

Evaluating Strange Forecasts: The Curious Case of Football Match Scorelines

Online Appendix

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Appendix A. Measures of ‘closeness’

Superbru

The *Superbru* closeness metric is given by:

$$c_i = |\widehat{m}_i - m_i| + \left| \frac{\widehat{t}_i - t_i}{2} \right|. \quad (12)$$

Users get 1.5 points if $c_i \leq 1.5$ and the result is correct. In practice, this equates to the forecast having one goal more (less) for one or both teams than what actually occurred.

Foulley & Celeux

[Foulley and Celeux \(2018\)](#) propose a forecast penalty measure which is similar to *Superbru*’s measure, but which penalises the difference in result more and the distance from scoreline relatively less. The measure is summarised as:

$$FP(\mathbf{s}_i, \widehat{\mathbf{s}}_i) = C(\mathbf{s}_i, \widehat{\mathbf{s}}_i) + D(\mathbf{s}_i, \widehat{\mathbf{s}}_i), \quad (13)$$

where:

$$C = \begin{cases} 0 & \text{if } r_i(\widehat{\mathbf{s}}_i) = r_i(\mathbf{s}_i) \\ c_0 & \text{if } |r_i(\widehat{\mathbf{s}}_i) - r_i(\mathbf{s}_i)| = 0.5 \\ 2c_0 & \text{if } |r_i(\widehat{\mathbf{s}}_i) - r_i(\mathbf{s}_i)| = 1, \end{cases} \quad (14)$$

$$D(\mathbf{s}_i, \widehat{\mathbf{s}}_i) = \frac{\|\mathbf{s}_i - \widehat{\mathbf{s}}_i\|_2}{\|\mathbf{s}_i\|_2 + \|\widehat{\mathbf{s}}_i\|_2}, \quad (15)$$

where c_0 is some positive constant.

Appendix B. Additional tables

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This study is based on data obtained from and analysed with the permission of Superbru, Sport Engage Ltd. Throughout the study, the anonymity of individual users of the Superbru prediction game was maintained. The use of these data does not imply the endorsement of the data owners in relation to the interpretation or analysis of the data.

TABLE B1: Implied frequency (probability) from average bookmaker odds for scoreline outcomes in the 2016–17 and 2017–18 EPL seasons.

		2016–17 Away goals							2017–18 Away goals								
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Home goals	0	8.8	7.6	4.0	1.7	0.9	0.7	0.6	0.3	8.5	7.3	3.6	1.5	0.9	0.6	0.6	0.4
	1	10.5	13.1	6.7	2.5	1.0	0.7	0.3	0.3	10.2	12.6	6.2	2.3	1.0	0.7	0.3	0.4
	2	6.8	9.1	5.9	2.3	0.9	0.4	0.3	0.2	6.5	8.7	5.6	2.1	0.9	0.4	0.3	0.3
	3	3.1	4.2	3.0	1.5	0.6	0.3	0.3	0.1	2.9	3.9	2.7	1.3	0.5	0.3	0.3	0.3
	4	1.4	1.7	1.3	0.7	0.4	0.3	0.2	0.1	1.4	1.6	1.2	0.6	0.4	0.3	0.3	
	5	0.9	0.9	0.6	0.3	0.3	0.2	0.2	0.1	0.9	0.9	0.5	0.4	0.3	0.3	0.3	
	6	0.6	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.7	0.3	0.4	0.3	0.3	0.3	0.3	
	7	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.7	0.6	0.4	0.3				

Source: author calculations using Oddsportal.com and Soccerbase.com

TABLE B2: Frequency of tips by Superbru tipsters for each scoreline outcome in the 2016–17 and 2017–18 EPL seasons (%).

