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Keith Jakee and Martin Kenneally

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Running Head: Scheduling and League Objectives

Scheduling Slots and Sports League Objectives: An Empirical Analysis of the Australian Football League

Keith Jakee*
Wilkes Honors College
Florida Atlantic University
5353 Parkside Dr.
Jupiter, FL 33458

kjakee@fau.edu
Tel: (+1) 561-799-8131
Fax: (+1) 561-799-8576

Martin Kenneally
Centre for Policy Studies
University College Cork
Cork, Ireland

m.kenneally@ucc.ie

**Corresponding Author*

Scheduling Slots and Sports League Objectives: An Empirical Analysis of the Australian Football League

Abstract: We concentrate on the redistributional aspects of sports league decisions by analyzing the allocation of scheduling slots in the Australian Football League. We model and empirically test a number of team variables that we hypothesize are likely to influence the league's allocation of scheduling slots to teams. We frame each of these variables in terms of its likelihood of contributing to either competitive balance or "infant industry" objectives versus its likelihood of contributing to increased gate attendance and television viewership (*viz* profit) objectives. We found no evidence that the league's distributional choices were consistent with competitive balance-infant industry goals. Rather, our results suggest that the league is pursuing a policy of profit maximization.

Keywords: Australian Rules Football, Broadcasting Contracts and Sports, Competitive Balance, Determinants of Scheduling Slots, Scheduling Slot Allocations, Wealth Redistribution within Sports Leagues.

Scheduling Slots and Sports League Objectives: An Empirical Analysis of the Australian Football League

1. Introduction

Since Rottenberg (1956), economists have emphasized both outcome uncertainty and competitive balance across teams as the hallmarks of sports as an industry, and in recent years both phenomena have received considerable attention by scholars.[1] Rottenberg nicely summarizes the importance of competitive balance: "Professional team competitions are different from other kinds of business ventures. … in baseball no team can be successful unless its competitors also survive and prosper sufficiently so that the differences in the quality of play among teams are not 'too great'" (p. 254). In other words, "success," as measured by on-field performance must circulate through the various teams over some reasonable time period if the *league*, as a collective, is to thrive. Outcome uncertainty is directly related to competitive balance: the balance of competition will be more even when outcomes are more uncertain. The corollary implies that greater certainty of outcome induces weak competitive balance and, as a result, fans are expected to abandon perennially-losing teams. Moreover, since greater uncertainty is a public good for the league, even strong teams should have an interest in maintaining a more even balance.

There may, however, be a fundamental problem with the forgoing hypothesis: while it has largely been offered as a factual description of the objectives in sports leagues, the possibility exists that it is a *normative* proscription of what researchers and league officials alike claim *should be* important to fans and therefore sports executives. To this point, Lee and Fort (2008) specifically examine whether outcome uncertainty really matters to fans by examining Major League Baseball data over 102 years. They use several measures of uncertainty and find that only playoff uncertainty is statistically significant and, then, only with what the authors call "truly ambitious" league

[1] While Rottenberg discusses "uncertainty of outcome" (p. 246), he never explicitly employs the term "competitive balance." However, he clearly has the latter concept in mind in the quote provided in paragraph one, above (from Rottenberg, p. 254). Fort and Quirk (1995), Kesenne (2006), Sanderson and Siegfried (2003), and Szymanski (2003) are but a small sample of the studies that examine an array of factors, such as salary caps, player drafts, revenue sharing and the like, for their effects on league balance. For analyses of competitive

intervention. And, even though playoff uncertainty is statistically significant, its economic significance is "questionable" (p. 292). In other words, the claim that outcome uncertainty—and hence competitive balance—does actually drive the dynamics of sports as an industry and the policy objectives of leagues is in doubt. Rather, Lee and Fort suggest the "policy implication is that actual league choices may be motivated by wealth redistribution rather than concerns over competitive balance" (2008, p. 281). Indeed, they urge that "an alternative focus for future research is in-depth analysis of the wealth redistribution consequences of league choices among owners, players, and fans" (2008, p. 292).

In a similar vein, Jakee *et al*. (forthcoming) attempt to estimate the revenue effects of asymmetric slot allocations to various sub-groupings of teams in the Australian Football League (AFL). A critical aspect of that analysis is that scheduling slots are wholly allocated by league officials, officials who are often characterized as having a dominant relationship with the management of individual clubs, if not a downright adversarial one (Stewart *et al*., 2005).[2] The AFL might, therefore, be more closely compared to a league such as the NCAA in the United States, which plays a strong and ongoing "enforcement" role than to, say, Major League Baseball, which is often characterized as playing a concessionary role when it comes to its relationship with the management of individual clubs. While Jakee *et al*. do not model the correlation between scheduling slot allocations and competitive balance directly, they note that the large revenue asymmetries that result from the asymmetric allocation are hardly consistent with league objectives that balance financial returns across clubs. These authors also note that the actual incentives for the league quite likely diverge from the those that would promote competitive balance and they suggest that the league is maximizing its own profits when annual gate and broadcasting revenues are maximized in a given season. In sum, maximizing overall attendance and television viewership in a given season (which maximizes profits) may well involve forgoing greater balance in on-field competition.

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balance in the Australian Football League, see Macdonald and Borland (2004). Lee and Fort (2008) provide a extensive summary of the uncertainty-of-outcome literature.

[2] The strong central control exhibited by AFL league officials can be usefully contrasted with the "cartel instability" of the English Premier League described in Forrest *et al*. (2004).

The aim of the current paper is to further elucidate the tension between league decisions to "balance" the teams and the temptation to increase revenues. We use Australia's premier Australian Rules competition, the Australian Football League (AFL) as an example. Specifically, we model day-of-the-week slot allocations to AFL teams as the dependent variable. Effectively, this approach allows us to explore a little scrutinized decision made by *league* officials and it should provide us with greater insights into league objectives. Given the secrecy surrounding most sports leagues' decisions and their financial details, researchers can often only infer what the true objectives are.[3] We therefore aim to specifically test for the conflict between favoring popular teams, which Jakee *et al*. (forthcoming) suggest implies increasing revenues for both the popular teams and the league, versus favoring weak teams in the name of competitive balance or even some version of an "infant industry" objective, which might be in place to protect younger expansion teams.

Following Jakee *et al*. (forthcoming), we assume that certain playing slots (usually holiday games and Friday nights) generate more revenue, *ceteris paribus*, than others. This assumption is consistent with the few additional studies that specifically test for scheduling effects, such as Schofield (1983), García and Rodríguez (2002) and Knowles *et al*. (1992).[4] Our empirical model examines the allocation of slots to each team for the years 1990 through 2003, which were pivotal years for the AFL. First, the league expanded considerably in the 1990s and concomitantly the AFL's management grew increasingly independent from the interests of specific teams over this period. Second, several teams experienced serious financial losses motivating mergers and league bailouts; these financial crises, themselves, motivate an investigation into their causes and policy implications.

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[3] Pinnuck and Potter (2006) note how little is known about the detailed financial performance of specific AFL clubs and they use aggregate yearly figures to calculate a range of *average* team financial estimates. Lee and Fort also note, in passing, the dearth of "supporting financial data" in conducting their analysis (2008, p. 290). Even Forbes (Forbes, various years) is not transparent about its calculations of yearly estimates of revenue, operating income and "current value," for various sports clubs in the United States (and for European soccer).

[4] These studies find that, *ceteris paribus*: (a) public holiday matches attract greater attendances in cricket (Schofield, 1983) and (b) weekend slots attract larger attendances than non-weekend slots; García and Rodríguez (2002) provide evidence from Spanish league football; Knowles *et al*. (1992) provide evidence from U.S. baseball.

Third, towards the end of this period, in 2002, a new era of historically lucrative television broadcasting contracts took effect.

Specifically, we analyze whether the distribution of slots depends on any of the following: (a) past competitive performance, (b) previous attendance shares, (c) various sub-categories of teams, or (d) the 2002 broadcasting contract. We test for the significance of a club's lagged on-field performance since it is the most direct test of whether the league is making policy decisions that are consistent with competitive balance objectives. We hypothesize that a competitive balance objective is consistent with allocating winning teams smaller allocations of favorable scheduling slots in subsequent seasons. A profit maximization objective is consistent with winning teams receiving a higher allocation of favorable scheduling slots.

We include a team's lagged attendance share as a proxy for the popularity of a club; it also serves as a proxy for television viewership as per Jakee *et al.* (forthcoming) and Lee and Fort (2008). Evidence that the league favors last year's high-attendance clubs with more lucrative scheduling slots is consistent with a hypothesis that league officials are maximizing revenues. Evidence that the league favors low-attendance clubs with better scheduling slots is consistent with competitive balance objectives.

We also include various sub-categories of AFL teams as independent variables because there is an ongoing tension between the teams from the State of Victoria, the traditional stronghold where Australian Rules began, and the *non-Victorian* expansion teams that were largely established over the past two decades. The AFL has instituted explicit tactics, such as recruiting and salary cap concessions, to nurture the expansion teams in what is essentially an "infant industry" policy. Yet another commonly-cited grouping among fans and the press is a subset of the *Victorian* clubs, the powerful *Big-4* clubs, so known for their strong attendances, large "membership" lists (season-pass holders), and typically robust financial positions. See Table 1 for a list of the relevant categories of teams. Indeed, concern over favorable scheduling for these *Big-4* or "high profile" clubs, as they have been called, has been noted in previous research on the AFL (Stewart, *et al*., 2005; and Turner and Shilbury, 2005), but the details of any such scheduling imbalance have remained anecdotal.

{Insert Table 1: *The 16 AFL Clubs as of the 2003 Season*}

Our last independent variable is a dummy that tests for any effects when the historic multi-year broadcasting contract went into effect in 2002. This media deal was worth AU$500 million for the league over the five years inclusive of 2002 to 2006. The per-yearly value of this contract was nearly three times the amount paid during the last year of the previous contract, which had been worth approximately AU$36 million for the 2001 season.[5] As a broader issue, scholars have begun to devote greater attention to articulating the role that large broadcasting contracts play in sports management. For example, Forrest *et al*. (2004) provide econometric evidence that broadcasting had a negligible effect on reducing actual attendance at English Premier League games while Cave and Crandall (2001) and Hoehn and Lancefield (2003) focus largely on some of the potential anti-competitive aspects of league "foreclosure" of broadcasting markets, bundling, and the vertical integration with media companies. Szymanski (2006) provides a useful overview of a number of sports broadcasting issues. Of particular relevance to our study is his review of the arguments that "collective sellers" (i.e., leagues that act as a single seller of broadcasting rights) have justified their cartelization of broadcasting rights on the basis of *redistributing income* across the league with a "view to sustaining competitive balance" as well as the need to coordinate club schedules (p. 431). In the case of the NBA, Fortunato's case study (2001) finds that *the league facilitates the networks* in its scheduling of the most popular teams. In the specific case of the AFL, Stewart *et al.* (2005) claim that, in the aftermath of the historic contract, the broadcaster influenced the scheduling of games, but provide no evidence. Turner and Shilbury (2005) provide interview evidence that disaffected clubs felt that the league bowed to the broadcaster's preferences in favoring the more popular high profile teams, but details are again lacking.

