



**SPORTSMAN TEAMS AND LABOUR MARKET REGULATION:  
COMPLIANCE STRATEGIES AND WIN-MAXIMISATION IN THE  
VICTORIAN FOOTBALL LEAGUE, 1930-70\***

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**Abstract:**

The objective of teams in professional ‘sportsman’ leagues is to maximise the number of wins, rather than maximise profits. Owners have an incentive not to comply with labour market regulations if pay differentials increase winning percentages. We extend these models through a four-team analysis, in which team performance was affected by the strategies of rivals, to test how winning percentage was affected by compliance status. In a semi-professional league, it was possible for owners to either maintain equal (consistent with profit-maximisation) or dispersed pay structures (consistent with win-maximisation). Both objectives could be satisfied within this labour market regulation regime.

**Keywords:** labour market regulation, pay differentials, sports leagues

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## I INTRODUCTION

Sporting leagues are unusual in that while individual teams attempt to win all of their games the league as a collective often tries to handicap the better teams to reduce their winning percentage. This conflict of objectives arises from the observation that league profits increase if matches are contested more evenly, due to a direct relationship between attendances and viewing and the uncertainty of match outcomes (Rottenberg, 1956; Neale, 1964). Leagues have used a variety of tools to limit the ability of teams to outperform, including restrictions on profits (such as the sharing of gate and other league revenues), player recruitment, mobility and wages (reserve clauses and salary caps) to limit the predictable flow of talented players towards the top teams.

In professional ‘sportsman’ leagues, in which owners pursue a sole objective of maximising the number of wins, owners will invest as much as they can in playing talent subject to a breakeven constraint.<sup>1</sup> While sportsman team owners have a clear objective as individuals, their influence on the collective objective of the league is less clear. The rules of a league and the willingness to comply with them can be compromised by the divergence of underlying team objectives. Win-maximising team owners are more likely to attempt to cheat collective rules than their profit-maximising counterparts. At the very least teams with different objective functions will approach the collective rules differently. Most models assume that the objective functions of owners are homogenous across leagues. In reality, leagues may be a mix of profit-maximising and win-maximising teams (Dietl *et al.*, 2009). Objective functions may be homogenous across leagues, but it may be possible for teams to adopt different strategies of compliance with labour market regulations.

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<sup>1</sup> Vrooman (2015). Sloane (1971) is the seminal work on utility (and win) maximization as an objective of owners in professional sports. For an overview of the literature, see Fort (2015).

The questions posed in this literature predominantly relate to North American leagues, where territorial monopolies with closed labour markets exist and privately-owned profit-maximising teams hire from within one major league. However, in terms of the economic history of professional sports worldwide, the North American experience is a modern outlier. Outside North America, sportsman leagues were the norm. Major sports such as cricket, tennis, golf and the various forms of football were not established as commercial enterprises and the issue of payment of players created tensions between individual teams and athletes and the ruling bodies that acted as the guardians of each sport's amateur traditions (Vamplew, 1988; Holt, 1989; Holt and Mason, 2000; Wright and Zammuto, 2013).

Outside North America, the club, established to allow fee-paying members to play, was the organisational foundation of team sports at the elite and grass-roots level (Vamplew, 2013). Clubs are 'owned' by their members, who elect (usually volunteer) committees to handle administrative matters. Professional soccer clubs recruit in open labour markets, hiring from several leagues, with promotion-and-relegation allowing clubs to rise to the elite level of domestic competitions in each country (Szymanski and Zimbalist, 2005). Talent investment decisions were based on the expected impact on the utility derived from winning matches. British clubs adopted limited liability company status, but this was to secure loans for stadium construction rather than a means of generating profits.

Until the 1980s, a 'peculiar patchwork' of amateurism and professionalism characterised British sport (Holt and Mason, 2000, p. 36). Professionals and amateur could play in the same teams in cricket but not rugby; tennis players could claim expenses for lost work time but athletes and swimmers could not. Rowing and athletes separated amateur and professional competitors, but the former excluded working-class amateurs while the latter did not. In soccer, clubs employed semi-professional players who received payment for playing but held full-time jobs outside of football. This was possible because the geographical

compactness of competitions allowed players and fans to travel to games on Saturday afternoons and return home the same evening. (Cain and Haddock 2005). Labour market regulation was attractive both to administrators who believed in amateurism and clubs that were concerned that their leagues would be dominated by clubs from the larger cities. The English Football League established a retain-and-transfer system, similar to a reserve clause, and set an individual salary cap (maximum wage) to minimise pay differentials within teams and prevent players from selling their labour to the highest bidder (Vamplew 1988; Harding, 1991). Most players were not paid the full maximum wage and wealthy clubs found ways to evade the regulations (Vamplew *et al.*, 1984; Holt, 1989, pp. 293-6). Existing studies focus on how the maximum wage affected the incomes of English footballers, but do not consider the effects of variations in compliance on the key objective of clubs, to maximise winning percentage.<sup>2</sup>

In sports leagues where institutional arrangements span amateurism to semi-professionalism, the range of salaries can extend from zero (with players paying a fee to play) to players being paid equal to their marginal revenue product. Pay differentials can extend from equal pay for all team members to one player being paid the entire wage fund. If clubs are able to choose whether to comply with labour market regulations, salary differentials within and between teams may impact on player motivation and team performance. In this paper we consider the following research question:

*How is the winning percentage of sportsman teams affected by compliance with league labour market regulations?*

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<sup>2</sup> See for example Vamplew *et al.*, 1984; Taylor, 2005; Wilson and Pomfret, 2014.

Empirical testing of the effects of compliance status on team performance is difficult if data on the individual wage paid to each player is not available and evidence of non-compliance is hidden by the chicanery of team owners. Even if wage data is available, testing may be complicated by the clubs that comply with the monetary elements of labour market regulation also providing non-wage benefits, such as prestige and assistance in finding jobs outside of football (Késenne, 2000).