		2016–17 Away goals							2017–18 Away goals							
		0	1	2	3	4	5	6	0	1	2	3	4	5	6	
Home goals	0	2.1	5.8	6.6	1.8	0.2	0.0	0.0	1.5	5.1	5.9	2.1	0.5	0.1	0.0	0.0
	1	9.8	12.6	11.5	4.3	0.3	0.0	0.0	10.0	13.7	12.8	5.0	0.6	0.1	0.0	0.0
	2	10.1	14.3	4.6	0.7	0.1	0.0	0.0	10.6	15.2	3.7	0.7	0.1	0.0	0.0	0.0
	3	3.2	4.1	0.8	0.0	0.0	0.0	0.0	4.1	5.1	0.8	0.1	0.0	0.0	0.0	0.0
	4	0.4	0.3	0.1	0.0	0.0	0.0	0.0	1.2	0.6	0.2	0.0	0.0	0.0	0.0	0.0
	5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0

Source: *Superbru*

TABLE B3: Frequency of tips by ‘experts’ for each scoreline outcome in the 2016–17 and 2017–18 EPL seasons (%).

		2016–17 Away goals				2017–18 Away goals						
		0	1	2	3	0	1	2	3	4	5	
Lawrenson	Home goals	0	0.3	0.5	16.4	0.5	0.0	0.3	15.9	0.8	0.0	0.0
		1	1.6	26.1	5.0	0.0	1.9	26.8	3.4	0.0	0.0	0.0
		2	28.8	14.0	0.5	0.0	31.0	13.3	0.5	0.0	0.0	0.0
		3	6.1	0.3	0.0	0.0	5.3	0.3	0.0	0.0	0.0	0.0
		4	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Merson	Home goals	0	0.0	0.0	3.2	4.0	0.3	2.1	4.7	3.4	1.3	0.0
		1	2.9	14.8	9.0	7.4	8.2	9.8	9.0	7.4	0.0	0.3
		2	13.8	13.0	5.8	0.3	17.9	14.8	1.6	0.3	0.0	0.0
		3	11.9	9.8	2.6	0.3	9.5	4.2	0.8	0.0	0.0	0.0
		4	1.1	0.0	0.3	0.0	3.7	0.3	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0		

Source: author calculations using *BBC Sport & Sky Sports*

TABLE B4: Selected ranks out of 55 (50 tipsters, 2 experts, 3 models) and 155 (150 tipsters, 2 experts, 3 models) according to different scoring rules in the 2016/17 and 2017/18 EPL seasons, respectively

	Scoring Rule												ROI
	Brier (1)	Scores (%) (2)	Results (%) (3)	Close (4)	BBC (5)	Sky (6)	Sbru (7)	Pen (8)	Results (9)	Scores (10)	Margins (11)	Total Gls (12)	
2016/17													
Merson	5	14	3	20	5	4	2	7	4	1	2	9	
Lawrenson	3	5	7	2	2	3	1	8	2	11	1	23	
Unconditional	4	8.5	52	9	17.5	29	33.5	39	44	27	48	20	
Conditional	1	1	6	16	1	2	3	35	6	6	7	12	
Fuzzy Cond.	2	3	25	19	8	11	12	40	30	18	27	11	
2017/18													
Merson	5	130.5	22	98	114	100	45	22	85	123	35	60	
Lawrenson	1	3	65	29	16	22	3	7	56	11	57	38	
Unconditional	3.5	29.5	107.5	22	57.5	88.5	97.5	49	48	89	120	89	
Conditional	3.5	29.5	16.5	38	31.5	29.5	15	81	104	93	118	111	
Fuzzy Cond.	2	11.5	50.5	43	24	27.5	29.5	50	88	45	125	105	

Notes: see Table 3 in main text.

TABLE B5: Weak efficiency tests for forecast scoreline outcomes

	Model	Bookmakers	Lawrenson	Merson	Tipsters
	(1)	(2)	(3)	(4)	(5)
Constant ($\hat{\alpha}$)	0.002*** (0.0005)	-0.002*** (0.0005)	0.011*** (0.0004)	0.011*** (0.0004)	0.007*** (0.0005)
Forecast/Pick ($\hat{\beta}$)	0.839*** (0.014)	1.156*** (0.018)	0.111*** (0.004)	0.080*** (0.004)	0.458*** (0.010)
Observations	61,560	61,560	61,560	61,560	61,560
Adjusted R^2	0.052	0.063	0.012	0.006	0.036
Resid. std. error	0.107	0.107	0.110	0.110	0.108
F test of efficiency	0.000***	0.000***	0.000***	0.000***	0.000***