If the new broadcasting contract had an effect on the allocation of slots, we hypothesize that it would most likely manifest itself in greater attention to a club's ability to draw game-day audiences as a proxy for the potential of a club to draw television audiences; this hypothesis is consistent with the results in Jakee *et al.* (forthcoming) and with the assumption made in Lee and Fort (2008). If there is a

[5] The exchange rate for the Australian dollar was between US$0.50 and US$0.75 over the 2001–2003 period that we analyze in this paper.

"broadcasting effect," we expect to see an increase in the weight the league places on a club's attendance shares when the contract took effect.

Given that this paper models slot allocations as a *league* decision, we wish to be clear that it is unlike demand-for-attendance studies that specifically model the various factors that drive consumers' decisions to attend sports matches.[6] We therefore do not attempt to determine the independent effect of scheduling slots on attendance, but rather proceed with the assumption that certain slots attract larger attendances and/or larger television audiences than others. These slots generate more revenue and we expect that league (and club) officials understand this. We thus posit that league officials and/or club officials vie for the rents created by the more popular slots. Indeed, these are precisely the "wealth redistribution consequences" that Lee and Fort urged economists to consider more carefully.

We also do not specifically model revenues as a function of slot allocations in this paper, but we can tie the implications of our results indirectly to revenues via the analysis provided by Jakee *et al*. (forthcoming) and the few other papers that have connected attendance to revenues.[7] For example, Forrest and Simmons (2006) link attendance asymmetries to revenue asymmetries in the English Football League. They find that certain weekly slots are severely revenue-disadvantaged compared to others. Tainsky and Winfree (2008)—while not examining scheduling issues *per se*—link falling attendance to reduced club revenues in Major League Baseball as a result of the increased vigilance in steroid testing.

Besides emphasizing the implications scheduling has for league objectives, we are interested in simply furthering the analysis of scheduling slots as a variable of interest in the industrial organization of sports. Except for the few demand-for-attendance studies that have included scheduling as an

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[6] While we do not take a demand-for-attendance approach, it is worth pointing out that game-day scheduling has received fairly little attention in that literature, even though scheduling would seem to be an obvious factor in the demand for attendance. See Borland and Macdonald (2003) for an excellent overview of nearly 100 other papers on the demand-for-attendance topic.

[7] Jakee *et al.* (forthcoming) calculate that revenues for the most highly-attended slots in the Australian Football League provide significantly more revenue than the least popular slot does, even though they acknowledge that exact revenue calculations are difficult to measure because of the proprietary nature of the financial data. One of the innovations of the latter paper is an attempt to estimate the additional sponsorship revenue that clubs receive as a result of playing in popular *televised* slots.

independent variable (Schofield, 1983; García and Rodríguez, 2002; and Knowles *et al*., 1992) and the two studies that specifically link scheduling to club revenues (Jakee *et al*., forthcoming; Forrest and Simmons, 2006), this subject has garnered very little attention even in the demand-for-attendance literature. Moreover, these studies do little beyond regressing attendance data on scheduling slots as one of several independent variables. Similarly, the competitive balance literature has examined an array of factors, such as salary caps, player drafts, revenue sharing, etc., for their effects on league balance (see, e.g., Fort and Quirk, 1995; Kesenne, 2006; Sanderson and Siegfried, 2003; or Szymanski, 2003). Yet, this literature has also overlooked any potential effects of scheduling. These omissions alone would seem to warrant greater scrutiny of scheduling slots.

In sum, we aim to: (a) clarify the role scheduling plays in the decision of league executives, (b) develop a simple model of scheduling allocations that can be extended to cover other distributional phenomena in a league setting, (c) provide empirical support for the notion that leagues may be implementing policies that maximize overall attendance and television viewership at a point in time while potentially forgoing greater financial (and therefore on-field) balance across teams, and (d) determine the importance of broadcasting contracts on sports leagues' policy decisions; in other words, we want to know what effects broadcasting might have on scheduling and whether there should be increased attention paid to these more subtle results of the broadcasting contracts.

The paper is laid out in the following manner. The next section, 2, provides a brief overview of the Australian Football League. Section 3 introduces a simple distributional model that is tested in section 4, the latter of which provides our econometric results. We conclude in section 5.

2. Some Background on the AFL and its Scheduling

While our empirical analysis takes the Australian Football League as its case study, we believe our approach is relevant well beyond the Australian shores. In addition to the concepts we develop, the AFL is hardly an insignificant sport, even in an international context. For example, AFL average attendances were ranked approximately *third in the world* among professional sports leagues behind only the United States' NFL and India's Indian (Cricket) Premier League over the period 2006–2008; with average AFL attendances above 38,000 in 2007, they were greater than even America's Major

League Baseball.[8] Moreover, the AFL's "Grand Final" may routinely be the most highly-attended club championship event in the world with attendances regularly around 100,000.[9]

Within Australia, Aussie Rules is the most highly attended spectator sport with more than 2.5 million people attending games in 2005–06 (ABS, 2007). In terms of electronic media viewership, the AFL Grand Final is one of the most-watched sporting events on television in Australia. According to OzTAM (2005), the official source of Australian television audience measurement, the 2005 AFL Grand Final was watched by a record television audience of almost 3.4 million people (approximately 17 percent of the population), and this figure counts only the five largest metropolitan areas. Australian Rules is also fostering an international audience, a Roy Morgan Research poll reporting that more Americans (7,496,000) occasionally watched Australian Rules than Australians (7,004,000) between April 2002 and March 2004 (Levine and Pownall, 2004: 8).

The AFL changed considerably between the mid-1980s and the first few years of the new millennium; among other things, it underwent a significant name change, from the Victorian Football League to the Australian Football League, as it redoubled its efforts to move from a traditionally State-of-Victoria-centered competition to a national one.[10] League match attendances more than doubled throughout this period from around 2.7 million in 1985 to 5.9 million in 2003, the number of participating clubs increased by 33 percent from 12 to 16 (see Table 1 for a list of the legacy *Victorian* clubs and the expansion *non-Victorian* clubs), and match attendances increased by 60 percent for the 11 AFL clubs that survived the full period.[11] In 1990, 14 AFL clubs played 22 matches, giving a total of 308 team appearances at 154 matches, while the number of AFL clubs reached 16 and appearances increased to 352 (16 AFL teams each playing 22 games) by 1995. The number of clubs and team appearances remained unchanged from that point throughout the remainder of our data sample period

[8] See, for example, Wikipedia (2008a) for a convenient list of leagues and their corresponding attendances.

[9] See "Domestic Club Championship Events" section of Wikipedia (2008b) for a list of championship events and list of primary sources for attendance data.

[10] See Stewart *et al.* (2005) or Dickson *et al.* (2005) for an overview of this expansion.

[11] These 11 "survivor" teams are Carlton, Collingwood, Essendon, Geelong, Hawthorn, Kangaroos, Melbourne, Richmond, St. Kilda, Western Bulldogs and Sydney.

that ended in 2003, although in 1997, Port Adelaide joined the league and a merger took place between the Brisbane and Fitzroy clubs.[12]

AFL officials allocate *fixtures* (i.e., the particular matching of teams in a given round) and *scheduling* slots (i.e., the particular day and time that a given match is played) before the season of play begins each year. We focus solely on the latter. The nature of the allocation decision is a secretive matter decided by league officials and therefore little is known about it. Specifically, AFL scheduling slots consist of four regular weekly slots (e.g., Friday night, Saturday afternoon, Saturday Night and Sunday afternoon, referred to hereafter as *Friday*, *Saturday*, *Saturday Night* and *Sunday*, respectively) or "*Other*" irregular playing slots; these *Other* slots are typically matches scheduled on national holidays, during other special events, or for other idiosyncratic reasons.

Table 2 shows that, over the 2001–2003 period, average match attendances were ranked in the following order: (1st) *Other*, (2nd) *Friday* (3rd) *Saturday Night*, (4th) *Saturday*, and (5th) *Sunday*. This attendance pattern is broadly similar in earlier years with the exception that *Saturday Night* starts off the period in a very distant last-place ranking and ends up in third place after *Other* and *Friday*. Indeed, the general trend is for *Saturday Night* to increase its relative ranking throughout the sample period, its audiences increasing over 30 percent from 2000 to 2003, alone. These patterns broadly conform to the studies that have examined attendance slots, such as Schofield (1983), García and Rodríguez (2002), Knowles *et al*. (1992) and Forrest and Simmons (2006), which have found that public holiday matches and certain weekend matches attract greater attendances.

{Insert Table 2: *Average Match Attendances by Year and Slot*}

From 1995 onward, each of the 16 clubs played once in each of the 22 rounds and a fortunate few were allocated the special *Other* slots. To provide a glimpse into the slot allocations over the latter period of the data sample, Table 3 lists each club's 2002 slot allocations. The *Big-4* (Victorian) clubs, Carlton, Collingwood, Richmond and Essendon, constitute 25 percent of the 16 AFL clubs, but received more than 62 percent of the best-attended *Other* playing slots and 48 percent of the next-

[12] The competition consisted of 12 teams between 1925 and 1987; the league expanded to include Brisbane and the West Coast clubs in 1987. Adelaide and Freemantle joined in 1991 and 1995, respectively, increasing the

best-attended *Friday* playing slots in that year. When it came to the least-attended slots, *Saturday* and *Sunday*, they received 26 percent and 14 percent, respectively. In other words, Table 3 shows that the *Big-4* clubs generally did very well in the allocation of highly-attended *Friday* and *Other* slots. Carlton fared the least well of the *Big-4*. Table 3 also reveals that two of the *Big-4*, Collingwood and Essendon, attracted the largest match attendances in 2002, while a third, Richmond, essentially tied for third in attendances.

{Insert Table 3: *2003 Slot Allocations Ranked by Average Attendance in 2002*}

3. A Simple Model of Slot Allocations

We now turn to our analysis of *how* favorable and unfavorable playing slots might be decided by league officials. For simplicity's sake, we discuss the mechanics of distribution wholly in terms of the league's allocation of *favorable* slots; in our case, these will be the most highly-attended *Friday* and *Other* slots. The model can easily accommodate unfavorable slots and indeed we do this in our empirical test, below. For our dependent variables, we amalgamate *Friday* and *Other* slots into a composite *Friday + Other* slot, because *Other* slots are too sparsely distributed in some years to be treated as a continuous variable for our econometric test in the next section. Greater detail on this amalgamation is provided, below, in the empirical section of the paper. Similarly, *Saturday Night* was discontinuous and we amalgamated it with *Sunday* to improve continuity and to avoid heteroscedastic model errors. Figure 1 plots the percentage share of each of the three categories of slots, referred to as slot *j*, that we empirically examine: i) *Friday + Other* (i.e., *F+O*), ii) *Saturday* (i.e., *Sat*), and iii) *Saturday Night + Sunday* (i.e., *SatN+Sun*) for the 13 clubs between 1990 and 2003. These three sets of scheduling allotments are the dependent variables we seek to explain in the following analysis.