Our tests are based on data from Australian Football between 1930 and 1970. Like American football, Australian Football (or ‘Aussie Rules’ as it is known colloquially) evolved in isolation and is played at the elite level in only one country. The major Australian Football leagues are closed leagues, with no promotion-and-relegation. However, Australian Football clubs are member-based associations and profit-maximisation is not an objective. From 1930 to 1970, the code’s major league, the semi-professional Victorian Football League (VFL), set a maximum wage and prohibited the payment of signing on fees. VFL clubs operated in open labour markets, with almost all players recruited from minor leagues.

The literature on models of talent investment, reviewed in the following section, suggests that clubs in sportsmen leagues overinvest in playing talent and may breach labour market regulations as they attempt to increase their winning percentage. An analysis of the VFL extends this literature by considering the effects of variations in compliance status within a league. Historical evidence reveals that for wealthy VFL clubs, compliance was a matter of culture and tradition. In a semi-professional league, it was possible for owners to make an endogenous choice to either maintain equal (consistent with profit-maximisation) or dispersed pay structures (consistent with win-maximisation). Both objectives could be satisfied within this labour market regulation regime.

Over a 40-year sample period that covers the operation of these regulations, we consider matches involving the four dominant, strongest-drawing teams, two of which chose

to comply (Collingwood and Melbourne) and two that did not (Carlton and Richmond). These strategies were maintained over the sample period and so compliance may be considered to be time-invariant. We develop a proxy for individual wage payments that allows compliance status to be identified. Changes in winning percentage were zero-sum across these teams and reflected the relative talents of teams and the success of their talent investment strategies. Identification of the variables that affected winning percentages and the payoffs from compliance and non-compliance with labour market regulations allows us to assess how well these markets worked in generating league-wide beneficial outcomes.

## II ECONOMIC THEORIES OF SPORTSMAN LEAGUES

Quirk and Fort (1992) model a competitive labour market equilibrium in professional sports leagues by assuming a 'closed' duopsony, made up of one team from a strong-drawing area (team A) and one from a weak-drawing area (team B). The supply of talent is fixed because the two teams can only recruit from each other. Team owners are assumed to be profit-maximisers. Figure 1 plots the marginal revenue of each team (the change in revenue for each one point change in winning percentage, W/L PCT), with the marginal revenue of team A reading from left to right and that of team B reading right to left. At each point on the horizontal axis the winning percentage of the two teams sums to unity. The teams bid for units of player talent until the profit-maximising equilibrium is reached, at the intersection of the two marginal revenue curves (P), where the marginal cost of an additional W/L percentage point is  $C^*$  for both teams. At this market-clearing equilibrium the strong-drawing team A has the higher winning percentage. Neither team has an incentive to invest in talent beyond equilibrium, as the marginal cost of doing so will be greater than marginal revenue.

[INSERT FIGURE 1]

Advocates of labour market restriction assert that distribution of players' marginal revenue product between players and owners is changed by reducing the marginal cost of talent (shown as  $C^{**}$  in Figure 2) to below the market-clearing level. Rottenberg (1956) challenged this proposition, arguing that the distribution of talent between teams is invariant to any change in property rights. In the Quirk and Fort model, if a reserve clause results in an initial distribution of winning percentages equal to .500, the marginal revenue of team A ( $MR^A$ ) is higher than that of team B ( $MR^B$ ). If the teams are free to buy and sell players for cash, both will profit if team A pays up to  $MR^B$  for an additional winning percentage point and team B sells for more than  $MR^B$ . This will continue until the marginal revenue curves are equalised at point P, equal to the competitive labour market equilibrium (El Hodiri and Quirk, 1971; Quirk and El Hodiri, 1974). This invariance principle holds that at equilibrium, the distribution of winning percentages under free agency does not vary when the reserve clause applies, but rents are transferred from players to owners and playing talent is drawn from weaker teams to stronger ones.

[INSERT FIGURE 2]

The closed labour market model is consistent with the reality of US leagues, but is not applicable to the open leagues of European football. If teams are able to hire players from other leagues, investment in extra talent by one team does not necessarily result in an equal loss of talent to the other team. Driskill and Vrooman (2014) observe that the upward-sloping supply function for talent is initially perfectly elastic and approaches perfect inelasticity at its limit. This 'reverse-L' shaped talent supply function reflects initial hiring at a constant cost over a range of talent, with players paid at a reservation wage that is sufficient to attract those

who are willing to play at this wage or less. The perfectly elastic segment of the supply function applies up to a fixed amount of talent, and then becomes perfectly inelastic, as players with a higher opportunity cost will seek a higher wage to enter the market.

A sportsman club's demand curve for talent is given by its average revenue curve because all revenue is spent on playing talent up to the breakeven point where total revenue equals total cost. Clubs may pay players on the perfectly inelastic segment of the supply curve to avoid adverse selection and prevent the turnover of quality players leaving the club. Owners increase spending on players beyond the profit-maximising level, ignoring the negative externalities associated with reduced competitive balance (Cairns *et al.*, 1986). In a two-team model, win-maximising teams will hire up to the point at which their average revenue curves intersect, at which wage costs are higher and the competition is less competitively balanced than if teams were profit-maximisers (Késenne, 2000). If talent is seen as a strategic input, the productivity of which for a given user depends on how much is employed by a rival, owners will tend to 'overinvest' in playing talent by bidding up its value, engaging in a process of destructive competition (Canes, 1974; Whitney, 1993). If teams have sufficient funds to engage in a recruiting rat race, the aggregate level of talent may become inefficiently high, with players being over-valued and competitive balance reduced. Owners fail to maximise the joint value of their franchises, creating what Vrooman (2015) calls a 'sportsman effect'.

