



Source: NCAA. All values in current US Dollars.

Table 2: Descriptive Statistics for Coaches' Salaries

Variable	all	BCS	Non-BCS
Average salary of head coaches $\frac{\text{women sports}}{\text{men sports}}$	38.91	34.81	43.88
	(16.51)	(15.65)	(16.19)
Average salary of assistant coaches $\frac{\text{women sports}}{\text{men sports}}$	47.00	44.14	50.47
	(10.10)	(8.16)	(11.12)
Average salary of head coaches – men's sports program[a]	3.56	4.80	2.06
	(2.35)	(2.40)	(1.09)
Average salary of head coaches – women's sports program[a]	1.13	1.42	.78
	(.52)	(.50)	(.26)
Average salary of assistant coaches – men's sports program[a]	1.04	1.26	.76
	(.39)	(.33)	(.25)
Average salary of assistant coaches – women's sports program[a]	.46	.55	.37
	(.15)	(.14)	(.11)
N	**467**	**256**	**211**

Standard deviation in parentheses. All variables based on The Equity in Athletics Data provided by the U.S. Department of Education at http://ope.ed.gov/athletics/index.aspx. [a] Average salaries for head and assistant coaches measured in 100,000 US $.

Table 3: Descriptive Statistics for Share of Female Coaches

Variable	All	BCS	Non-BCS
% female head coaches of all coaches	8.733	8.19	9.39
	(3.74)	(3.02)	(4.38)
% female assistant coaches of all coaches	22.84	22.86	22.81
	(5.34)	(5.02)	(5.72)
% female coaches of all coaches	31.57	31.05	32.20
	(6.22)	(5.96)	(6.47)
% head coaches on women programs female	44.10	47.04	40.53
	(17.71)	(14.42)	(20.49)
% assistant coaches on women programs female	51.20	50.11	52.52
	(11.51)	(11.26)	(11.70)
% assistant coaches on men programs female	7.44	8.29	6.42
	(7.82)	(6.94)	(8.67)
% of head coaches female and fulltime	12.09	11.92	12.29
	(5.81)	(4.60)	(7.01)
% of assistant coaches female and fulltime	21.34	20.67	22.15
	(8.24)	(7.05)	(9.43)
% of all coaches female and fulltime	22.67	22.37	23.04
	(7.54)	(6.08)	(8.99)
% of assistant coaches female	25.22	25.66	24.72
	(5.71)	(5.50)	(5.92)
% of all coaches female	25.64	26.03	25.16
	(5.00)	(4.91)	(5.09)
% female fulltime university employed of all coaches	23.23	22.71	23.86
	(6.96)	(5.98)	(7.96)
% female fulltime university employed of all female coaches	73.90	73.53	74.36
	(17.61)	(15.40)	(19.99)
% female fulltime university employed head coaches of all female coaches	27.25	26.03	28.75
	(10.21)	(8.30)	(11.97)
N	467	256	211

Standard deviation in parentheses. All variables based on The Equity in Athletics Data provided by the U.S. Department of Education at http://ope.ed.gov/athletics/index.aspx.

Table 4: Descriptive Statistics - Explanatory Variables

Variable	All	Non-BCS	BCS	Diff.	St. dev.	p-val
Absolute number of sports	11.56	10.57	12.37	-1.79	.196	0.000
	(.11)	(.11)	(.15)			
Total student aid	68.53	83.03	50.93	-32.10	2.271	0.000
	(29.17)	(27.23)	(20.51)			
Recruitment share women	31.46	31.96	31.04	.92	.529	0.083
	(5.70)	(6.02)	(5.40)			
Student aid share women	42.62	41.93	43.19	-1.26	.359	0.000
	(.18)	(.27)	(.24)			
Participation share women	43.50	42.42	44.38	-1.97	.514	0.000
	(5.61)	(5.53)	(5.53)			
Share of women sports	55.45	56.73	54.40	2.33	.385	0.000
	(.20)	(.30)	(.25)			
Participating athletes	489.28	406.95	557.14	-150.19	11.091	0.000
	(6.51)	(5.85)	(8.83)			
Football headcoaches	1	1	1	0	0	-
	(0.00)	(0.00)	(0.00)			
Football assistant coaches	10.27	10.24	10.29	-.04	.11	0.693
	(.05)	(.09)	(.07)			
N	467	256	211			
Base Salary Football Coach	5.23	6.65	3.52	-3.129	.56	0.000
	(5.24)	(6.17)	(3.07)			
N	318	174	144			

Standard deviations in parentheses. All variables based on The Equity in Athletics Data provided by the U.S. Department of Education at http://ope.ed.gov/athletics/index.aspx.