{Insert Figure 1: Slot *j*'s Percentage Share of Total by Year, 1990–2003}

We introduce our model by proposing three possible distributional scenarios concerning favorable slot allocations:

1. Each team receives an equal allocation of favorable timeslots.

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number of clubs to 16.

2. Teams do not receive an equal allocation of favorable slots: the league rewards clubs with favorable slots as an *inverse* function of some team characteristic.
3. Teams do not receive an equal allocation of favorable slots: the league rewards clubs with favorable slots as a *positive* function of some team characteristic.

The first option can be defined as an "equal shares" or "neutral" allocation of slots, since under that rule, each team receives an equal allocation of favorable slots regardless of any other criteria. Such an allocation disregards any sort of extrinsic characteristics of the teams. Under this rule, each team receives an allocation of $1/n$ favorable slots, where n = number of teams. Should we observe this particular outcome, league objectives—which we can only infer—might be either to allocate shares equally across teams deliberately or it may be the non-deliberate outcome of allocating shares on a completely random basis.

Under scenarios (2) and (3), above, slots are not allocated equally. We now consider three plausible team characteristics upon which league officials might base their decisions: (a) a club's match attendance of the previous season; (b) a club's past competitive performance; or (c) a club's regional or "power" status, e.g., its *Victorian* or *Big-4* status.

Allocating favorable slots as an *inverse* function of attendance, previous competitive performance, *Victorian*, or *Big-4* status as per scenario (2), above, suggests that AFL decisions are redistributing current resources away from either winning or legacy teams. Redistributing to losing teams is a policy that directly targets on-field performance, and is thus consistent with competitive balance objectives. Redistributing to low-attendance clubs is also consistent with competitive balance objectives as it is expected to promote on-field balance *indirectly* by favoring the lower-attendance clubs financially. Finally, redistributing *away from* either the *Victorian* clubs or the *Big-4* would have an ambiguous effect on on-field balance. However, it would be consistent with an infant industry objective that seeks to redistribute current resources away from the legacy teams toward the newly-created expansion teams. All of the *non-Victorian* clubs can be considered recent entrants (expansion teams) or are wholesale revivals of failing *Victorian* teams in non-Victorian locations. Besides being legacy clubs, the *Victorians* and the *Big-4* tend to be among the most financially secure (although a subset of weak legacy teams has faltered in recent years). The *Big-4* enjoy some of the highest "memberships" (*viz* annual supporters), and they are among the top five most winning teams when it

comes to premierships over the 100 plus year history of the AFL and its *Victorian Football League* predecessor (i.e., Essendon and Carlton tie for the most number of premierships, Collingwood places second, and Richmond fifth).

A *positive* relationship between allocations and these three variables as per scenario (3), above, suggests a bias in favor of strong teams (defined either in terms of performance or finances) or legacy teams at the expense of weak or expansion teams. In effect, the league would be rewarding popular clubs, winning clubs, or the traditional *Victorian* (or *Big-4*) clubs. None of these possibilities strike us as consistent with competitive balance objectives. Rather, as suggested in the Introduction, we posit that a positive correlation between favorable slots and any of these variables is evidence of profit maximization for the league as a whole. Further, redistributing in favor of the *Victorian* (or *Big-4*) clubs is consistent with bias toward the legacy clubs (or some subset of them) and perhaps tacit collusion with them, since the financial interests of the high-attendance-high-viewership clubs align with the interests of the league management on the matter of maximizing attendance and television viewership.

In turning to our basic model and the empirical tests that follow, we are interested in examining the problem of slot allocation in light of the three possible variations in allocational rules discussed above. We hope to shed light not only on how particular clubs fared, but also on any patterns that might emerge as the league allocates scarce favorable slots. In effect, we attempt to construct the league's allocation "rule." Specifically, we investigate whether (1) some teams received favorable slots *as an inverse function* of the extrinsic criteria we discussed, or whether (2) some teams received favorable slots *as a positive function* of the extrinsic criteria.

We introduce our basic model by supposing there are only two teams in a league: Sydney (a *non-Victorian* expansion team) and Essendon (a *Big-4 Victorian* team). In a two-club context, the model is:

$$S_{ijt} = \alpha_{ij} + \beta_{ij} ATT_{it-1} + \gamma_{ij} D_i + \delta_{ij} D_i ATT_{it-1} + \varepsilon_{ijt}, \qquad (1)$$

where S_{ijt} is club i's share of slot j received in year t. For our analysis in this section and in the first set of estimations in the econometric analysis, we will take slot *j* to imply the most favorable

F+O slots. ATT_{it-1} is club i's share of total match attendances in the previous year. D_i is a dummy variable that takes a value of one if the club is, for example, Sydney (a *non-Victorian* club) and zero if it is, for example, Essendon (a *Victorian* club); ε_{ijt} is a random error term. For Essendon, the model reduces to the following:

$$S_{Ess,F+O,t} = \alpha_{ij} + \beta_{ij} ATT_{it-1} + \varepsilon_{ijt}. \quad (2)$$

For Sydney, however, $D_i = 1$ implies that the model reduces to:

$$S_{Syd,F+O,t} = (\alpha_{ij} + \gamma_{ij}) + (\beta_{ij} + \delta_{ij}) ATT_{it-1} + \varepsilon_{ijt}. \quad (3)$$

In light of our allocational focus, the γ_{ij} and δ_{ij} coefficients are constructed to measure any asymmetric treatment that Sydney receives in its allotment of the favorable *F+O* slots. As the coefficient on the intercept dummy, γ_{ij} provides a measure of any *outright bias* in allotting favorable slots to Sydney (regardless, for example, of attendances). In the case where $\gamma_{ij} > 0$, Sydney is receiving a greater share of the *F+O* slots than Essendon, which might be because of any of the specific attributes that we test for, such as it being a *non-Victorian* team, or a *non-Big-4* team, or because of its previous on-field performance. Of course, it might also be the result of some other idiosyncratic reason unknown to us. The second coefficient, the slope coefficient δ_{ij}, measures any *bias towards Sydney as a result of larger attendance shares* that it might enjoy. In other words, when $\delta_{ij} > 0$, a larger attendance share for Sydney is treated more favorably in terms of *F+O* slot allotments than an equal attendance share for Essendon.

If the allocation of *F+O* slots were *independent of match attendance*, the coefficients on a team's own lagged attendance, β_{ij}, and any special bias towards a particular team's attendance record, δ_{ij}, would be zero, or $\beta_{ij} = \delta_{ij} = 0$. Moreover, when $\gamma_{ij} = 0$, no asymmetric treatment for particular clubs exists and, ignoring random effects, the share of *F+O* slots, S_{ijt}, will simply equal the constant term, or $S_{ijt} = \alpha_{ij}$. In such a case, since each club receives an identical share, α_{ij}, it is

obvious that $\alpha_{ij} = 1/n$; this is synonymous with the first scenario presented above, the *equal shares* distribution of slots.

In the case where greater match attendances are rewarded with favorable *F+O* slots, $\beta_{ij} > 0$ and, if both clubs are rewarded equally for match attendances, the slope dummy, δ_{ij}, will equal zero. If Sydney is more highly rewarded for match attendances, $\delta_{ij} > 0$ and, if it is less favorably rewarded for match attendances, $\delta_{ij} < 0$. Note that it will be true that $\alpha_{ij} = 0$, and therefore $S_{ijt} = \beta_{ij} ATT_{it-1}$, in the case where: (i) attendances are rewarded (i.e., $\beta_{ij} > 0$), (ii) attendances matter equally across teams (i.e., $\delta_{ij} = 0$), and (iii) *only* attendance matters in allocating shares. Moreover, because ATT_{it-1} is defined as club *i*'s percentage share of the previous season's overall league attendance, it will be true that $\beta_{ij} = 1$, and a club's allocation of *F+O* slots, S_{ijt}, will simply equal its previous season's attendance share, or $S_{ijt} = ATT_{it-1}$.

{Insert Figure 2: Allocation of Slots as a Function of Attendance}

Figure 2 illustrates several of these possibilities, ignoring random effects. If *F+O* slots are *not* allocated on the basis of attendance and there is no asymmetry in the treatment of teams, then each of the two clubs in our example receives 50 percent of the slots, since all of the variables drop from the equation except for $\alpha_{ij} = 1/n = 0.5$. If there is outright asymmetry in the allotment of shares based on some other extrinsic criteria, such as a bias for or against the *Big-4*, *Victorian* or winning clubs, then $\gamma_{ij} \neq 0$; indeed, this variable can be thought of as capturing any of these effects, although we specifically add separate dummy variables for *Big-4*, *Victorian*, and on-field performance effects in our econometric test. If there is, for example, some positive bias toward Sydney, $\gamma_{ij} > 0$. The share of *F+O* slots would therefore conform to the pattern suggested in Figure 2, in which Sydney = *A* and Essendon = *B*, and where $A > B$ and $A + B = 1$.

If favorable slots are rewarded proportionally on the basis of attendance, *and only on attendance*, a team's percentage allocation of *F+O* slots will be exactly equal to its attendance share

as a percentage of overall league attendance in the previous season. If Sydney had smaller attendance shares in the previous season, Sydney will receive a smaller allocation of favorable slots in year *t* than Essendon will. Such a scenario is illustrated by the positively sloped line, S_{ij}, in Figure 2, which passes through the origin at 45° (i.e., $\alpha_{ij} = 0$ and $\beta_{ij} = 1$). If, on the other hand, bias exists, such that Sydney is more favorably rewarded for any given level of attendance than its rival (i.e., $\delta_{ij} > 0$), its allocation will lie above the illustrated S_{ij} line (where $\beta_{ij} = 1$) and Essendon's allocation will lie below it. In this latter case, each team will have its own S_{ij} line and Sydney's will be more steeply sloped than Essendon's.