Salary caps may counteract the sportsman effect by rationing the supply of top players, if the demand for talent at the capped wage exceeds supply. As caps force strong-drawing teams to cut back on player payments and the lower per-unit cost of talent encourages weak-drawing teams to hire more talent, an increase in the winning percentage of weak-drawing teams at the expense of strong-drawing ones is likely, thus improving competitive balance (Dietl *et al.*, 2011). However, if it is possible for sportsman owners to

avoid salary cap rules, an equilibrium based on an agreed level of investment in playing talent is unlikely to be sustained (Dietl, et al., 2008).

Empirical work on the effects of pay dispersion on team performance has produced varying results, depending on the nature of the sport. Hierarchical pay structures provide optimal team performance in basketball, where the potential impact of star players on team productivity is high (Ramaswamy and Rowthorn, 1991; Halevy et al., 2012). Low pay dispersion has a positive impact on team performance in sports with a large number of players per team, such as baseball and football, if less talented team members are discouraged from withholding effort (Akerlof and Yellen, 1990; Levine, 1991; Frick, Prinz and Winkelmann, 2003; Jewell and Molina, 2004). Franck and Nüesch (2011) found that in one sportsman league, the German *Bundesliga*, the relationship between wage dispersion and team performance was U-shaped, with teams performing strongly when wage inequality was either very high or very low.

### III CASE STUDY

Australian Football evolved from football games played on the parklands of Melbourne shortly after the gold rush of the 1850s. As in Britain, its clubs were founded by middle-class sports enthusiasts but drew revenue from spectators who were willing to pay to watch matches. By the start of the twentieth century, a Melbourne-based sportsman league, the Victorian Football League (VFL) had been formed, made up of 12 clubs, each owned by members who paid an annual subscription fee and elected a president and committee each year to administer the club.

Australian Football is a winter sport, played on large ovals that are used for cricket in the summer. Matches were initially played on open parkland, but as the mass market appeal

of the game increased clubs leased enclosed grounds from cricket clubs.<sup>3</sup> No VFL club owned its own ground (stadium). Grounds were built on land owned by colonial (later state) or municipal governments, which in some cases delegated management powers to public trustees, a cricket club or ground management committee. The League set a standard admission charge for all matches and a standard price for club memberships. Ground managers received one-third of net gate receipts from all games, with the rest split evenly between participating clubs. At the largest stadium, the Melbourne Cricket Ground (MCG, the home ground of Melbourne Football Club and the venue for post-season play), capacity was endogenous to previous demand, as public trustees used revenue from football, cricket and special events (such as the 1956 Olympic Games) to improve facilities for spectators and cricket club members. At some other grounds, rent-seeking councils and cricket clubs cases chose to invest little in ground improvement. This was not the case at Carlton and Collingwood, where football club administrators were members of ground management committees. Collingwood secured its own liquor license in 1940 and negotiated a 40-year lease in 1956 that gave the club full control of its ground (Stremski, 1986, pp. 185-96).

For most of the sample period, membership fees were a more important source of club revenue than gate receipts. For example, from 1918 to 1939, membership accounted for 43 per cent of Carlton's revenue and gate receipts 42 per cent. Gate money exceeded membership revenue during the Great Depression, as unemployment and wage cuts reduced the ability of many fans to make a lump sum payment for a member's ticket. In the post-World War 2 period (1946-70), membership provided 45 per cent of Carlton's revenue and gate receipts 32 per cent. Strong-drawing clubs benefitted disproportionately from

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<sup>3</sup> In the early 1870s, major games attracted crowds of 10-12,000, drawn from all ranks of society. In that decade the largest attendance at the FA Cup Final was 5,000 (Frost, 1998, p. 15).

membership sales. With a standard ticket price set by the League, supporters of the leading clubs were likely to be under-charged, while those of less popular clubs were likely to be over-charged. A member's ticket provided free admission to all regular season games – home and away – with all revenue retained by the individual club. When Carlton won the premiership in 1947 it had 11,000 members; Hawthorn, which finished second-last, had 2,400. In 1951, Collingwood had more than 9,000 members, while South Melbourne had less than 3,000 and Hawthorn less than 2,000.<sup>4</sup>

Games of Australian Football are played between teams of 18 interacting players. The large number of players on the field and the importance of teamwork reduce the likelihood that a single 'star player' will be crucial to team performance. During the sample period there was no formal limit to the size of playing squads; clubs fielded a reserve grade team and were allowed to draw on local junior clubs or retired senior players if they were short of players. With their club's permission, players were allowed to transfer during the season. Most new players to a club came from minor leagues; most exited by retiring or moving to minor leagues, where coaching jobs were available.<sup>5</sup> With the support of local patrons, such as farmers and publicans, minor league clubs could offer wage premiums for League players that compensated for lower status and standards of play.

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<sup>4</sup> Carlton Football Club, *Annual Report 1947*; Collingwood Football Club, *Annual Report 1951*; South Melbourne Football Club, *Annual Report 1951*; Lenten (2012). The remainder of club revenue came from donations, fundraising events, and a League dividend of a share of the proceeds of post-season matches and broadcasting rights, distributed equally between the clubs. Radio broadcasts of matches started in 1925 and television replays in the early 1960s. League dividends averaged 12 per cent of Carlton's revenue for 1930-57, and 22 per cent for 1958-70.

<sup>5</sup> Of the players who left the sample clubs during the sample period, only 3.6% moved internally to another of the sample clubs.

Although payment of VFL players remained illegal until 1911, most clubs had for years been compensating high-quality players for the time they took off work to play and attend training (Frost, 1998, pp. 45-49). In 1915, the VFL divided metropolitan Melbourne into recruiting zones, so that the issue of which club a player joined would be decided by where he lived, rather than money. Players from outside Melbourne were free agents.