Table 5: Log-Averages Wages Men/Women Teams

	Broad specification		*Narrow specification*	
Dependent variables	Log(avg. wages) head coaches	Log(avg. wages) assistant coaches	Log(avg. wages) head coaches	Log(avg. wages) assistant coaches
Market share	1.369***	0.929***	1.389***	0.931***
	(0.186)	(0.122)	(0.183)	(0.120)
No. of sports	-0.083***	-0.031**	-0.093***	-0.028*
	(0.030)	(0.015)	(0.030)	(0.015)
Student aid[b]	0.003	-0.001	0.003	-0.002
	(0.003)	(0.002)	(0.003)	(0.002)
Participants[c]	-0.001*	-0.001***	-0.001	-0.001**
	(0.001)	(0.000)	(0.001)	(0.000)
Share of recruiting expenses for fem. athletes			-0.004	-0.009**
			(0.005)	(0.004)
Share of student aid assigned to fem. athletes			-0.002	-0.011
			(0.013)	(0.008)
Participation rate of women in sports			0.000	-0.001
			(0.009)	(0.006)
% of sport programs being women sports			0.019*	0.013*
			(0.011)	(0.007)
First-stage coef. of BCS	.555***	.555***	.555***	.555***
	(.080)	(.080)	(.080)	(.080)
Observations	467	467	467	467
F-stat. on excl. I.[d]	48.544	48.544	51.445	51.445

Cluster-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include state, public/private and year fixed-effects. [a]Absolute number of various coaching groups in all sports excluding all coaches in the football program. [b] Absolute amount of student aid in current $100.000. [c]Absolute number of all unduplicated female and male participants in all sports programs. [d] Kleibergen and Paap (2006) F-statistic.

Table 6: Absolute Number of Coaches Men/Women Teams

	Head coaches			*Assistant coaches*		
Dependent variables[a]	all	male	female	all	male	female
Market share	-0.047	0.183	-0.229	16.999***	12.815***	4.071**
	(0.563)	(0.802)	(0.633)	(4.290)	(2.596)	(1.908)
No. of sports	1.487***	1.133***	0.355***	1.802**	0.852*	1.094***
	(0.120)	(0.126)	(0.116)	(0.779)	(0.439)	(0.360)
Student aid[b]	0.013	-0.011	0.025**	-0.041	-0.046	-0.007
	(0.010)	(0.015)	(0.010)	(0.065)	(0.039)	(0.025)
Participants[c]	0.006***	0.005**	0.000	0.011	0.015**	-0.004
	(0.002)	(0.002)	(0.002)	(0.010)	(0.007)	(0.004)
First-stage coef. of BCS	.555***	.555***	.555***	.555***	.555***	.555***
	(.080)	(.080)	(.080)	(.080)	(.080)	(.080)
Observations	467	467	467	467	467	467
F-stat. on excl. I.[d]	48.544	48.544	48.544	48.544	48.544	48.544

Notes: Cluster-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include state, public/private and year fixed-effects. [a]Absolute number of various coaching groups in all sports excluding all coaches in the football program. [b] Absolute amount of student aid in current $100.000. [c]Absolute number of all unduplicated female and male participants in all sports programs. [d] Kleibergen and Paap (2006) F-statistic.

Table 7: Head Coach and Assistant Coach Wages: Men and Women Sports

			Head coaches		*Assistant coaches*	
Dependent variables	ratio of wages HC[a]	ratio of wages AC[a]	log avg. wages men's sports	log avg. wages women's sports	log avg. wages men's sports	log avg. wages women's sports
Market share	-13.807**	-5.736	4.966***	0.983***	0.931***	0.804***
	(6.005)	(3.730)	(0.528)	(0.144)	(0.120)	(0.128)
No. of sports	2.023	0.787	-0.362***	-0.039**	-0.028*	-0.010
	(1.246)	(0.772)	(0.085)	(0.017)	(0.015)	(0.018)
Student aid[b]	-0.179*	-0.101*	-0.001	-0.002	-0.002	-0.003*
	(0.098)	(0.056)	(0.009)	(0.002)	(0.002)	(0.002)
Participants[c]	0.024	0.003	-0.002	-0.000	-0.001**	-0.000*
	(0.024)	(0.010)	(0.002)	(0.000)	(0.000)	(0.000)
Share of recruiting expenses for fem. athletes	0.045	0.289***	-0.002	-0.005*	-0.009**	-0.004
	(0.194)	(0.111)	(0.017)	(0.003)	(0.004)	(0.003)
Share of student aid assigned to fem. athletes	-0.485	0.330	0.028	-0.014*	-0.011	-0.005
	(0.459)	(0.263)	(0.035)	(0.008)	(0.008)	(0.007)
Participation rate of women in sports	-0.244	-0.092	0.004	-0.005	-0.001	-0.003
	(0.307)	(0.164)	(0.026)	(0.006)	(0.006)	(0.006)
% of sport programs being women sports	-0.010	-0.299	0.071**	0.019***	0.013*	0.008
	(0.445)	(0.227)	(0.034)	(0.007)	(0.007)	(0.006)
First-stage coef. of BCS	.537***	.537***	.537***	.537***	.537***	.537***
	(.075)	(.075)	(.075)	(.075)	(.075)	(.075)
Observations	467	467	467	467	467	467
F-stat. on excl. I.[d]	51.445	51.445	51.445	51.445	51.445	51.445

