The Production of Winning and Losing Hockey Games

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Presentation Outline

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2/12

- 1. Motivation
- 2. Related research
- 3. Production of winning
- 4. Team behaviour
- 5. Concluding remarks

Motivation

- Are high quality teams more efficient?
- Is team behaviour influenced by psychological biases?
- Can teams win more with improved in-game processes?

Motivation

In-game asymmetric incentives exist

Game state:	Leading	Trailing
Average benefit of a goal scored	0.13	0.20
Average cost of a goal allowed	0.19	0.14
Net benefit	-0.06	0.06

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Related Literature

- The Implied Volatility of a Sports Game (Polson and Stern, 2015)
- Production of winning (Kaplan, Mongeon and Ryan, 2013)

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5/12

 Prospect Theory: An Analysis of Decision under Risk (Kahneman and Tversky, 1979)

Production of Winning

$$p(H_g|S_{g,t}) = \frac{p(S_{g,t}|H_g)p(H_g)}{p(S_{g,t}|H_g)p(H_g) + p(S_{g,t}|\bar{H}_g)p(\bar{H}_g)}$$
$$\frac{p(H_g|S_{g,t})}{p(H_g|\bar{S}_{g,t})} = \frac{p(H_g)}{p(\bar{H}_g)} \times \frac{p(S_{g,t}|H_g)}{p(S_{g,t}|\bar{H}_g)}$$

Estimate and resample from posterior parameter distributions.

$$S_{g,t} = (SM_{h,k,t}|H_k, \bar{H}_k) \sim MNL(\theta_{k,t}(t)))$$

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Game progression average score-margins



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Team Behaviour

Game progression average score-margins







Team Efficiency

 $win_{g,t,l} = F\left(\beta_0 + \beta_1 ln(prior_{g,t,l}) + \beta_2 ln(BG_{g,t,l}) + \beta_3 ln(AG_{g,t,l})\right)$

Variable	Mean	Credible interval
Prior odds	-0.38	(-0.34, 0.23)
Posterior BG	0.11	(0.69, 1.27)
Posterior AG	0.99	(-0.08, 0.04)
Constant	-0.02	(-0.08, 0.04)

Team-specific posterior AG distributions

NYR	0.62	(0.13, 1.26)
MTL	-0.28	(-0.55, 0.04)
TOR	-0.46	(-0.79, -0.14)
BUF	-0.68	(-0.97,-0.36)

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Goal Effects

$$win_{g,t,l} = F\left(\beta_0 + \beta_1 ln(prior_{g,t,l}) + \beta_2 ln(\frac{postBG_{g,t,l}}{postAG_{g,t,l}}) + \beta_3 ln(postAG_{g,t,l})\right)$$

Variable	Mean	Credible interval
Prior odds	-0.42	(-0.70, 0.14)
Posterior BG-AG change	-0.13	(-0.52, 0.25)
Posterior AG	1.05	(0.92, 1.18)
Constant	-0.05	(-0.32, 0.22)

Team specific change in posterior distributions

NYR	1.07	(0.24, 1.89)
	1.01	(0.21, 1.00)
MTL	-0.31	(-1.75, 0.10)
TOR	-0.61	(-1.52, 0.30)
BUF	-0.68	(-1.45, 0.24)

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Concluding Remarks

- Market inefficiencies
- \blacksquare Under and over reaction to goals
- \blacksquare Increase winning through team processes

Thank you

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12/12