At the onset of the Great Depression, a disparity in the financial resources of VFL clubs was apparent. In 1929, Carlton had 6,470 members and paid its players £5 15/- per match. Richmond and Collingwood, with 3,900 and 3,600 members, were financially stable.<sup>6</sup> Most other clubs struggled to pay their players. In 1930, South Melbourne ran an overdraft of £780 and could not pay its players until the end of the season. Essendon paid £2 per win and 30 shillings for a loss. Melbourne and Hawthorn did not pay their players at all. North Melbourne paid only 30 shillings per match in 1931 (Sandercock and Turner 1981, 105-7).

In an attempt to stabilise the financial position of clubs, the VFL set a maximum match payment (initially £3 per game) and prohibited signing-on fees.<sup>7</sup> This maintained the semi-professional status of players. Unlike the maximum wage in English football, which was paid year-round, the VFL's payment was a match fee and players were not paid during the off-season. The regular season consisted of 18 rounds of matches; post-season play could extend the season by up to three matches. Throughout the sample period players could expect their yearly football earnings to amount to no more than around one-fifth of average weekly

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<sup>6</sup> Carlton Football Club, *Annual Report 1929*; Richmond Football Club, *Annual Report 1929*; Collingwood Football Club, *Annual Report 1929*.

<sup>7</sup> This set of regulations became known as the 'Coulter Law', after George Coulter, a delegate from the Melbourne Football Club, who chaired the finance sub-committee appointed by the VFL in 1930 to develop rules governing player payments. Clubs were allowed to pay bonuses of up to £2 per game; players who were injured or unemployed could be paid up to £3 per game.

earnings (see Table 1). The current value of football payment was halved during the Second World War; in the post-war era the real value of the payment remained stable in relation to average weekly earnings. No minimum wage was specified and clubs could choose not to pay players. A club found to be in breach of the regulations faced possible losses of match points and the club officials and player concerned could be suspended ‘at the pleasure of the League’.

[INSERT TABLE 1]

‘The principle of the flat rate is sound and equitable’, argued one football writer when the rules were introduced. ‘It should do much to promote general harmony, and should tend ultimately to even up the strength of the teams’.<sup>8</sup> Booth (2004) argues that these outcomes could only have achieved it if all clubs had been prepared to abide by the regulations, as the clubs that did not comply could attract and retain high quality playing talent and raise their winning percentage at the expense of those that did comply. However, of the four highest-ranked VFL teams in terms of regular season attendance (which won 61% of premierships) from 1930-70, two adhered scrupulously to the regulations because they were consistent with principles embedded in their historically-evolved culture. Collingwood and Melbourne complied with the maximum wage at the outset, reinforcing traditions of compressed wage structures.

The maximum wage was in effect modelled on Collingwood’s system of player payments (Stremski 1986, p. 213). A philosophy that to pay one person, even the coach, more

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<sup>8</sup> W. Sharland, ‘Victorian League controls players’ payments: Flat rate of £3 a week adopted’,

*Sporting Globe* (Melbourne), 12 March 1930, p. 9.

than another 'would lead to personal jealousies and discontent and would inevitably destroy that fine team spirit' had prevailed at the club since 1896 (quoted by Stremski, 1986, p. 153). The committee allowed star players to leave rather than depart from this principle.<sup>9</sup> In 1930 it paid the maximum match payment of £3 but would not pay allowances to out of work players. As a result, one of Collingwood's greatest players, Albert Collier, then aged 20, took a position as playing coach of a team in Tasmania for £9 per match, plus guaranteed job as builder's labourer at £7 per week, for two years. Another star, Ron Todd, was only 22 when he signed a three-year contract with a minor league team in 1940 that guaranteed him £500, plus match payments that were double those of Collingwood (Stremski, 1986, pp. 152-4). When 27-year old Bob Rose approached the club committee at the end of the 1955 football season and requested an increase in match payments (then £6 per match) to help him to buy a house, he was arguably the best footballer in Australia. The committee allowed Rose to transfer to a minor league club, where he accepted an offer to captain-coach for £45 per match plus a house and a sporting goods store (Stevens, 2003).

In 1890, a heavily-indebted Melbourne Football Club became an affiliate of the Melbourne Cricket Club (MCC) (Batchelder, 2005, pp. 261-4). The football club's administration and team selection was controlled by the committee of the MCC, which maintained a commitment to amateurism that extended to a refusal to select 'working men'.<sup>10</sup> All players were paid equally. Well-credentialed players who were nearing the end of their careers took coaching jobs. Fred Fanning's wage increased from £3 to £20 per game when he

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<sup>9</sup> David Williamson's play, *The Club* (1978), is a thinly-disguised portrayal of Collingwood and its struggle to adapt the tradition that it 'would never stoop to buying players' to a modern era, in which the 'days when recruits would flock to the Club from all over the country simply because of its name are long gone'.

<sup>10</sup> *Leader* (Melbourne), 2 March 1907.

left in 1947, aged 26 (Collins, 2008, p. 145). In the 1962 *Annual Report*, it was announced that eight premiership-winning players intended to retire. ‘Many of these players intend to go coaching .... Your Club, as always, while deeply regretting their decisions, will not stand in their light’.<sup>11</sup>

Collingwood and Melbourne offered non-wage benefits that reduced the reservation wage of potential players. Both clubs found jobs for players through formal coteries of patrons and ex-players and if necessary paid the educational fees of players.<sup>12</sup> Melbourne offered non-monetary benefits that were derived from the club’s affiliation with the MCC. Once selected for the senior team, players were made honorary members of the MCC, which gave them free admission to all football and cricket matches at the MCG. Joining Melbourne gave a young man the opportunity to be part of a winning team, to play in finals and to play on the Melbourne Cricket Ground every second week.