The *F+O* club shares, illustrated in Figure 2, can be thought of as the "equilibrium" shares that we would expect each club to obtain over the long run. In any given year, however, the share for a particular club might not conform to its long-run equilibrium. In this dynamic setting, we expect that observed short-term club shares will adjust non-linearly towards their equilibrium long-run values over time. Figure 3 illustrates this scenario. In this example, we simply assume that Sydney's *equilibrium* allocation (denoted S^*_{Sydney}) of the favorable *F+O* slots, $S^*_{Sydney} = (\alpha_{ij} + \gamma_{ij}) + (\beta_{ij} + \delta_{ij})ATT_i$, is smaller than Essendon's equilibrium allocation, $S^*_{Essendon} = \alpha_{ij} + \beta_{ij} ATT_{it-1}$ (i.e., $\gamma_{ij} < 0$ and $\beta_{ij} = \delta_{ij} = 0$). This diagram implies that Sydney's initial allocation, S^0_{Sydney}, adjusts more quickly towards its equilibrium level than does Essendon's, S^0_{Sydney}. To accommodate this dynamic process, we augment equation (1) by incorporating non-linear adjustments, which allows the allocation shares, S_{ijt}, to also depend on the inverse of time ($1/t$). In our econometric test, we therefore add dummy variables to equation (1) that allow for the possibility that clubs differ in their speed of adjustment:

$$S_{ijt} = \alpha_{ij} + \beta_{ij} ATT_{it-1} + \gamma_{ij} D_i + \delta_{i\,j} D_i ATT_{it-1} + \lambda_{ij} 1/t + \kappa_{ij} D_i 1/t + \varepsilon_{ijt}\,. \qquad (4)$$

{Insert Figure 3: Dynamic Adjustment of Slot Allocation as a Function of Time}

Thus, as $t \to \infty$, $1/t \to 0$ in the dynamic adjustment terms, such that the remainder of the equation represents a club's equilibrium allocation share, S_{ij}^{*} (i.e., the original equation 1).

Finally, we wish to introduce the one additional variable that is key to our analysis of slot distributions. Besides testing for the effects of attendance, *Big-4* and *Victorian* status, and on-field performance, we also test for any effects of the new broadcasting contract that went into effect in 2002. We do this by looking for any systemic breaks in the allocation scheme in 2002 compared to prior years. Like the others, this variable enters our test as a dummy variable. We hypothesize that the league paid greater attention to a club's ability to draw attendance and television audiences in 2002 and that the intercept and attendance slope dummy coefficients for 2002 will be negative and positive, respectively. That is, a significant broadcasting effect will reduce the reduce the fixed or autonomous allocations of favorable slots made to clubs and increase the weight the league puts on clubs' attendance shares.

4. An Empirical Investigation of Slot Allocations: Econometric Results

This section presents our econometric results. In the first subsection, we analyze *F+O*, the most highly-attended—or *favorable*—group of slots. In the second subsection, we analyze *Saturday Nights + Sunday* (*SatN+Sun*). The third subsection provides our estimates of the allocation of the least favorable slot, *Saturday* (*Sat*).

A. Estimations of *Friday + Other* Allocations

We perform our estimations using ordinary least squares. Table 4 includes the resulting estimated equation for the 13 AFL clubs that played over the entire 1990 to 2002 period. These 13 clubs are a subset of the 17 clubs identified in Table 1, which excludes Adelaide, Freemantle, Port Adelaide and Fitzroy because these clubs did not survive for the entire sample period. We withhold 2003 allocations to test out-of-sample forecast performance of the model and we control for outliers using dummies. We also adjusted attendance shares to conform to changes in the number of AFL clubs over the period.[13] Where the estimated intercept and slope coefficients for particular clubs did not differ significantly from each other, we restricted them to equality.

[13] The results for the nine dummy variables are not included in Table 4 in the interest of parsimony, however, the complete estimated equation is given in Appendix 1. To obtain the adjusted attendance shares, we multiplied

{Insert Table 4: *Results of OLS Regressions for F+O Allocation Shares, 1990–2002*}

The equation represented in Table 4 explains 60 percent of the variance in the allocation of *F+O* slots to AFL clubs, which is notable, given the volatile and idiosyncratic scheduling allocations that AFL league officials made privately. The estimated coefficients are generally well determined. The model errors are not significantly correlated, abnormal or heteroscedastic and give no grounds for suspicion that the functional form is mis-specified. Our results include the following observations:

1. The attendance variable, $ATTS_{t-1}$, is very nearly significant at the 5 percent level.
2. The *1/Time* variable is strongly significant.
3. The test for *non-Victorian* effects, *DNONVICTORIAN*, is strongly significant at the 1 percent level.
4. Our 2002 broadcasting dummy, *D2002*, is strongly significant at the 1 percent level as is an attendance slope dummy for the 2002 broadcasting effect (i.e., $D2002 \times ATTS_{t-1}$).
5. The *Big-4* dummy variable was insignificant.
6. Our two measures of club performance were insignificant.
7. Two other dummies for particular subset of teams multiplied by *1/Time* are strongly significant; one subset is [*DCOLL* + *DESS*] and the other is [*DBRIS* + *DBULL* + *DCARL* + *DGEE* + *DHAW*] .
8. Two intercept dummies, one for Richmond (i.e., *DRICH*) and one for a particular group of teams (i.e., *DBULL* + *DCARL* + *DGEE* + *DHAW*), were significant.
9. Several "slope dummies" were also strongly significant for specific teams (i.e., Melbourne, Richmond, St. Kilda).

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the attendance shares by the adjustment factor ($NOAFL_{t-1}/NOAFL_t$), where NOAFL is the number of AFL clubs. The rationale is as follows. Suppose, for simplicity, that a club's allocation is equal to its previous period's attendance share. If, when 15 clubs compete, the club receives a 1/15th share of attendances, it would expect to receive a 1/15th share of allocations the following year. However, if the number of clubs increases from 15 to 16 in the following year, then we must rescale its previous period attendance share by multiplying it by the adjustment factor (15/16) to allow for the change in the number of clubs; otherwise the incoming 16th

10. Three outlier dummies for specific clubs in specific years were also significant; these were necessary to achieve normality in the error distribution and to validate the application of the standard tests. The other estimated coefficients are robust with respect to their exclusion and, accordingly, we do not discuss them further.

The effects of the transitory time-adjustment fell as the sample period progressed; this result indicates that clubs' shares of *F+O* slots adjusted more quickly towards their equilibrium values. Collingwood and Essendon's actual allocation shares adjusted *up* most quickly towards their equilibrium values. Richmond, Kangaroos, Melbourne, St. Kilda, Sydney and West Coast adjusted less quickly *down* to their equilibrium values. Carlton, Geelong, Hawthorn, Bulldogs and Brisbane were just 1.2 percent shy of their equilibrium allocations at the outset in 1990 and this small disequilibrium died away as the period progressed.

The sign on the *DNONVICTORIAN* dummy is negative, suggesting that, *ceteris paribus*, *non-Victorian* teams receive inferior allocations of *F+O* slots. However, while the allocations to the *non-Victorian* clubs, Brisbane, Sydney and West Coast, clearly differed from some of the *Victorian* clubs, they were made on a basis very similar to those given to some *Victorian* teams, such as Geelong, Hawthorn and the Bulldogs. In general, the differences between *Victorian* and *non-Victorian* allocations are statistically significant, but the results are nuanced as is evidenced by the several specific club dummies.

When it comes to the *Other Victorian* clubs (i.e., the *non-Big-4 Victorians*), the Kangaroos received their equilibrium allocation on a basis identical to the *Big-4* Collingwood and Essendon, whereas Geelong, Hawthorn and the Bulldogs received their equilibrium allocation on the same basis as the *Big-4* Carlton. Melbourne and St. Kilda defy the trend of positively related *F+O* slot allocations and attendance shares. In the mid-1990s, Melbourne's share of *F+O* slots doubled to around 10 percent even though its attendance share was slowly drifting south; earlier, in 1993, St. Kilda's share dropped from over six percent to under two percent, even though its previous season attendance share

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club receives no allocation. The adjustment factors were 14/15 in 1991 and 15/16 in 1995; in all other years, the adjustment factor is 1 and the adjusted and unadjusted attendance shares are the same for those years.

had risen. This negative relationship between attendance and *F+O* slot allocations was also repeated in later years.

{Insert Table 5: *Implied AFL* F+O *Slot Allocation Rule, 1990–2002*}

Table 5 conveniently illustrates the combined effects of the various intercept and slope dummies in each club's particular case. Those clubs with identical effects were grouped together, such as Collingwood and Essendon. The implied AFL allocational "rule" suggests that each club's share of *F+O* slots is: (i) partly autonomous (i.e., the club's estimated regression intercept combined with any relevant intercept dummies); (ii) partly dependent on extrinsic factors, such as its *non-Victorian* status and an individual club's unspecified idiosyncrasies; (iii) partly dependent on its share of previous season attendances (i.e., its estimated attendance slope coefficient times its share of attendances combined with any relevant slope dummies); and (iv) partly time-related (i.e., its estimated inverse-of-time slope coefficient times the inverse of time combined with any relevant time dummies).[14]

The 2002 dummy was strongly significant, both economically and statistically. Table 5 specifically demonstrates the difference between the *pre*-2002 allocation rule and the *post*-2002 allocation rule. We interpret this result as a dramatic change in the rule for allocating scheduling slots once the 2002 broadcasting contract came into effect. As can be noted from the coefficients, autonomous allocations were cut by 14.5 percent to all clubs, while the weight given to their previous season match attendances—or on clubs' crowd-pulling ability—was increased by 2.2 percent. Clubs like Collingwood and Essendon with large member bases and attendance records received increased shares of the coveted *F+O* slots, so too did the highly-attended (but under-performing) Richmond. The *non-Victorian* clubs received reduced allocations of favorable slots in 2002.

{Insert Table 6: *Actual and Model Forecasts of F+O Slot Allocations in 2003 …*}

[14] It is worth noting that while we are able to logically and empirically account for the role that *non-Victorian* status, attendance, and on-field performance plays (or does not play) in allocating slots, we obviously cannot account for some of the nuanced results for particular teams or groups of teams as evidenced by the various team dummies. It is our hope that these results will be useful for future qualitative investigation into the role scheduling has played for specific clubs over this period.

Table 6, which categorizes teams in terms of their *Victorian* or *non-Victorian* status, condenses and simplifies the Table 5 estimates for ease of interpretation. It gives the *actual* shares of *F+O* slots each club received in 2003 and our model *forecasts* of both the *pre*-2002 allocation and *post*-2002 allocation that each club would be expected to receive.[15] Under the pre-2002 allocation rule, clubs generally received a larger *autonomous* allocation and attendance was not as well rewarded as it was post-2002. For example, the model predicts that Collingwood and Essendon would have each received 11 percent of the available *F+O* slots under the pre-2002 rule. When the rule is revised in 2002, the model projects their allocation shares to increase to 18 percent and 16 percent, respectively. In fact, Collingwood and Essendon each received 18 percent of the available slots in 2003. With the exception of Hawthorn, the "2002 effects" dominate the projected allocations of the remaining *non-Big-4* clubs. The proportionate effect is greatest on those clubs with the smallest shares of *F+O* slots and the two percent share each of the *non-Victorian* clubs actually received contrasts sharply with all of the *Victorian* clubs except for the Bulldogs.

Our final estimating equation in Table 4 is also noteworthy for what it does *not* include. We tested the *Big-4* as a dummy variable, itself, and found it insignificant; it was therefore dropped from our final estimating equation. Our interpretation is that while *some* of the *Big-4* teams receive very favorable allocations, there is not a clear distinction that sets all four teams clearly apart from the others. Collingwood and Essendon are apparently in a "league unto themselves" when it comes to allocations and attendances. And, as noted, Carlton received allocations similar to Geelong, Hawthorn, and the Bulldogs, while Richmond received an allocation unlike any other team.

