Table A-1: Descriptive statistics national soccer leagues data set

	seasons	games	% hw	% aw	% draw	agh	aga
1945-1946 to 2007-2008							
Belgium	63	17644	0.49	0.49	0.26	1.78	1.19
England	62	27290	0.49	0.49	0.26	1.70	1.15
France	63	22386	0.53	0.53	0.27	1.75	1.02
Germany	45	13712	0.52	0.52	0.26	1.90	1.19
Italy	63	18422	0.48	0.48	0.32	1.52	0.95
Netherlands	52	15648	0.48	0.48	0.26	1.83	1.25
Spain	63	18990	0.56	0.56	0.24	1.78	0.98
All	63	134092	0.51	0.51	0.27	1.74	1.10
1945-1946 to 1995-1996							
Belgium	51	14006	0.50	0.50	0.26	1.80	1.18
England	50	22730	0.50	0.50	0.26	1.74	1.16
France	51	18196	0.54	0.54	0.26	1.83	1.04
Germany	33	10040	0.53	0.53	0.26	1.98	1.19
Italy	51	14454	0.49	0.49	0.33	1.51	0.91
Netherlands	40	11976	0.48	0.48	0.26	1.84	1.25
Spain	51	14348	0.59	0.59	0.24	1.86	0.94
All	51	105750	0.52	0.52	0.27	1.79	1.09
1996-1997 to 2007-2008							
Belgium	12	3638	0.48	0.48	0.24	1.71	1.23
England	12	4560	0.47	0.47	0.26	1.51	1.09
France	12	4190	0.48	0.48	0.29	1.41	0.90
Germany	12	3672	0.48	0.48	0.25	1.68	1.18
Italy	12	3968	0.47	0.47	0.30	1.53	1.09
Netherlands	12	3672	0.48	0.48	0.23	1.78	1.26
Spain	12	4642	0.48	0.48	0.26	1.54	1.09
All	12	28342	0.48	0.48	0.26	1.59	1.11

A APPENDIX WITH ADDITIONAL FIGURES AND ESTIMATION RESULTS

This appendix belongs to Ruud H. Koning (2008) 'Sport and measurement of competition' *De Economist* 157(1). In this appendix we provide some additional tables and graphs to that paper.

In table A-1 we provide some summary statistics of the national soccer leagues: the number of seasons per country, the total number of games in the period indicated, the fractions home wins, away wins, and draws, and the average number of goals by the home team and the away team.