When the VFL introduced a maximum wage in 1930, Carlton, Collingwood and Richmond were the only clubs that could afford to pay the full amount. Carlton paid an additional bonus of 10 shillings per match.<sup>13</sup> These payments were recorded in official, audited financial statements, but Carlton and Richmond made further payments to recruit and retain players that were not recorded to avoid League sanctions. Secret payments were drawn from funds provided by donors and patrons or made directly from the president or committee’s pockets. Signing-on fees were paid to free agents from minor leagues, star players received bonuses in excess of the maximum, valued players who applied to join minor league teams were offered cash to stay, and players at other clubs were paid to stand

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<sup>11</sup> Melbourne Football Club, *Annual Report 1962*, p. 7.

<sup>12</sup> Ron Barassi, interviewed by author 2, 18 September 2007.

<sup>13</sup> Carlton Football Club, *Annual Report 1930*.

out of football until they became free agents (Branagan and Lefebvre, 1995; Frost, 1998). Anecdotal evidence suggests that Carlton and Richmond's wage structures were hierarchical, dispersed between highly- and relatively lower-paid players. For example, secret payments to Jack Dyer, Richmond's star player of the 1930s and 1940s, increased his wages from the £3 allowed to £10 per week (Dyer, 1963, p. 54). Less valuable players were allowed to join minor league clubs 'to give them opportunity of receiving monetary reward for their football'.<sup>14</sup> Due to the concealment of some wage payments, however, evidence of the actual distribution of wages is unavailable.

Table 2 shows winning percentages for the sample of complying and non-complying clubs. Because there are two teams in each sub-group, the winning percentage within each sub-group sums to unity. The two compliers had a higher winning percentage in games against each defecting team than in games against each other. Although Melbourne's overall winning percentage was lower than that of Collingwood, and comparable to that of Carlton and Richmond, Melbourne was advantaged by most post-season games being played at its home ground, the MCG. Once Melbourne qualified for the finals, it was more than twice as likely to win a premiership as the other three clubs. The two defectors had lower winning percentage in games against the compliers than in games against each other, where winning percentages were almost evenly divided.

[INSERT TABLE 2]

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<sup>14</sup> Richmond Football Club, *Annual Report 1954*, p. 13.

All four teams had higher winning percentages in matches against the other VFL clubs than in matches against the other three in the sample. The large standard deviations of winning percentages for Melbourne and Richmond show significant peaks and troughs in team performance over time. Melbourne won a hat trick of premierships in 1939-40-41 and five premierships in six seasons in 1955-60, but won less than 20% of matches in 1933, 1953, 1966 and 1969, and 6% in 1951. During the 41-season sample period, there were 24 seasons in which Melbourne or Richmond won less than 50% of their matches, but only 11 seasons when Carlton or Collingwood did so.

#### IV METHOD

The proposition tested is that the outcome of any given match will be affected by whether or not the participants comply with labour market regulations. In any match involving the four sample clubs, three scenarios are possible: teams followed the regulations, neither team followed the regulations, or one team followed the regulations while its opponent did not. The zero-sum nature of a match allows us to consider the relevance of each teams' compliance with labour market regulations to match outcomes. To identify the compliance strategy of each team, we use player turnover as a proxy for individual payments, because the retention of players on squad lists normally reflected the value that their clubs placed on their talent.<sup>15</sup> Clubs were more likely to have sought to retain experienced players who intended to leave the club than they were inexperienced ones. If one club is more able than another to prevent losses of experienced players, the result may be a product of

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<sup>15</sup> This is a variation on standard efficiency wage models, in which workers are heterogeneous and firms choose to pay above the market-clearing rate if a lower wage will reduce the average quality of new workers (Weiss, 2014). Schmidt and Zimmermann (1991) follow a similar approach, using firm size as a proxy for wage determinants for which no data is available, such as job satisfaction and labour quality.

differences in compliance strategies, with higher wages and incentives discouraging players from moving to other leagues.

The model can be written as:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 \text{Scenario}_t + \beta_3 \text{l10hm}_{t-1} + \beta_4 \text{l10am}_{t-1} + \beta_5 \text{tehm}_{t-1} + \beta_6 \text{team}_{t-1} + \beta_7 \text{puhm}_t + \beta_8 \text{puam}_t + \mu_t$$

The dependant variable is the winning percentage per season against a particular opponent ( $y_t$ ), with the value ranging from zero to one. Independent variables related to compliance that may be expected to affect the dependent variable are specified (see Table 3). These are applied to data that show the number of career games and year of first and last games of individual players and the number of players used each season by teams (Rodgers, 1996). Three independent variables are demeaned and lagged from the previous period, both for the team of interest and its opponent: the number of players who leave the playing squad at the end of a season having played 1-9 senior games (*L.l10*); the number of players lost at the end of each season with 50 or more games of VFL experience (*L.p50*) (players needed to be on a playing list for at least three seasons to reach this level of experience); the percentage of team experience lost from the previous season (*L.te*), calculated by expressing the career total of games played by players who leave the club as a percentage of the total number of games played by the squad list. Because *L.p50* and *L.te* capture similar variations in the experience of playing squads, only the variable with the greatest statistical significance is retained in the model. The variables are demeaned because it is the variation from the average level of player turnover that is important, not the number of players leaving. They are lagged because it is the change in the playing squad from the previous year that is important, not the change at the end of a season. A fourth independent variable is the number of players used in

a season ( $pu$ ) by each team. The previous year's winning percentage is also included as it may predict team success in the current year.

[INSERT TABLE 3]

Three regressions are run, for each compliance scenario (see Table 4). For regression one the model is a pooled OLS in which there is a dummy variable for each of the pairs of teams. The panels are very similar in manner: with Melbourne-Richmond in one panel and Melbourne-Carlton in another, half of the combinations involve the one team. The number of games played by each pair of teams per season ranges from one to five, thus the model will be run with robust standard errors. There are 41 observations for each scenario, because the regulations operated from 1930-70.