We also tested the clubs' performance in the previous season as measured by a dummy variable indicating whether a club made it to the playoffs and another continuous variable that measured the number of points a team amassed over the previous season as a fraction of the maximum points attainable. We found no correlation between either of these measures of performance and allocations, which, itself, is consistent with the hypothesis that the AFL ignores competitive balance objectives when allocating slots.

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[15] Table 6 also gives the previous 2002 season attendance share of each club. Since 1/t = 1/15 = 0.0667 in 2002, the 2003 forecasts in Table 6 can be directly calculated from Tables 5 or 6.

B. Estimating the Remaining Slots

As suggested above, it is impossible to statistically estimate each club's allocation of *Saturday Night* slots on their own. From 1990 to 1992, fewer than a half dozen *Saturday Night* games were played and those attracted miserable attendances compared with any other slot (see Table 2). No games were played on *Saturday Night* in 1993, and only one was played in 1994.[16] From 1995, onwards, however, the number of *Saturday Night* slots and the attendances they attracted surged. By 2003, more games were played on *Saturday Night* than on *Saturday* and the former attracted larger attendances than either *Saturday* or *Sunday* games. We were therefore forced to amalgamate the allocation of *Saturday Night+Sunday* (*SatN+Sun*) slots. We then separately estimate the allocation of *Saturday* slots.[17]

i. Estimating *Saturday Night + Sunday* Slots

The estimated equation for the share of *SatN+Sun* slots that each of the 13 clubs received is given in Table 7. As the *F+O* allocation shares are strictly endogenous in this equation, we replace these shares with their Table 7 projected values and then we re-estimate the *SatN+Sun* share equation. The resulting forecasts are given in column two of Table 7.

{Insert Table 7: *Results of OLS Regressions for* SatN+Sun *Slot Shares,* S_{ijt} *, 1990–2002*}

[16] West Coast received 50% of the *Saturday Night* slots in 1994 along with Fitzroy, which is not one of our surviving 13 AFL clubs.

[17] Our rationale is as follows. First, a club's allocation of *Saturday* and *Sunday* slots in any year is simply 22 minus the number of *F+O* slots it receives (which is true for all years except 1993, when only 20 rounds were played and the *non-F+O* slots allocated to a club was 20 minus its allocation of *F+O* slots). *Friday+Other* slots, however, represent only between 14% to 20% of the total available slots in any year. Hence, given a club's estimated allocation of *F+O* slots, it is deceivingly easy to project its *combined* allocation of *Saturday Night* and *Sunday* slots with a high level of accuracy, even if the *F+O* projections are not very accurate. The number of *SatN+Sun* slots available ranged from 80 in 1990 to 226 slots in 2001 (or between 23% and 64% of the total available each year), whereas the number of *Saturday* slots ranged from 62 to 186 slots (or between 18% and 53% of the total available slots in each year). Second, throughout the period, *Saturday* and *Sunday* were closely matched in terms of live audiences, but Jakee *et al.* (forthcoming) provide evidence that *Sunday* attracted larger television audiences in the years 2000 and 2001; in fact, over 100,000 viewers, or 23%, more watched *Sunday* AFL games than *Saturday* AFL games. This fact also supports amalgamating *SatN+Sun* slots into a composite category and modeling *Saturday* slots separately.

This model explains more than 75 percent of the variation in club allocations of *SatN+Sun* slots, which is high for pooled cross-section time series data; the model errors pass the usual diagnostic tests. In general, a club's allocation of *SatN+Sun* slots varied inversely with its allocated share of *F+O* slots and also with its previous season share of attendances. This is especially true for Hawthorn, whose allocation was more than twice as sensitive to changes in its attendance share compared with other clubs.

The *non-Victorian* clubs' autonomous allocation for *SatN+Sun* slots was about 5 percent higher than the *Victorian* clubs over the full period. However, when we consider only the period after 1994, the *non-Victorian* share of these slots fell as its attendance share grew, but then, as the square term implies, tapered off at lower levels. For example, between 1990 and 1994, when *Saturday Night* was a particularly *unpopular* slot, the *non-Victorian* Brisbane, Sydney and West Coast teams received an average annual allocation of the available *SatN+Sun* slots of 14 percent, 12 percent and 12 percent, respectively. These *non-Victorians* make up under 19 percent of all AFL clubs, but collectively averaged 38 percent of all *SatN+Sun* slots—over twice the average share of all AFL clubs.

The increasing popularity of the *SatN+Sun* slots from the mid-1990s onwards was most notably marked by a sizeable fall in the share of these slots allocated to the three *non-Victorian* clubs. The combined average share going to the *non-Victorian* Brisbane, Sydney and West Coast fell from 38 percent between 1990 and 1994 (i.e., approximately 13 percent each) to 25 percent between 1995 and 2003 (i.e., approximately eight percent each), even though their combined average annual attendance share *increased* from 13.5 percent to 15.2 percent between the same sub-periods.

These developments are reflected in the econometric estimates. The *non-Victorian* intercept dummy indicates that, other things being equal, *non-Victorian* clubs averaged five percent more of these slots than other clubs. However, the post-1994 *non-Victorian* attendance slope dummy shows the *non-Victorian* clubs' allocation of these slots declined far more sharply than for other clubs whose attendances increased: the significant positive coefficient on the square of the same variable indicates the falling allocation tended to level off at a lower level (i.e., approximately eight percent). These results further support the hypothesis that scheduling slot decisions are inconsistent with policies that are designed to support the *non-Victorian* expansion teams.

The coefficient on the significant lagged dependent variable implies the explanatory variables have long-term effects about 20 percent greater than their immediate impact and that allocations adjust quickly and smoothly to these equilibrium values. We also had to include five dummy variables to capture outlier values for particular clubs. Two relate to the Bulldogs, whose share of *SatN+Sun* slots inexplicably spiked upwards twice in the early 1990s, and then twice downwards as the decade progressed; the remaining three relate to other idiosyncratic allocations.[18]

We now use the estimated equation to project the club shares of *SatN+Sun* slots in 2003 and compare them with their actual allocations as a quality check on the estimated equation. The results are given in columns 2 and 3 of Table 8 and, with the exception of Hawthorn, the forecasted shares are in broad conformity with the actual outcomes.

{Insert Table 8: *Actual Allocations and Model Forecasts for SatN+Sun* and *Sat*, *2003*}

ii. Estimating the Least-Favorable *Saturday* Slots

The model projection of the share of *F+O* and *SatN+Sun* slots each club will jointly receive in 2003 implies the projected number of *Saturday* slots it will receive in 2003. That is,

$$N_{i,Sat} = 22 - \hat{s}_{i,F+O} \times N_{i,F+O} - \hat{s}_{i,SatN+Sun} \times N_{i,SatN+Sun} . \qquad (5)$$

The model projection of the number of *Saturday* slots club i receives, $\hat{N}_{i,Sat}$, equals the 22 slots it must receive during the season *less* its projected number of *F+O* slots (i.e., its estimated share of these slots, $\hat{s}_{i,F+O}$ times their total number, $N_{i,F+O}$) and *less* its projected number of *SatN+Sun* slots (i.e., its estimated share of these slots, $\hat{s}_{i,SatN+Sun}$ times their total number, $N_{i,SatN+Sun}$). The results for 2003 are presented in columns 4 and 5 of Table 8 and, with few exceptions, conform well with the actual number of *Saturday* slots each club received. We put this impression on a more formal footing by using equation (5) and the fitted values of $\hat{s}_{i,F+O}$ and $\hat{s}_{i,SatN+Sun}$ to make within-sample or historic projections of the number of *Saturday* slots each club received in each year between 1990 and

[18] For example, Geelong's allocation averaged 7% between 1990 and 1994, and it dropped dramatically to about 1% in 1995 and 1996, before recovering to earlier values. Richmond jumped from 6% to 10% in 1993,

2002.[19] We then compared those projections with the actual allocations. Figure 4 provides a visualization of both series.[20]

{Insert Figure 4: Actual and Fitted Values of *Saturday* Slots, 1990–2002}

The total number of available *Saturday* slots oscillates between 186 in 1990 and 62 in 2000 and club allocations range from zero (i.e., West-Coast in 2000) to 18 (i.e., Hawthorn in 1990 and 1992); *Saturday* allocations display considerable variation. Notwithstanding the considerable variation in the actual values, the model projections track the actual series closely as revealed by the computed $R^2 = 0.81$, which shows that the projections explain a significant proportion of the variations in the number of *Saturday* slots clubs received.[21] The projections also serve as a qualitative check on how well the model-estimates *F+O* and *SatN+Sun* slots, since errors in either necessarily carry over into the *Saturday* projections.

5. Conclusion

We began our analysis by noting that competitive balance in sports leagues may not be as critical to the dynamics of sports industries as commonly thought. Indeed, there may be other objectives and Lee and Fort implore economists to divert more of their attention to the "wealth redistribution consequences of league choices…" (2008, p. 292). Our paper attempts to do just that. We analyzed the allocation of scheduling slots in the Australian Football League over the 1990 to 2003 period, a period of considerable expansion for the league as well as financial difficulty for several teams. The end of that period also saw the implementation of a historically lucrative broadcasting contract.

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and Sydney received 15% of the allocations in 1990, well ahead of its 10% average for the full period.

[19] The fitted values $\hat{S}_{i,F+O}$ and $\hat{S}_{i,SatN+Sun}$ were obtained by multiplying their equation coefficient estimates in Table 4 and Table 7, respectively, by the historic values of the corresponding explanatory variables each year from 1990 to 2002.

[20] The number 22 in equation (5) refers to the number of AFL rounds and, hence, the total number of slots each club receives each year. It was changed to 20 in 1993, as only 20 AFL rounds were played that year.

[21] $R^2 = \sum_{i=1}^{13}\sum_{j=1990}^{2002}(\hat{N}_{ij} - \overline{N})^2 / \sum_{i=1}^{13}\sum_{j=1990}^{2002}(N_{ij} - \overline{N})^2 = 0.81$, where $\hat{N}_{ij}$ is the model-projected number of slots club *i* receives in year *j*.

We investigated whether the league's allocation of scheduling slots to teams follows any discernable pattern, being principally interested in any significant asymmetries in the allocation of higher-revenue slots to particular teams, subsets of teams, or teams with certain characteristics. To this end, we developed a simple model with which to capture a number of potential asymmetries in allocations across teams. We then tested several variables that we hypothesized are likely to influence the league's allocation decisions: (a) previous attendance shares, (b) a team's classification as a legacy *Victorian* or expansion *non-Victorian* team, or its classification as one of the powerful *Big-4* teams, (c) past on-field performance, and (d) the 2002 broadcasting contract. In the spirit of Lee and Fort's suggestion to focus on redistributional dynamics, we framed each of our variables in terms of whether we expected it to be congruent with improving the league's competitive balance (or supportive of its "infant" expansion teams), or whether we expected it to increase gate attendance and television viewership, thereby maximizing revenues (profits). We therefore explicitly test for the likely conflict between favoring popular teams, which involves increasing revenues for both those popular teams *and* the league, versus favoring weaker teams in the name of competitive balance or some version of an "infant industry" objective designed to protect the newer expansion teams.

