The Impact of Monitoring in a Principal Agent Setting: Evidence from the Introduction of Television Match Officials in Pro14 Rugby.

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Introduction

- Sports match officials agents in a Principal-Agent relationship - principal is sport's governing body.
- Sports organisation (Principal) seeks to ensure fair competition.
- Match officials (Agents) apply the rules in match.
- Paper analyses impact of increased monitoring on Agent behaviour arising from introduction of TMOs in Rugby's Pro-14 league.

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Literature Review

- Principal-Agent relationship - delegation of task by Principal to Agent.
- Imperfect or asymmetric information - Agent may act in own interests rather than principal's (Laffont & Martimort, 2002).
- Large literature drawing on Lazear (1995) core recommendation is to link pay to performance.
- Enhanced monitoring - improved short-run performance and longer run HR development (Taylor & Tyler, 2012).
- Increased monitoring increases stress and pressure on Agents to perform (Parsons, Sulaeman, Yates, & Hamermesh, 2011) and/or reduces their trust (Frey, 1993).
- Sports match officials agents in a Principal-Agent relationship - principal is sport's governing body. (Downward & Jones, 2007).
- Long-standing tradition in sport - official's decision final (Collins, 2010).

Home Advantage Common in Many Sports.

- Match officials key source of home bias (Dohmen & Sauermann, 2016).
- Bias not due to officiating malfeasance - reflects how context of decision making can influence outcomes.
- Weight of evidence indicates crowd main source of home advantage largely due to effect on referees (Nevill & Holder, 1999).
- Positive relationship between crowd size and referee home bias in Spanish football (Garicano, Palacios & Prendergast, 2005).
- Crowd proximity: Home advantage higher in indoor sports than in (predominantly) outdoor sports. (Trandl & Maxcy, 2011).
- Boudreaux et al. (2017); Ponzo & Scoppa (2018) - shared stadiums - further support crowd effect hypothesis.
- Greater contact between particular teams and officials (Hlasny & Kolaric, 2017).
- Parsons et al. (2011) group dynamic between team of officials might alter expression of individual biases.

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Evidence of Bias

- Discretionary official 'bias'
  - Adding extra time in soccer

    (Garicano et al, 2005; Sutter & Kocher, 2004).

  - Awarding yellow and red cards

    (Dawson et al. 2007; Downward & Jones 2007; Buraimo et al., 2010; Dawson & Dobson, 2010; Dawson et al., 2019)

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Rugby Particularly Interesting Case.

- Home advantage high - 65% of matches in our sample home wins.
- Six nations Thomas et al. (2008); Vaz et al. (2012)
- Currie cup (SA) Pretorious et al. (1999 & 2000).
- Super 14 Rugby Union and European Super League (Rugby League) Page & Page (2010).
- European Rugby Cup (Dawson et al 2019).
- Referee is an instrumental influence on the game (Page & Page, 2010).
- History of using technology to review refereeing decisions - the television match official (TMO).

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Increased Monitoring Of Referees

- Additional on-field officials – results mixed.
  - North American college basketball (McCormick & Tollison, 1984.
  - NHL (Heckelman & Yates, 2003).
  - UEFA Champions League (Dawson, 2014).

- Technology.
  - Camera monitoring of strike calls in baseball (Parsons et al., 2011; Hamrick & Rasp, 2015).
  - Decision review system in cricket, (Borooah, 2016; Shivakumar, 2018).

Impact Of Increased Monitoring Of Officials.

- May induce higher performance and effort and reduce the effects of favouritism.
- May also result in over-reliance on back-up leading to greater crowd pressure irritated by apparent indecisiveness of the officials
  - "You don't know what you're doing".
- Organisational and rule changes in sport can have unintended consequences (Wright, 2014; Kendall & Lenten, 2017).

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The Pro14

- Launched 2001/2 as Celtic League
- 15 teams - Ireland (4), Scotland (2), Wales (9).
- 2003/04 reduced to 12 teams
  - 5 Welsh, 4 Irish, 3 Scots
- 11 teams 2004/05, 10 teams 2007/08.
- 2010/11 pro12 2 Italian teams added.
- 2017/18 pro14 2 South African teams added
  - Switch to 2 conference format with playoffs.

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Pro14 Refereeing Changes.