[INSERT TABLE 4]

Tests were conducted for stationarity and autocorrelation. In matches between a complying and non-complying team (scenario one), there are combinations involving all of the sample teams and the data is panel in nature. A panel-data unit-root test was conducted once the variables were demeaned (Levin, Lin and Chu, 2002). All variables were found to be stationary and there is sufficient evidence to reject the null hypothesis. The other scenarios (two and three) involve only one pair of teams and the data is times series. An augmented Dickey-Fuller unit-root test is conducted, with the variables found to be stationary.

For the panel regression, Arellano-Bond and Cumby-Huizinga tests for autocorrelation were performed. The Arellano-Bond test had insufficient evidence to reject the null hypothesis of no autocorrelation in the regressions. The Cumby-Huizinga general test

passed at the 5% level, so the null hypothesis that there is serial correlation in the disturbance can be rejected. The null hypothesis in the Cumby-Huizinga was that the variable tested is a moving average process of order  $q$  (Baum and Schaffer, 2013). The alternative considered is that serial correlation is present in that range of lags, or for that specified lag. This test was selected as it does not require that all regressors be strictly exogenous.

In the time series regressions, a Durbin's alternative test for autocorrelation was applied, plus a Durbin Watson test with the critical values adjusted by not including the lagged dependent variable in the number of regressors. A Cumby-Huizinga general test for autocorrelation in time series is also performed (Baum and Schaffer, 2013). In the Durbin's alternative and Cumby-Huizinga tests both passed at the 5% level. For the Durbin Watson test there was enough evidence to be able to reject autocorrelation as the test statistics was above the upper range.

## V RESULTS

The results reveal two strategies that were effective in increasing winning percentages. First, churning players and replacing them with new, if untried talent had a positive effect on winning percentage for all of the clubs. When a player with less than 10 games of experience was deleted from a playing list, it is likely that he had revealed a level of ability and discipline that was below the required standard. The effects on winning percentage of moving such players on was stronger for the complying clubs. Collingwood and Melbourne's comparative advantage lay in non-wage benefits that were attractive to new recruits, allowing replenishment of their teams at zero marginal cost. However, the refusal of complying clubs to pay above the maximum wage made them vulnerable to losses of experienced players. The results before the variables are demeaned and lagged (Table 5) show that the compliers had the highest mean turnover of players with at least 50 games experience ( $p50$ ). Melbourne's

high standard deviation in this variable suggest that compliance made it harder for that club to control its winning percentage.

[INSERT TABLE 5]

A second effective strategy was to retain experienced players by making secret payments above the maximum wage. Non-compliers recorded lower turnover of (*p50*) players than compliers. This is consistent with anecdotal evidence that breaching league regulations allowed Carlton and Richmond to field competitive teams. Non-compliance gave Carlton and Richmond more discretion in meeting the demands of required players and potential recruits. Richmond's high turnover of 1-9 game players (*l10*) suggests that the club paid less experienced players the maximum wage, with star players capturing a larger share of the total payroll. Carlton's mean loss of inexperienced players (*l10*), and experienced (*p50*) players, and team experience (*te*), as well as players used per season (*pu*) are the lowest of the sample. Carlton has the lowest standard deviation for each of the four independent variables.

Once the regressions are demeaned (see Table 6), the results show the importance of team stability to winning percentage. For each of the sample teams, an increase in the number of players used in a season (*puhm*) has a negative effect on winning percentage. In any scenario involving at least one non-complying club (scenario 1 and 2), the result is significant at the 1% level. This makes intuitive sense, as teams will use more players than average in a season if the number of players that are injured, suspended, omitted due to poor form, or leave the club during the season is also above average. Injuries are exogenous events, but team morale (reflected by players' form and the willingness of players to leave the club) is an endogenous variable that may have been affected by the wage levels offered.

[INSERT TABLE 6]

In regression 1, for every player used above the mean (*puhm*), the winning percentage of complying clubs declined by 4.6% (significant at the 1% level); that of the non-complying clubs fell by 1.9% (significant at the 5% level). Due to zero-summing, these decreases in winning percentages are exactly offset by increases in the winning percentage of the opposition. When non-complier played non-complier (regression 2), Richmond's winning percentage declined by 4.86% for every player the club used above the mean (significant at the 1% level); Carlton's results are not significant. When the complying clubs played each other (regression 3), Melbourne's winning percentage fell by 2.54% for every player used above the mean, but the results are only significant at the 10% level.

Of the four sample clubs, Melbourne's winning percentage was most affected by changes in the experience of the playing squad than any other club. If Melbourne lost 37.7% of its previous season's team experience (10% above the mean of 27.7% for *te*) due to player retirements, the model predicts that its winning percentage in the current season in matches against non-compliers declines by 11%. In matches against Collingwood, Melbourne's winning percentage declines by an estimated 17.2% (significant at the 5% level). Losses in team experience by the non-compliers have no statistically significant effect on the winning percentage. Melbourne's high standard deviation for *te* (Table 5) suggests that the impact of losses of experience on the following season's winning percentage was substantial in some seasons. This negative impact was partly offset by the turning over of inexperienced players. Compliers increased their winning percentage against non-compliers by 3.8% for every player with 1-9 games of experience lost in the previous season (*L.110hm* and *L.110am*) above the mean value. This is significant at a 5% level.

## VI CONCLUSION

The owners of sportsman teams pursue a sole objective of winning matches. League rules that regulate labour markets by compressing pay differentials between heterogeneously talented players may be incompatible with this objective if such pay structures reduce winning percentages. Sportsman owners who seek to invest as much as they can in playing talent subject to a breakeven constraint may have an incentive not to comply with labour market regulations if pay differentials increase winning percentages. If it is possible to evade labour market regulations, the outcome of any given match between sportsman clubs will be affected by whether or not the participants have chosen to comply. Our case study reveals two compliance strategies within a league's four dominant teams – one based on very low, or zero intra-team pay differentials with a high level of non-wage benefits, the other based on hierarchical wage structures, maintained through secret payments to players whose reservation wage was above the maximum allowed.