Our empirical models explain nearly 60 percent of the variation in *Friday + Other* slots, 78 percent of the variation in *Saturday Night + Sunday* slots and over 80 percent of the variation in *Saturday* slots. In sum, we found that, until 2002, two of the *Big-4* (*Victorian*) teams, Collingwood and Essendon, received a noticeably larger share of the most treasured of all the playing slots, *Friday + Other*, compared to other clubs; this was true even after allowance was made for their attendance shares. Richmond, another of the *Big-4 Victorians*, is disproportionately rewarded with *Friday + Other* slots for its attendance share, compared with other clubs. Early in the period, the *non-Victorians* received much higher shares of the *Saturday Night + Sunday* slots when these slots were much less popular. However, the *non-Victorians*' allocations were reduced after 1995, when these slots became more attractive.

In terms of our model, we found that the club intercepts, α_{ij}, were non-zero and specific club dummies were non-uniform, $\gamma_{ij} \neq 0$. The non-uniformity dictates that the league's allocations of the most-favorable *F+O* slots are not absolutely equal across clubs, a finding that is consistent with Jakee

et al. (forthcoming). While we found evidence that the league allocates on the basis of attendance (at nearly the five percent level of significance), it is clear that it is not attendance alone that drives allocations. The attendance-slope coefficients are non-unitary (β_{ij} , $\beta_{ij} + \delta_{ij} \neq 1$), from which it follows that allocations of favorable slots are also not perfectly proportional to a club's share of (previous season) attendances. Additional criteria are therefore influencing league decisions.

We did not find support for the hypothesis that clubs within the *Big-4* category were treated homogeneously. We did, however, find evidence of a negative *non-Victorian* effect. Thus, the expansion *non-Victorian* teams received less favorable allocations of *F+O* slots, which suggests that, in its slot allocations at least, the league favors the legacy *Victorian* teams. This result is not consistent with an infant industry policy, despite stated AFL policies that suggest otherwise.

Further evidence that the league ignores competitive balance objectives when allocating scheduling slots is found in our result that a club's lagged on-field performance plays no role in the distribution of slots. If the league had explicitly taken account of favorable slot allocation in implementing its competitive balance strategies, we would have expected to see a negative relationship between the two performance variables that we tested and favorable slot allocations.

Finally, the 2002 intercept and its slope attendance dummies that proxied the historic broadcasting contract are highly significant. We interpret this as a dramatic break with the league's allocation rule prior to 2002. Autonomous club allocations were cut by 14.5 percent in 2002 for all clubs, while the weight given to their previous season match attendances increased by 2.2 percent for each club. Under the new allocation, clubs like Collingwood and Essendon—which were highly-attended (and presumably highly-viewed on television) as proxied by their large attendance shares—received an even larger share of the coveted *F+O* slots as did highly-patronized Richmond. The *non-Victorian* clubs received reduced allocations of the most highly-attended slots in 2002.

Importantly, none of the statistically significant variables that we tested would be consistent with a competitive balance or infant industry objective. Rather, our results support the hypothesis that the league is pursuing a policy of attendance and television-viewership maximization, which implies revenue and ultimately profit maximization. Considering that the interests of some of the legacy clubs, namely those which draw significant crowds or viewers, align with the league's in maximizing

attendance, we further speculate on the existence of some kind of quiet collusion between these groups. The essence of the speculation is that additional rents are created when popular teams play in popular slots, *ceteris paribus*. These rents are then shared by the league and the high-attendance teams: the league receives additional revenue from a more lucrative broadcasting contract, while the powerhouse teams are able to capitalize on both higher gate revenue *and* sponsorship revenue, as suggested by Jakee *et al*. (forthcoming). The details of any such "arrangement" might be explored in future research.

The significance of our broadcasting dummies is important in its own right: a number of authors have speculated over the effect that lucrative broadcasting contracts might be having on sports leagues' decisions. Ours is perhaps the first paper to show econometrically that scheduling is influenced by broadcasters. Indeed, our results are consistent with the hypothesis that league's officials take account of broadcasters' preferences for televising popular teams during popular scheduling slots. This finding confirms earlier, largely anecdotal, claims that AFL teams that are not among the "highly visible" feel that they lost valuable scheduling slots after the historic broadcasting deals came into effect.

Admittedly, it was beyond the scope of this paper to more fully articulate any empirical relationship between these allocational choices and competitive balance in the league, but we hope that future researchers might close this gap. Also, while our tests uncovered several variables of interest that were significant, it was necessary to include a number of club dummy variables. We were unable to explain these particular club idiosyncrasies. Nonetheless, we hope that these results will be useful to other observers who might be able to identify nuances in the league's choices that have eluded us.

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Tables

Table 1: The 16 AFL Clubs and Abbreviations as of the 2003 Season

Victorian		*Non-Victorian*
Big-4	*Other Victorian*	*Expansion*
Carlton (Carl)	Geelong (Gee)	Adelaide (Adel)
Collingwood (Coll)	Hawthorn (Haw)	Brisbane (Bris)
Essendon (Ess)	Kangaroos (Kang)	Freemantle (Free)
Richmond (Rich)	Melbourne (Melb)	Port Adelaide (Port)
	St Kilda (Klda)	Sydney (Syd)
	Western Bulldogs (Bull)	West Coast (WCst)

Note: The 13 underlined clubs are those used in our econometric test, below, because they are the ones that survived our entire data sample period. Abbreviations used in other parts of the paper are in parentheses below each club.

Table 2: Average Match Attendances by Year and Slot

Year		*Other*	*Fri Night*	*Sat*	*Sat Night*	*Sun*	*Total Slots & Ave. Attendance*
1990	Number of Slots	16	26	186	10	70	308
	Average Attendance	32,694	20,214	24,887	9,222	20,077	23,296
1991	Number of Slots	22	28	186	8	86	330
	Average Attendance	30,616	26,343	22,604	7,250	22,335	23,013
1992	Number of Slots	16	30	170	10	104	330
	Average Attendance	49,376	22,560	26,784	11,798	24,305	26,260
1993	Number of Slots	22	38	156	0	84	300
	Average Attendance	47,963	38,404	25,355	n/a	22,629	27,903
1994	Number of Slots	22	30	166	2	110	330
	Average Attendance	46,122	39,769	28,056	28,980	22,936	28,624
1995	Number of Slots	18	40	152	22	120	352
	Average Attendance	46,454	39,047	26,617	30,544	25,988	29,078
1996	Number of Slots	18	44	142	38	110	352
	Average Attendance	55,328	37,129	25,250	28,787	28,876	29,637
1997	Number of Slots	20	42	116	52	122	352
	Average Attendance	41,353	37,440	29,901	31,039	34,424	33,187
1998	Number of Slots	20	44	96	46	136	352
	Average Attendance	47,794	40,176	28,732	29,970	36,029	34,768
1999	Number of Slots	14	44	94	76	124	352
	Average Attendance	44,949	43,277	31,787	26,691	32,498	32793
2000	Number of Slots	38	44	62	76	132	352
	Average Attendance	38,364	37,176	35,605	27,678	30,886	32,618
2001	Number of Slots	8	46	72	86	140	352
	Average Attendance	64,576	42,155	30,478	31,096	32,270	33,643
2002	Number of Slots	10	42	84	88	128	352
	Average Attendance	57,801	43,270	28,627	34,409	27,024	32,066
2003	Number of Slots	8	42	82	88	132	352
	Average Attendance	50,946	42,338	31,276	36,134	28,913	33,371
Average Attendance, 2000–2003		52,922	41,235	31,497	32,329	29,773	32,925

Source: AFL.
Note: two slots = one game.

Table 3: 2003 Slot Allocations Ranked by Average Attendance in 2002

Club (Category)	Other	Friday Night	Saturday (*Day*)	Saturday Night	Sunday	*Total Slots*	*Average Attendance 2002*
Collingwood (*Big-4, Vic*)	3	6	4	7	2	22	50,443
Essendon (*Big-4, Vic*)	1	8	5	4	4	22	45,587
Hawthorn (*Vic*)	0	4	5	4	9	22	35,296
Richmond (*Big-4, Vic*)	1	3	5	8	5	22	35,278
Adelaide (*Non-Vic*)	0	3	4	4	11	22	33,814
Carlton (*Big-4, Vic*)	0	3	7	4	8	22	33,679
Brisbane (*Non-Vic*)	1	0	3	12	6	22	30,326
Geelong (*Vic*)	0	2	7	3	10	22	30,285
Melbourne (*Vic*)	1	3	8	3	7	22	29,994
West Coast (*Non-Vic*)	0	1	7	4	10	22	28,735
Western Bulldogs (*Vic*)	0	1	2	5	14	22	28,361
Port Adelaide (*Non-Vic*)	0	2	4	7	9	22	27,600
Sydney (*Non-Vic*)	0	1	3	10	8	22	27,349
St. Kilda (*Vic*)	1	1	7	5	8	22	26,596
Kangaroos (*Vic*)	0	4	5	5	8	22	25,647
Freemantle (*Non-Vic*)	0	0	6	3	13	22	24,009
Total	8	42	82	88	132	352	
Average Attendances	50,946	42,338	31,349	36,134	28,913		32,066
Big-4 Share (25% of Total)	62.5%	47.6%	25.6%	26.2	14.39%		
Other Victorian Share (37.5% of Total)	25.0%	35.7%	41.5%	28.4%	42.4%		
Non-Victorian Share (37.% of Total)	12.5%	16.7%	32.9%	45.4%	43.2%		

Source: Slot data from AFL; other calculations by authors.