- Originally referee from a different country to teams in matches involving teams from 2 different countries.
- Referee "Neutrality" requirement dropped in 2007/08.
- 2007/08 TMOs appointed in all televised matches to assist referee in relation to try scoring. Approx 70% matches covered.
- 2013/14 TMO role expanded to include reviews of potential foul play.
- 2018/19 TMOs in all Pro14 matches (2013/14 English Premiership).
- 2016/17 Pro14 commits to "neutral" TMOs and 1 neutral assistant referee – due to "supporter concerns" – previously TMO & assistant referees from home country – for financial reasons – reverted to mainly home TMOs.

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Significant Criticism Of Pro14 Refereeing.

- "Ultimately, if you are listening to a match on television and you hear an Irish TMO speaking at a match in Ireland, as happened with Connacht versus the Ospreys, you are going to think they are biased, even though we know they are not." Martin Anayi MD Pro14.
- May indicate failure to recognise Principal/Agent problem.
- "Pro12 bosses must act now to solve major refereeing issues that are undermining its credibility." (Thomas, Wales Online, 02/03/2016).
- "Guinness Pro12 to introduce neutral television match officials after spate of controversies ." (Howell, Wales Online 23/08/2016)

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Dataset

1803 matches played between 2003/04 and 2017/18.

Data on all yellow and red cards and penalty tries.

In rugby yellow card results in player being excluded from game for 10 minutes (out of 80).

Referee can award a penalty try where try would have been scored but for foul play.

Data on referee nationality and previous number of Pro14 matches.

Also have data on number of penalties awarded against each team but only complete from 2012/13 onwards.

Summary Statistics (Base Model)

Variable	Obs	Mean	Std. Dev.	Min	Max
hwinratio	1,759	.4870193	.2460178	0	1
awinratio	1,759	.5105025	.2480443	0	1
game_time	1,759	.7879477	.4088779	0	1
derby1	1,759	.233087	.4229174	0	1
apps	1,759	27.31211	27.77186	0	155
tmo	1,759	.6134167	.4871053	0	1
att	1,759	7238.951	6518.517	400	68262
attcap	1,759	50.97924	25.41195	1.98	171.33
irishref	1,759	.3752132	.4843156	0	1
welshref	1,759	.3246163	.4683644	0	1
scotref	1,759	.2063673	.4048123	0	1
italianref	1,759	.0790222	.2698501	0	1

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Distribution of Sanction

YELLOW CARDS						
	Away					
Home	0	1	2	3	4	Total
0	629	442	118	16	4	1209
1	177	221	80	11	0	489
2	35	44	14	4	0	97
3	4	4	0	0	0	8
Total	845	711	212	31	4	1803

RED CARDS				
	Away			
Home	0	1	2	Total
0	1745	36	1	1782
1	18	3	0	21
Total	1763	39	1	1803

PENALTY TRY				
	Away			
Home	0	1	2	Total
0	1652	51	1	1704
1	92	3	0	95
2	4	0	0	4
Total	1748	54	1	1803

Away Team Penalised More

Distribution of Sanction

		Yellow Card	Red Card
DERBY	Home	0.438	0.021
	Away	0.740	0.025
NON DERBY	Home	0.377	0.009
	Away	0.674	0.022
	1803		

NATIONALITY

	Mean Away Yellow Card
English	0.60
French	0.81
Irish	0.69
Italian	0.70
Scottish	0.75
South African	0.39
Welsh	0.67

More cards in Derbies – Away more

Nationality matters

Model

- Bivariate response models (count and ordered versions considered – similar results)
  - Yellow card
  - Overall sanction
- Nationality
- Derbies
- Shared nationalities (non-derbies)

Base Regression

VARIABLES	home_yc	away_yc	lambda
hwinratio	-0.287	0.105	
	(0.233)	(0.140)	
awinratio	0.143	-0.247*	
	(0.130)	(0.142)	
game_time	-0.184***	0.0372	
	(0.0593)	(0.0708)	
derby1	0.276***	0.151**	
	(0.0821)	(0.0672)	
apps	-0.0101***	-0.00823***	
	(0.00198)	(0.00180)	
tmo	0.215**	0.192**	
	(0.0870)	(0.0792)	
att	-3.67e-06	-1.64e-06	
	(8.28e-06)	(6.11e-06)	
attcap	-0.00362	-0.000289	
	(0.00252)	(0.00134)	
irishref	0.237	0.672**	
	(0.234)	(0.331)	
welshref	0.217	0.687**	
	(0.232)	(0.313)	
scotref	0.188	0.741**	
	(0.253)	(0.327)	
italianref	0.0918	0.635*	
	(0.248)	(0.342)	
Constant	-0.697***	-0.929***	1.141***
	(0.232)	(0.298)	(0.267)
Observations		1,759	