These compliance strategies cannot be identified through formal club accounts, but their existence is part of football folklore, supported by historical records and anecdotal testimony. Drawing on newly compiled data based on team playing lists and the careers of all individual players during the period of labour market regulation, we use variables relating to player turnover as proxies for team compliance. These variables are modelled to predict team performance in matches where either team may or may not have complied with labour market regulations. Within this set of teams winning percentages are zero-sum. Generally, compliance with labour market regulations has a negative impact on the likelihood of a team winning a match. However, the closeness of winning percentages between the four teams suggests that the complying clubs were advantaged by non-wage benefits associated with tradition and prestige. The complying teams were more likely to turn over inexperienced

players who did not perform at a required standard, but were also more likely to lose experienced players, many of whom moved to higher-paying minor leagues. For all four clubs, an increase in the number of players used in a season had a negative effect on winning percentage.

The questions asked by economists about team objectives and talent investment strategies in professional sports can be applied to the full range of sports organisation, from amateur to semi-professional teams and leagues. In professional leagues, labour market regulation is generally considered to be a profit-maximising strategy, which may break down if sportsman team owners are able to avoid compliance. In a semi-professional league, the choice of team owners to comply may reflect the congruity of regulated labour markets with amateur principles and embedded cultures that valued even team performances. In our case study, it was possible for owners to either maintain equal or dispersed pay structures within the one labour market regulation regime.

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TABLE 1

*VFL maximum wage and Australian average weekly earnings, 1930-70*

	Payment per match		Average weekly football earnings (constant 1970 dollars)§	Australian average weekly earnings (constant 1970 dollars)	Average weekly football earnings/ Australian average weekly earnings (%)
	Current (£)	Constant 1970 dollars			
1930	3	21.4	8.9	32.5	27.5
1935	3	25.2	10.5	25.6	41.1
1940	1.5	11	4.6	33.7	13.6
1945	1.5	9.3	3.9	32.4	12
1950	4	17.9	7.5	35	21.3
1955	6	17.8	7.4	42	17.7
1960	8	20.4	8.5	45.7	18.6
1965	10	24.2	10	51.2	19.6
1970	15†	30	12.5	61	20.5

Source: Authors' own calculations using data from Australian Football League; Butlin, Dixon and Lloyd (2015, Table A7). Constant 1970 prices calculated from Reserve Bank of Australia, Inflation calculators. <http://www.rba.gov.au/calculator/annualPreDecimal.html>; <http://www.rba.gov.au/calculator/> (accessed 24 March 2014).

Notes: †Payment for a player having played 1-50 games.

§Football earnings are based on weekly payments over a 20-week season, averaged over a 48-week working year.

TABLE 2

*VFL home and away attendance rank, winning percentages, finals appearances and premierships won, 1930-70*

		Mean winning %			Finals appearances	Premierships won
	Rank	Versus 'Compliers'	Versus 'Non-compliers'	Versus all other teams		
<i>'Compliers'</i>						
Collingwood	1	53 (.410)	55 (.395)	62 (.158)	27	5
Melbourne	3	47 (.410)	52 (.436)	55 (.225)	19	10
<i>'Non-compliers'</i>						
Carlton	2	46 (.406)	51 (.384)	62 (.117)	19	5
Richmond	4	46 (.426)	49 (.384)	56 (.183)	16	5

*Note:* Standard deviation in brackets.

TABLE 3

*Variables and definitions*

Variable	Definition
Dependent variable:	
$y_t$	Percentage of games won by one team against another team
Independent variables:	
$L.percent$	Lagged dependent variables
$match$	Scenario 1, matches 2, 3, 4 as specified in Table 4
$L.l10hm$	Previous year's loss of players that played 1-9 matches once demeaned for the team of interest
$L.l10am$	Previous year's loss of players that played 1-9 matches once demeaned for the opposition of the team of interest
$L.tehm$	Percentage of team experience lost from the previous year once demeaned for the team of interest
$L.team$	Percentage of team experience lost from the previous year once demeaned for the opposition of the team of interest
$Puhm$	Number of players used in a season once demeaned for the team of interest
$Puam$	Number of players used in a season once demeaned for the opposition of the team of interest
$L.p50hm$	Previous year's loss of players that played 50+ games once demeaned for the team of interest
$L.p50am$	Previous year's loss of players that played 50+ games once demeaned for the opposition of the team of interest

TABLE 4

*List of regression scenarios by compliance with maximum wage regulations*

Regression	Scenario	Matches
1	Compliers versus non-compliers	match1 = Collingwood-Richmond match2 = Melbourne-Richmond match3 = Collingwood-Carlton match4 = Melbourne-Carlton
2	Non-complier versus non-complier	Richmond-Carlton
3	Complier versus complier	Melbourne-Collingwood

TABLE 5

Summary of descriptives, 1930-70

	<i>l10</i>			<i>p50</i>			<i>te</i>			<i>pu</i>		
	Mean	Std. Dev.	Min/max	Mean	Std. Dev.	Min/max	Mean	Std. Dev.	Min/max	Mean	Std. Dev.	Min/max
<i>'Compliers'</i>												
Collingwood	2.93	2.54	0/10	2.22	1.64	0/6	25.83	8.90	6.9/45.9	35.73	3.81	28/49
Melbourne	3.02	2.48	0/10	2.29	1.83	0/8	27.70	10.04	10.3/52.2	35.44	4.38	27/46
<i>'Non-compliers'</i>												
Carlton	2.20	1.72	0/8	1.95	1.48	0/8	24.58	7.48	8.6/38.9	33.71	2.45	27/37
Richmond	3.34	1.92	0/8	2.00	1.58	0/6	27.01	8.01	5.6/45.5	35.12	4.46	27/44

*Note:* A t-test for Melbourne matches against the other teams was conducted for all variables. Only Melbourne-Carlton was significantly different at the 5% level. The other pairs of teams were all significant at the 5% level, except for two variables: Collingwood-Carlton (*l10*) and Richmond-Carlton (*te*).