Notes: Cluster-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include state, public/private and year fixed-effects. [a]Ratios defined as $\frac{\text{wages of female head-or assistant coaches}}{\text{wages of male head-or assistant coaches}} * 100$. [b] Absolute amount of student aid in current $100.000. [c]Absolute number of all unduplicated female and male participants in all sports programs. [d] Kleibergen and Paap (2006) F-statistic.

Table 8: Female Head and Assistant Coaches as Shares of Total Coaches

	Narrow specification			*Broad specification*		
Dependent variables	female HC of all coaches	female AC of all coaches	all female coaches of all coaches	female HC of all coaches	female AC of all coaches	all female coaches of all coaches
Market share	-3.859***	-0.130	-3.989	-4.018***	-0.864	-4.881*
	(1.486)	(2.504)	(2.783)	(1.470)	(2.368)	(2.579)
No. of sports	0.116	0.398	0.514*	-0.041	0.141	0.100
	(0.244)	(0.320)	(0.306)	(0.271)	(0.369)	(0.337)
Student aid[b]	0.066***	0.019	0.085**	0.067***	0.023	0.090***
	(0.024)	(0.035)	(0.034)	(0.025)	(0.033)	(0.034)
Participants[c]	-0.003	-0.011*	-0.013**	-0.001	-0.003	-0.005
	(0.004)	(0.006)	(0.006)	(0.003)	(0.006)	(0.006)
Share of recruiting expenses for fem. athletes				-0.049	-0.051	-0.100*
				(0.045)	(0.059)	(0.052)
Share of student aid assigned to fem. athletes				0.063	-0.216	-0.154
				(0.112)	(0.144)	(0.152)
Participation rate of women in sports				0.087	0.280***	0.368***
				(0.077)	(0.104)	(0.130)
% of sport programs being women sports				0.002	0.234*	0.236*
				(0.095)	(0.134)	(0.138)
First-stage coef. of BCS	.555***	.555***	.555***	.537***	.537***	.537***
	(.080)	(.080)	(.080)	(.075)	(.075)	(.075)
Observations	467	467	467	467	467	467
F-stat. on excl. I.[d]	48.544	48.544	48.544	51.445	51.445	51.445

Notes: Cluster-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include state, public/private and year fixed-effects. [a]Absolute number of various coaching groups in all sports excluding all coaches in the football program. [b] Absolute amount of student aid in current $100.000. [c]Absolute number of all unduplicated female and male participants in all sports programs. [d] Kleibergen and Paap (2006) F-statistic.

Table 9: Share of Head and Assistant Coaches of Women Sports Being Female

	Narrow specification			*Broad specification*		
Dependent variables[a]	% HC on women teams female	% AC on women teams female	% AC on men teams female	% HC on women teams female	% AC on women teams female	% AC on men teams female
Market share	0.477	-13.588***	8.030**	-2.035	-15.957***	8.574**
	(7.351)	(4.869)	(3.520)	(7.562)	(4.326)	(3.678)
No. of sports	-1.743	1.493***	-0.139	-1.831	1.073*	-0.113
	(1.193)	(0.564)	(0.530)	(1.220)	(0.620)	(0.528)
Student aid[b]	0.370***	0.120*	-0.060	0.384***	0.134**	-0.065
	(0.137)	(0.069)	(0.046)	(0.146)	(0.064)	(0.045)
Participants[c]	-0.006	0.003	-0.019**	-0.001	0.015	-0.019**
	(0.017)	(0.012)	(0.009)	(0.014)	(0.011)	(0.009)
Share of recruiting expenses for fem. athletes				-0.234	-0.130	-0.022
				(0.178)	(0.102)	(0.088)
Share of student aid assigned to fem. athletes				-0.469	-0.477	0.064
				(0.435)	(0.301)	(0.211)
Participation rate of women in sports				0.579	0.703***	-0.129
				(0.376)	(0.206)	(0.165)
% of sport programs being women sports				-0.186	0.128	0.098
				(0.437)	(0.300)	(0.196)
First-stage coef. of BCS	.555***	.555***	.555***	.537***	.537***	.537***
	(.080)	(.080)	(.080)	(.075)	(.075)	(.075)
Observations	467	467	467	467	467	467
F-stat. on excl. I.[d]	48.544	48.544	48.544	51.445	51.445	51.445

Notes: Cluster-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include state, public/private and year fixed-effects. [a]Percentage of coaches on women's sport programs being female. The dependent variable in columns 3 and 6 measure the percentage of female coaches on men's sports programs. [b] Absolute amount of student aid in current $100.000. [c]Absolute number of all unduplicated female and male participants in all sports programs. [d] Kleibergen and Paap (2006) F-statistic.