Table 4: Results of OLS Regressions for *Friday + Other* Club Allocation Shares, S_{ijt}, 1990–2002

Regressor	*Coefficient*	*Standard Error*	*T-Ratio*	*[Prob]*
Intercept and Club Intercept Dummies				
INPT	0.09	0.014	6.79	[.000]
DRICH	–0.13	0.059	–2.28	[.024]
(DBULL+DCARL+DGEE+DHAW)	–0.07	0.008	–7.75	[.000]
DNONVICTORIAN	–0.07	0.008	–7.96	[.000]
Slope Coefficient and Slope Dummies for Individual Clubs				
$ATTS_{t-1}$	0.34	0.174	1.94	[.054]
$DMELB \times ATTS_{t-1}$	–0.80	0.148	–5.40	[.000]
$DRICH \times ATTS_{t-1}$	1.31	0.818	1.60	[.111]
$DKLDA \times ATTS_{t-1}$	–1.16	0.154	–7.56	[.000]
2002 Broadcasting Dummies (Intercept and Slope)				
D2002	–0.14	0.036	–4.00	[.000]
$D2002 \times ATTS_{t-1}$	2.20	0.542	4.07	[.000]
Time Adjustment Coefficients (Including Club Dummies)				
1/Time	0.06	0.025	2.26	[.025]
(DCOLL+DESS)×1/Time	–0.26	0.042	–6.21	[.000]
(DBRIS+DBULL+DCARL+DGEE+DHAW)×1/Time	–0.07	0.032	–2.14	[.034]
Three Outlier Dummies				
DHAW2002	0.11	0.029	3.81	[.000]
DSYD1992	0.08	0.028	2.74	[.007]
DWCST1990	0.10	0.029	3.20	[.002]
R-Squared = 0.59660	*R-Bar-Squared = 0.55705*	*F-Stat F(15,153)*	*15.085*	[.000]

Diagnostic Tests

Test Statistics	LM Version	F Version
A. Serial Correlation	CHSQ (1) = 0.051450 [.821]	F(1,152) = 0.046288 [.830]
B. Functional Form	CHSQ (1) = 0.045984 [.830]	F(1,152) = 0.041370 [.839]
C. Normality	CHSQ (2) = 1.9410 [.379]	Not Applicable
D. Heteroscedasticity	CHSQ (1) = 0.001975 [.965]	F(1,167) = 0.0019519 [.965]

Table 5: Implied AFL *Friday + Other* Slot Allocation Rule, 1990–2002

	Long-Run Equilibrium Share of Friday + Other *Allocations*		*Add Transitory Short-Run effects*
Club	*Autonomous Allocation Share**	*Weight Given to a Club's Attendance Share***	*Weight Multiplying the Inverse of Time (1/t)*
1990–2001 (Pre-Broadcasting Contract)			
Big-4			
Carlton	0.02	0.34	–0.01
Collingwood and Essendon	0.09	0.34	–0.20
Richmond	–0.04	1.65	0.06
Other Victorian			
Kangaroos	0.09	0.34	0.06
Geelong, Hawthorn, and Bulldogs	0.02	0.34	–0.01
Melbourne	0.09	–0.46	0.06
St. Kilda	0.09	–0.82	0.06
Non-Victorian			
Brisbane	0.02	0.34	–0.01
Sydney and West Coast	0.02	0.34	0.06
Incremental 2002 Effects (Post-Broadcasting)			
All Clubs	–0.14	+2.20	*Nil Effect*

Table 6: Actual and Model Forecasts of *F+O* Slot Allocations in 2003 on a Pre-2002 and Post-2002 Basis

		Actual Share	*Forecast Share*	
Club	*Club Attendance Share, 2002*	*Actual Share of* F+O *Allocation, 2003*	*Forecast Share: Pre-2002 Allocation Rule*	*Forecast Share: Post-2002 Allocation Rule*
Victorian				
Collingwood	10%	18%	11%	18%
Essendon	9%	18%	11%	16%
Carlton	7%	6%	5%	5%
Richmond	7%	8%	8%	8%
Melbourne	6%	8%	7%	5%
Geelong	6%	4%	5%	3%
Hawthorn	7%	8%	5%	5%
Kangaroos	5%	8%	11%	8%
Bulldogs	6%	2%	5%	2%
St. Kilda	5%	4%	5%	2%
Non-Victorian				
Brisbane	5%	2%	5%	2%
Sydney	6%	2%	4%	3%
West Coast	6%	2%	5%	2%

Note: Figures rounded for convenience.

Table 7: Results of OLS Regressions for *SatN+Sun* Slot Shares, S_{ijt}, 1990–2002

Regressor	*Coefficient*	*T-Ratio*	*[Prob]*
Intercept and Club Intercept Dummies			
INPT	0.06	9.003	[.000]
DNON-VICTORIAN	0.05	8.019	[.000]
Lagged Dependent Variable and Projected F+O Slots			
PREVIOUS SEASON SHARE OF SatN+Sun *SLOTS,* S_{ijt-1}	0.18	2.828	[.005]
PROJECTED CURRENT F+O *SLOTS,* $\hat{S}_{i,F+O,t}$	–0.13	–3.660	[.000]
Slope Coefficient and Slope Dummies for *Non-Vic* and Individual Clubs			
$ATTS_{t-1}$	–0.13	–1.765	[.079]
$DHAW \times ATTS_{t-1}$	–0.16	–2.667	[.008]
$DNON\text{-}VICTORIAN\ POST\ 1994 \times ATTS_{t-1}$	–1.42	–3.477	[.001]
$(DNON\text{-}VICTORIAN\ POST\ 1994 \times ATTS_{t-1})^2$	14.13	2.035	[.044]
Five Outlier Dummies			
DBULL (1990 and 1992)	0.04	3.708	[.000]
DBULL (1993 and 1997)	–0.04	–4.104	[.000]
DGEE (1995 and 1996)	–0.04	–4.151	[.000]
*DRICH*1993	0.04	2.660	[.009]
*DSYD*1990	0.03	2.034	[.044]
R-Squared = 0.78 *R-Bar-Squared = 0.76* *F-Stat = 46.13*			

Diagnostic Tests

Test Statistics	LM Version [Prob]	LM Version [Prob]
A. Serial Correlation	CHSQ (1) = 0.273 [.601]	CHSQ (1) = 0.251 [.617]
B. Functional Form	CHSQ (1) = 0.997 [.318]	CHSQ (1) = 0.902 [.339]
C. Normality	CHSQ (2) = 0.495 [.781]	Not Applicable
D. Heteroscedasticity	CHSQ (1) = 0.149 [.699]	CHSQ (1) = 0.147 [.701]

Table 8: Actual Allocations and Model Forecasts for *SatN+Sun* and *Sat*, 2003

	SatN+Sun *Slots*		Saturday *Slots*	
Club	*Actual Share of* SatN+Sun *Slots in 2003*	*Forecast Share of* SatN+Sun *Slots in 2003*	*Actual Number of* Saturday *Slots, 2003*	*Forecast of* Saturday *Slots, 2003*
Victorian				
Carlton	5%	6%	7	6
Collingwood	4%	4%	4	6
Essendon	4%	4%	5	6
Richmond	6%	4%	5	6
Melbourne	5%	6%	8	7
Geelong	6%	6%	7	7
Hawthorn	6%	3%	5	8
Kangaroos	6%	5%	4	5
Bulldogs	9%	6%	4	7
St. Kilda	6%	7%	6	6
Non-Victorian				
Brisbane	8%	9%	3	3
Sydney	8%	8%	3	3
West Coast	6%	8%	7	3

Note: Columns 4 and 5 figures rounded to nearest integer for convenience.