- Strong teams penalised less
- Timing of match – later matches less sanctions to home team
- Derbies increase general sanction
- Referee experience reduces general sanction
- TMO increases general sanction – greater scrutiny?
- Nationality increases sanction (bias?)

Extended Regression

VARIABLES	(1) compositehome	(2) compositeaway	(3) lambda
hwinratio	-0.337	0.185	
	(0.223)	(0.144)	
awinratio	0.222**	-0.305**	
	(0.112)	(0.147)	
game_time	-0.223***	0.0616	
	(0.0520)	(0.0759)	
derby1	-0.235	0.177	
	(0.600)	(0.348)	
apps	-0.00959***	-0.00702***	
	(0.00190)	(0.00194)	
tmo	0.232***	0.226***	
	(0.0796)	(0.0864)	
att	-9.73e-07	-9.22e-08	
	(8.62e-06)	(5.93e-06)	
attcap	-0.00336	-0.000202	
	(0.00269)	(0.00134)	
irishref	0.224	0.615*	
	(0.266)	(0.361)	
welshref	0.201	0.612*	
	(0.244)	(0.343)	
scotref	0.204	0.639*	
	(0.288)	(0.349)	
italianref	0.102	0.619*	
	(0.281)	(0.370)	
irishrefderby	0.463	-0.152	
	(0.595)	(0.383)	
welshrefderby	0.601	0.00750	
	(0.566)	(0.390)	
scotrefderby	0.416	0.154	
	(0.654)	(0.350)	
italianrefderby	0.844	-0.303	
	(0.641)	(0.439)	
Constant	-0.626***	-0.837**	1.001***
	(0.223)	(0.334)	(0.255)
Observations		1,759	

- Composite Sanction & Interactions
- Similar Results

But….

- Away now penalised more in Derbies
- Less nationality 'bias' in Derbies

Shared Nationalities

VARIABLES	compositehome	compositeaway	lambda
hwinratio	-0.107	0.0810	
	(0.226)	(0.147)	
awinratio	0.159	-0.474**	
	(0.137)	(0.207)	
game_time	-0.111	0.0780	
	(0.0827)	(0.0782)	
apps	-0.0101***	-0.00627***	
	(0.00164)	(0.00217)	
tmo	0.339***	0.270**	
	(0.100)	(0.117)	
att	-4.21e-05**	8.56e-06	
	(2.09e-05)	(6.88e-06)	
attcap	-0.00197	-0.00148	
	(0.00309)	(0.00131)	
homematch	-0.105	-0.283	
	(0.235)	(0.208)	
awaymatch	0.215***	-0.0172	
	(0.0749)	(0.0687)	
Constant	-0.511***	-0.133	1.150***
	(0.162)	(0.169)	(0.322)
Observations		1,350	

- If the nationality of the referee is the same as the away team, the home team incurs more sanctions.
- Sample restricted to matches involving teams from different countries.

Conclusions

- Complex pressures on officials
  - TMO increases sanction generally – Increased monitoring improves agent behaviour…
  - …but does not reduce bias – familiarity heuristics.
  - Referee experience reduces bias
  - Derby sanction increases as intensity increases
  - Nationality effects
  - Reduces with derbies in context of greater bias;
    - Convergence of sanction
    - Needs review and training! Support for pro 14 criticism
  - Shared nationality
    - Potential biases when referee same nationality as away team but offsets bias from other sources?

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Future Work

- Include TMO nationality.
- Broadcaster nationality.
- Big screens in grounds (lack of data).

- Penalties awarded - data only for 2012/13-2017/18 (807 matches).
  - Penalties per game – 8.8 home 10.3 away.
  - Penalties per yellow card – 25.2 home 15.9 away.

- Data on timing of cards and state of play potential to analyse how decisions affect match outcomes.

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Thank you for your attention.

Questions and Comments Welcome.

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