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

TABLE B6: Strong efficiency tests for forecast result outcomes (home win, draw, away win)

	Model	Bookmakers	Lawrenson	Merson	Tipsters
	(1)	(2)	(3)	(4)	(5)
Constant ($\hat{\alpha}$)	0.005 (0.045)	0.071 (0.045)	0.045 (0.047)	0.056 (0.046)	0.277** (0.120)
Home-win forecast ($\hat{\beta}$)	0.317** (0.130)	1.158*** (0.200)	0.116*** (0.043)	0.163*** (0.046)	-0.255** (0.108)
Elo prediction	0.660*** (0.138)	-0.238 (0.215)	0.750*** (0.109)	0.657*** (0.115)	0.562*** (0.176)
Adjusted R^2	0.142	0.176	0.145	0.151	0.142
F -test of efficiency	0.61	0.978	0.000	0.000	0.000
Constant ($\hat{\alpha}$)	0.195*** (0.065)	0.016 (0.102)	0.244*** (0.025)	0.271*** (0.023)	0.244*** (0.051)
Draw forecast ($\hat{\beta}$)	0.299 (0.211)	0.945*** (0.354)	0.102*** (0.036)	0.048 (0.043)	0.120 (0.148)
Elo predict (balance)	-0.795** (0.393)	-0.068 (0.508)	-0.833** (0.364)	-0.964*** (0.364)	-0.757 (0.493)
Adjusted R^2	0.011	0.020	0.020	0.010	0.009
F -test of efficiency	0.835	1.000	0.000	0.000	0.395
Constant ($\hat{\alpha}$)	0.432*** (0.091)	-0.313** (0.131)	0.546*** (0.053)	0.556*** (0.058)	0.620*** (0.053)
Away-win forecast ($\hat{\alpha}$)	0.442*** (0.124)	1.406*** (0.169)	0.229*** (0.044)	0.174*** (0.044)	-0.340*** (0.111)
Elo prediction	-0.557*** (0.119)	0.343* (0.165)	-0.624*** (0.090)	-0.640*** (0.097)	-0.362* (0.187)
Adjusted R^2	0.166	0.225	0.181	0.169	0.162
F -test of efficiency	0.67	0.916	0.000	0.000	0.000
Observations	760	759	756	757	760

Note: *p<0.1; **p<0.05; ***p<0.01, two-tailed tests.

TABLE B7: Weak efficiency tests for forecast result outcomes (home win, draw, away win)

	Model	Bookmakers	Lawrenson	Merson	Tipsters
	(1)	(2)	(3)	(4)	(5)
Constant ($\hat{\alpha}$)	0.112*** (0.040)	0.043 (0.038)	0.319*** (0.025)	0.277*** (0.026)	0.653*** (0.024)
Home-win forecast ($\hat{\beta}$)	0.810*** (0.080)	0.957*** (0.076)	0.306*** (0.035)	0.344*** (0.035)	-0.558*** (0.052)
Adjusted R^2	0.117	0.173	0.092	0.115	0.131
F -test of efficiency	0.919	0.995	0.000	0.000	0.000
Constant ($\hat{\alpha}$)	0.116** (0.052)	0.005 (0.061)	0.205*** (0.018)	0.229*** (0.017)	0.179*** (0.028)
Draw forecast ($\hat{\beta}$)	0.482** (0.191)	0.979*** (0.246)	0.122*** (0.035)	0.072* (0.042)	0.278*** (0.107)
Adjusted R^2	0.007	0.019	0.015	0.003	0.008
F -test of efficiency	0.894	1.000	0.000	0.000	0.419
Constant ($\hat{\alpha}$)	0.023 (0.028)	-0.047* (0.027)	0.200*** (0.017)	0.190*** (0.018)	0.531*** (0.025)
Away-win forecast ($\hat{\beta}$)	0.892*** (0.079)	1.090*** (0.074)	0.398*** (0.037)	0.361*** (0.035)	-0.537*** (0.045)
Adjusted R^2	0.143	0.221	0.130	0.123	0.159
F -test of efficiency	0.973	0.979	0.000	0.000	0.000
Observations	760	759	756	757	760

Notes: *p<0.1; **p<0.05; ***p<0.01.