Figures

Figure 1: Slot *j*'s Percentage Share of Total by Year, 1990–2003

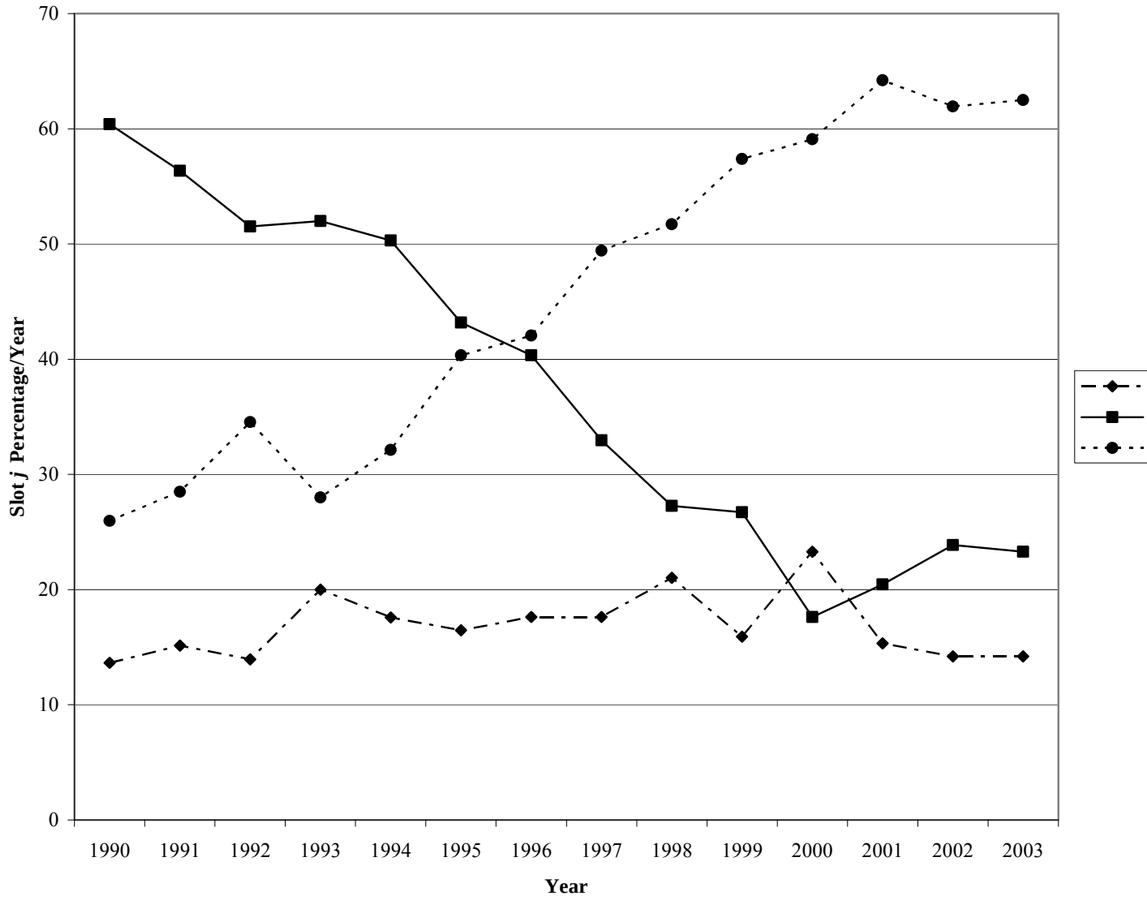


Figure 2: Allocation of Slots as a Function of Attendance

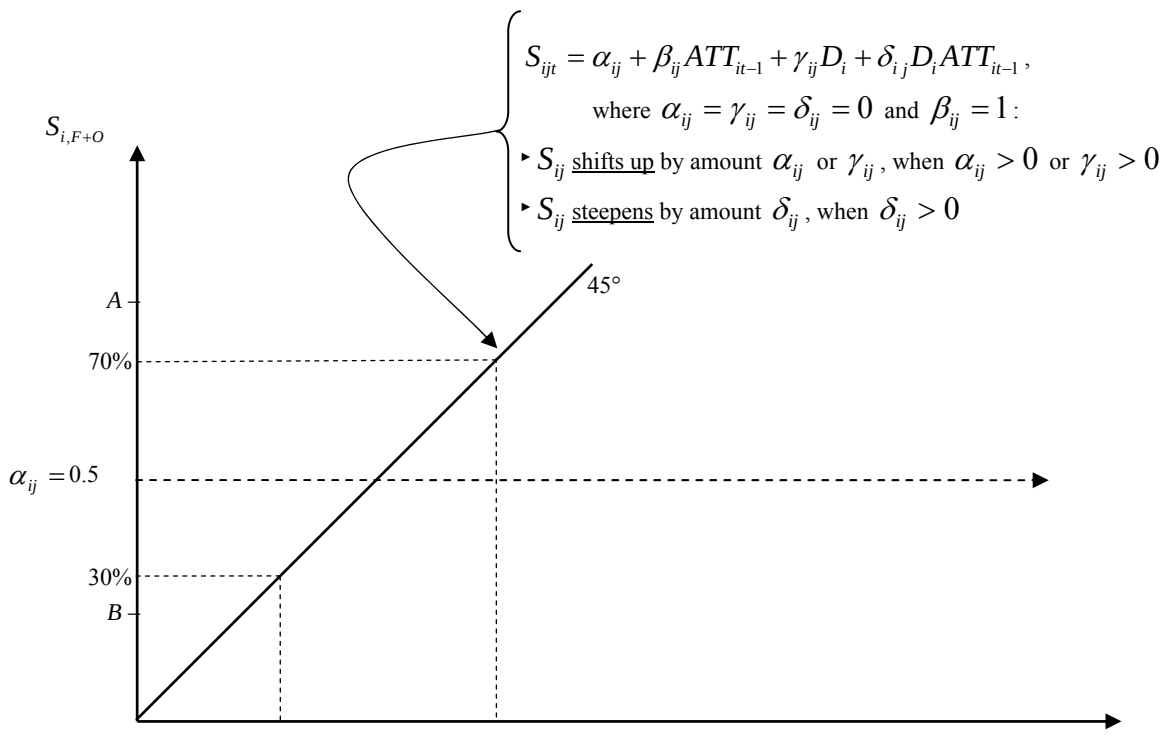


Figure 3: Dynamic Adjustment of Slot Allocation as a Function of Time

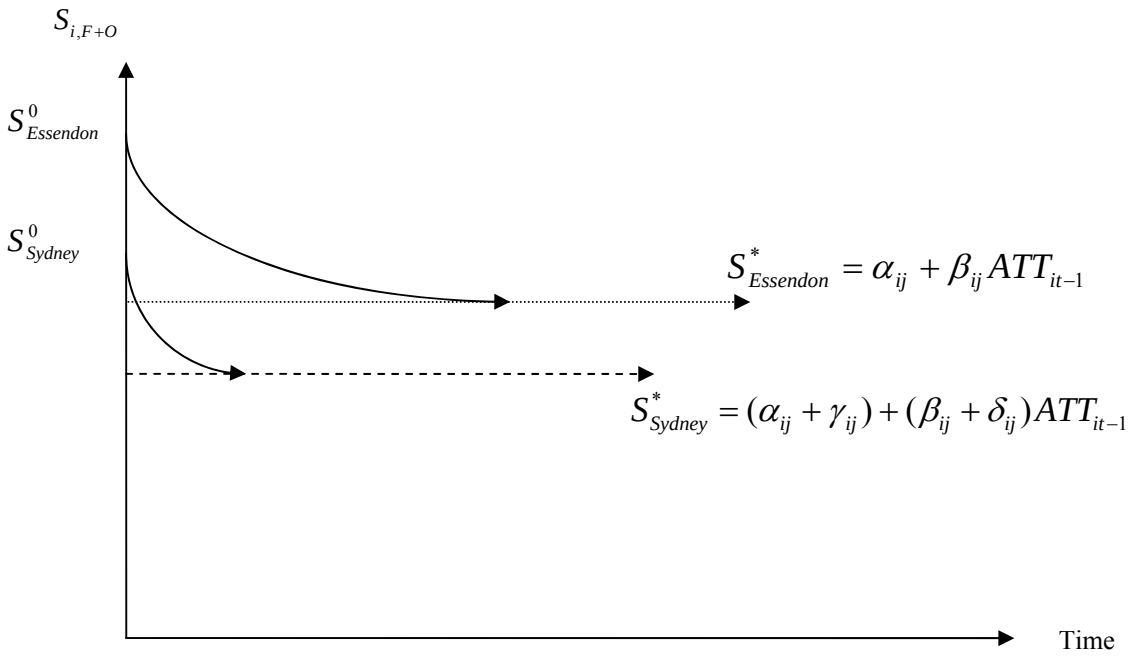
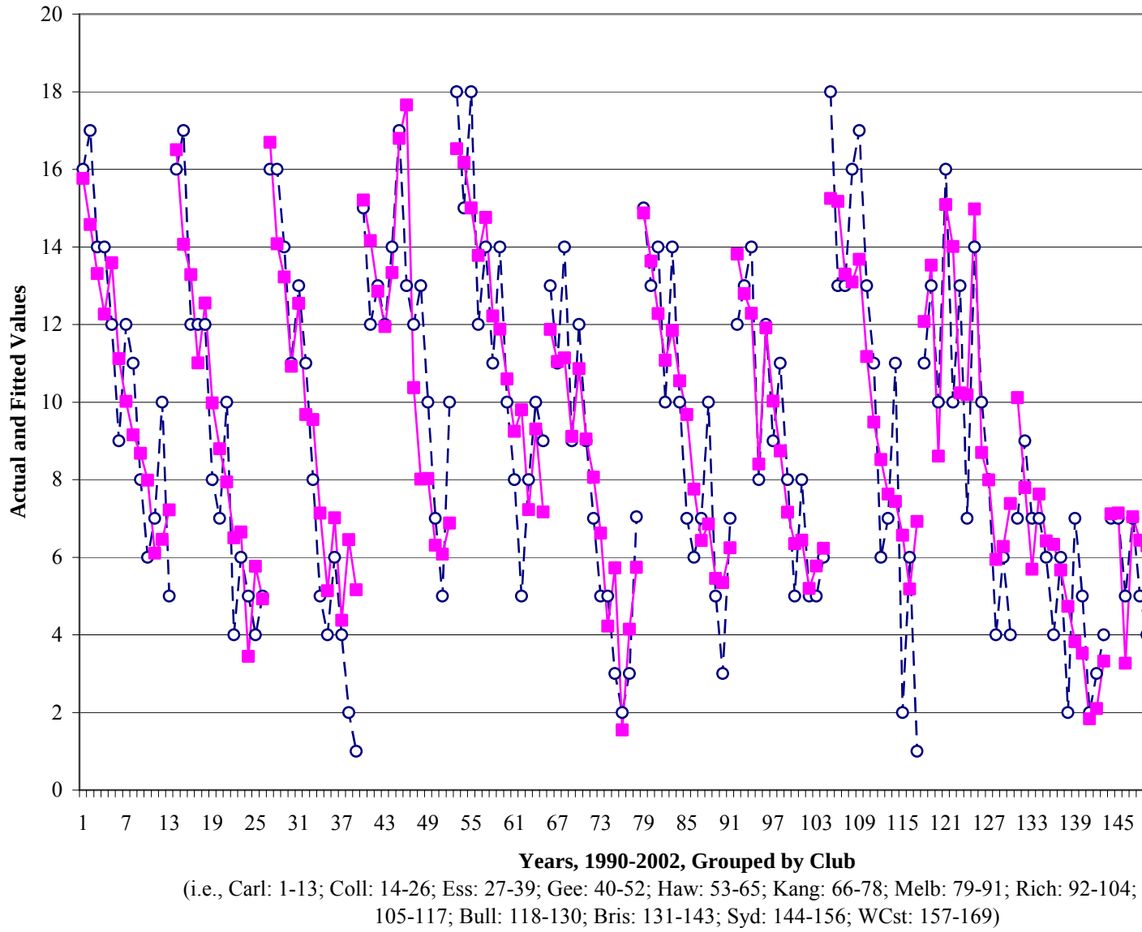


Figure 4: Actual and Fitted Values of *Saturday* Slots, 1990–2002



Appendix

Appendix: Full Report of OLS Regressions for Friday + Other Club Allocation Shares, S_{ijt}, 1990–2002

Regressor	*Coefficient*	*Standard Error*	*T-Ratio*	[*Prob*]
Intercept and Club Intercept Dummies				
INPT	0.09	0.017	5.10	[.000]
DRICH	–0.16	0.068	–2.35	[.020]
(*DBULL+DCARL+DGEE+DHAW*)	–0.07	0.009	–7.54	[.000]
DNONVICTORIAN	–0.06	0.010	–5.26	[.000]
Slope Coefficient and Slope Dummies for Individual Clubs				
$ATTS_{t-1}$	0.37	0.304	1.20	[.228]
$DMELB \times ATTS_{t-1}$	–0.78	0.155	–5.03	[.000]
$DRICH \times ATTS_{t-1}$	1.59	0.909	1.75	[.082]
$DKLDA \times ATTS_{t-1}$	–1.15	0.161	–7.17	[.000]
$(DBRIS+DSYDNEY)*ATTS_{t-1}$	–0.37	0.213	–1.72	[.087]
2002 Broadcasting Dummies (Intercept and Slope)				
D2002	–0.14	0.037	–3.94	[.000]
$D2002 \times ATTS_{t-1}$	2.20	0.552	3.99	[.000]
Time Adjustment Coefficients (Including Club Dummies)				
1/Time	0.05	0.027	1.74	[.083]
$(DCOLL+DESS) \times 1/Time$	–0.24	0.049	–4.87	[.000]
$(DBRIS+DBULL+DCARL+DGEE+DHAW) \times 1/Time$	–0.06	0.033	–1.76	[.080]
Performance Variables				
Point Scored/Maximum Possible Points (*t-1*)	0.02	0.021	0.80	[.426]
Made it to Playoffs Dummy (*t-1*)	–0.01	0.007	–1.15	[.251]
Big-4 Dummy				
DBIG-4	0.04	0.039	0.93	[.353]
Three Outlier Dummies				
DHAW2002	0.11	0.029	3.93	[.000]
DSYDNEY1992	0.08	0.028	2.83	[.005]
DWCST1990	0.09	0.030	2.83	[.005]

R-Squared = 0.61083 *R-Bar-Squared = 0.55824* *F-Stat F(20,148) 11.6149* [.000]

Diagnostic Tests

Test Statistics	LM Version		F Version	
A. Serial Correlation	CHSQ (1) = 0.146	[.702]	F(1,147) = 0.127	[.721]
B. Functional Form	CHSQ (1) = 0.162	[.687]	F(1,147) = 0.141	[.707]
C. Normality	CHSQ (2) = 1.57	[.456]	Not Applicable	
D. Heteroscedasticity	CHSQ (1) = 0.00226	[.988]	F(1,167) = 0.0023	[.988]