Table 10: Percentage of Female Coaches Fulltime Assigned to a Team

	Narrow specification			*Broad specification*		
Dependent variables[a]	% female HC of all HC	% female AC of all AC	% all female C of all coaches	% female HC of all HC	% female AC of all AC	% all female C of all coaches
Market share	-5.008**	-8.758**	-7.031**	-5.610**	-9.588***	-7.976**
	(2.393)	(3.562)	(3.474)	(2.295)	(3.336)	(3.294)
No. of sports	0.663*	0.912*	0.492	0.293	0.264	-0.051
	(0.389)	(0.509)	(0.471)	(0.404)	(0.459)	(0.431)
Student aid[b]	0.108***	0.152***	0.175***	0.112***	0.158***	0.180***
	(0.034)	(0.045)	(0.043)	(0.038)	(0.044)	(0.044)
Participants[c]	-0.007	-0.010	-0.012	-0.002	-0.002	-0.002
	(0.006)	(0.009)	(0.008)	(0.005)	(0.009)	(0.007)
Share of recruiting expenses for fem. athletes				-0.104	-0.102	-0.137
				(0.068)	(0.092)	(0.084)
Share of student aid assigned to fem. athletes				0.001	0.064	-0.065
				(0.158)	(0.163)	(0.165)
Participation rate of women in sports				0.271**	0.428***	0.420***
				(0.119)	(0.154)	(0.153)
% of sport programs being women sports				0.108	0.175	0.218
				(0.150)	(0.172)	(0.172)
First-stage coef. of BCS	.555***	.555***	.555***	.537***	.537***	.537***
	(.080)	(.080)	(.080)	(.075)	(.075)	(.075)
Observations	467	467	467	467	467	467
F-stat. on excl. I.[d]	48.544	48.544	48.544	51.445	51.445	51.445

Notes: Cluster-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include state, public/private and year fixed-effects. [a]Shares of female fulltime coaches excluding all coaches in the football program. [b] Absolute amount of student aid in current $100.000. [c]Absolute number of all unduplicated female and male participants in all sports programs. [d] Kleibergen and Paap (2006) F-statistic.

Table 11: Female Coaches Fulltime and University Employed

	Narrow specification			*Broad specification*		
Dependent variables	Female fulltime univ. empl. of all coaches	Female fulltime univ. empl. of fem. coaches	Female fulltime univ. empl. HC of fem. coaches	Female fulltime univ. empl. of all coaches	Female fulltime univ. empl. of fem. coaches	Female fulltime univ. empl. HC of fem. coaches
Market share	-7.433**	-11.345	-7.677*	-8.187***	-11.375	-7.188*
	(3.140)	(8.000)	(4.183)	(3.013)	(8.179)	(4.128)
No. of sports	0.450	0.328	-0.237	-0.066	-0.259	-0.418
	(0.407)	(1.199)	(0.735)	(0.382)	(1.182)	(0.800)
Student aid[b]	0.157***	0.280**	0.110	0.162***	0.284**	0.111
	(0.039)	(0.123)	(0.078)	(0.040)	(0.124)	(0.076)
Participants[c]	-0.009	-0.005	0.007	-0.001	-0.004	0.000
	(0.007)	(0.021)	(0.013)	(0.007)	(0.021)	(0.012)
Share of recruiting expenses for fem. athletes				-0.106	-0.077	-0.022
				(0.075)	(0.231)	(0.141)
Share of student aid assigned to fem. athletes				0.021	0.451	0.516*
				(0.164)	(0.421)	(0.302)
Participation rate of women in sports				0.361**	0.194	-0.088
				(0.147)	(0.301)	(0.187)
% of sport programs being women sports				0.150	-0.087	-0.330
				(0.159)	(0.428)	(0.297)
First-stage coef. of BCS	.555***	.555***	.555***	.537***	.537***	.537***
	(.080)	(.080)	(.080)	(.075)	(.075)	(.075)
Observations	467	467	467	467	467	467
F-stat. on excl. I.[d]	48.544	48.544	48.544	51.445	51.445	51.445

Notes: Cluster-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include state, public/private and year fixed-effects. [a]Share of female fulltime and university employed coaches excluding all coaches in the football program. [b] Absolute amount of student aid in current $100.000. [c]Absolute number of all un-duplicated female and male participants in all sports programs. [d] Kleibergen and Paap (2006) F-statistic.