TABLE 6

*Regression results by scenarios*

Variables	(1)	(2)	(3)
<i>L.percent</i>	0.023 (0.08)	-0.278** (0.11)	0.201 (0.14)
<i>match2</i>	-0.062 (0.08)	-	-
<i>match3</i>	-0.040 (0.08)	-	-
<i>match4</i>	-0.029 (0.08)	-	-
<i>L.l10hm</i>	0.038** (0.02)	0.003 (0.05)	0.0015 (0.02)
<i>L.l10am</i>	-0.041* (0.02)	0.0731** (0.03)	0.0002 (0.03)
<i>L.tehm</i>	-0.011*** (0.00)	-0.012 (0.01)	-0.0172** (0.01)
<i>L.team</i>	0.006 (0.00)	0.002 (0.01)	0.006 (0.01)
<i>puhm</i>	-0.046*** (0.01)	-0.0486*** (0.02)	-0.0254* (0.01)
<i>puam</i>	0.019** (0.01)	0.0187 (0.02)	0.0296 (0.02)
Constant	0.568*** (0.07)	0.642*** (0.07)	0.386*** (0.09)
N	160	40	40
r2	0.273	0.391	0.396

Notes: Standard errors in parentheses. \*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels respectively

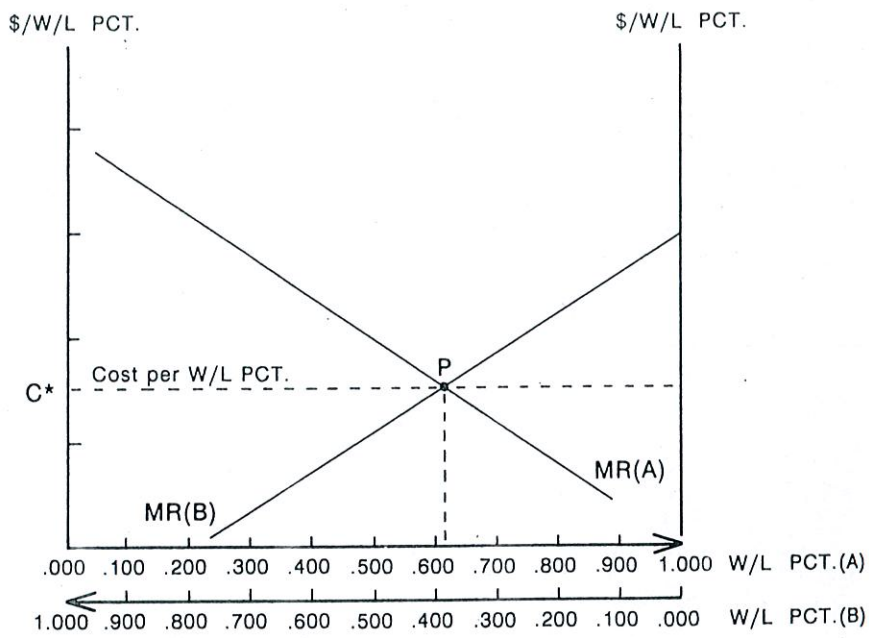


FIGURE 1. League equilibrium with a competitive labor market

Source: Quirk and Fort (1992, Figure 7.8)

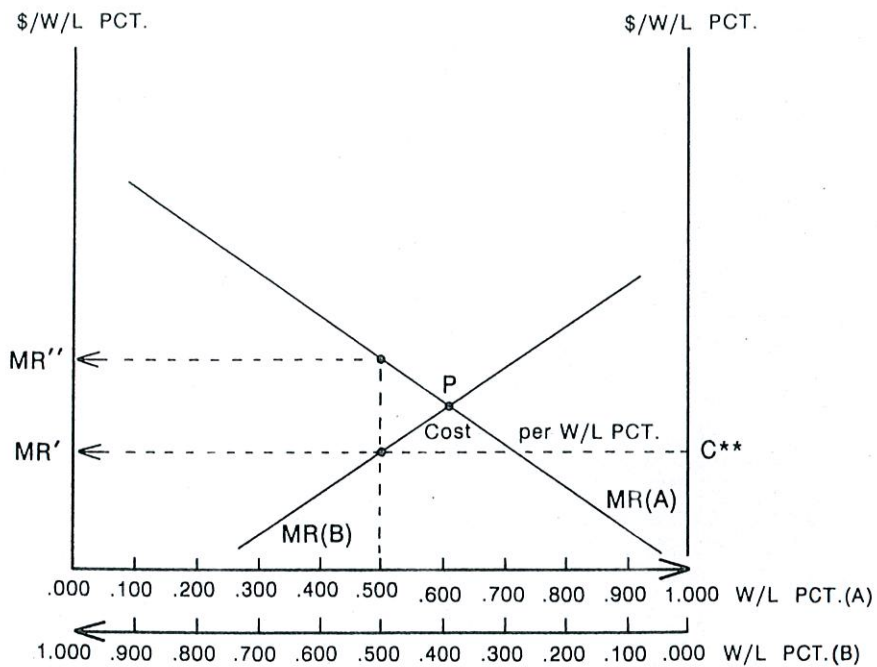


FIGURE 2. Incentives for player sales under a reserve clause

Source: Quirk and Fort (1992, Figure 7.10)