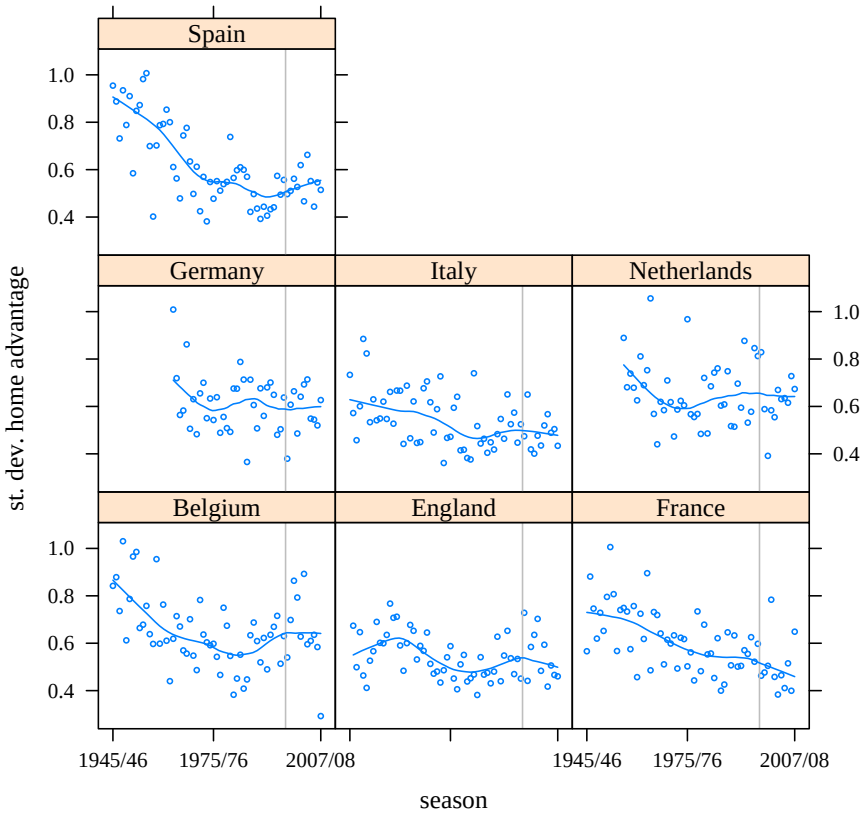

Figure A-1: Standard deviation of home advantage over time

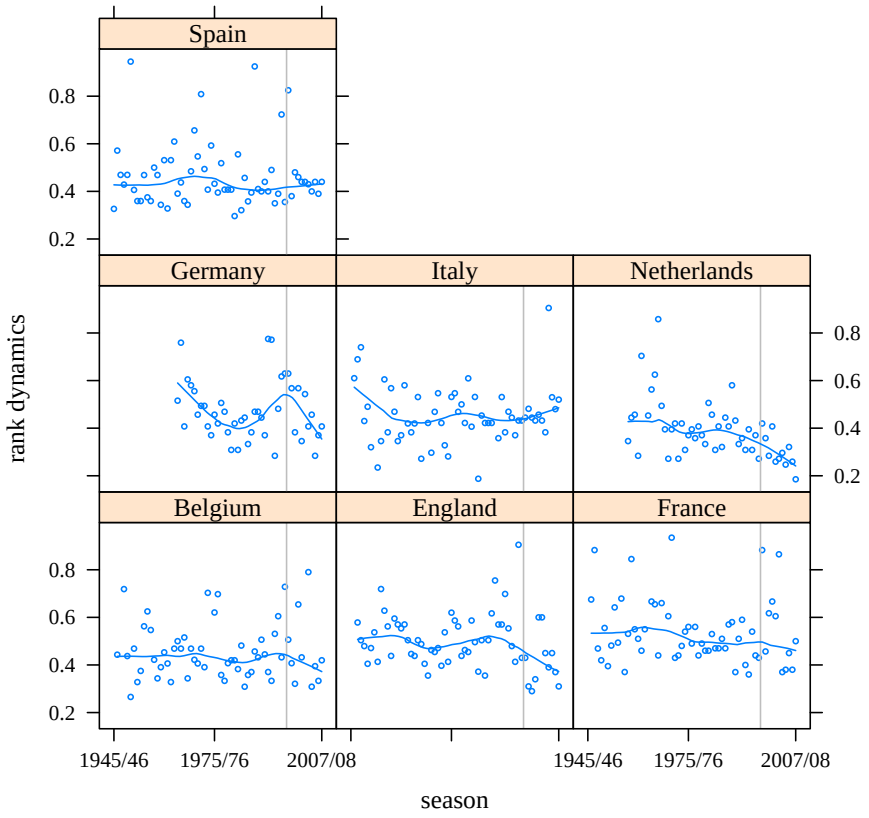

Figure A-2: Dynamics of ranking *DN* over time

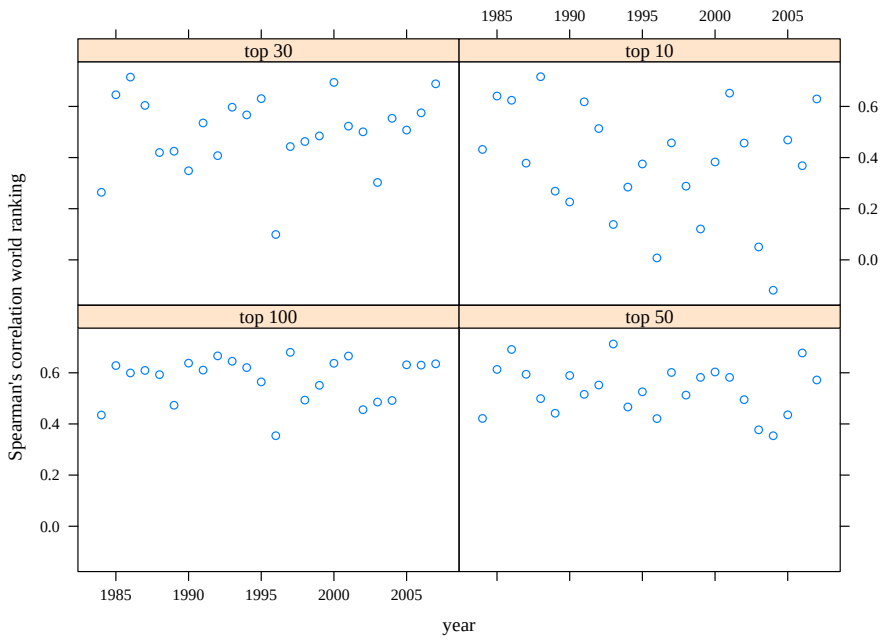

Figure A-3: Spearman's rank correlation coefficient (men)

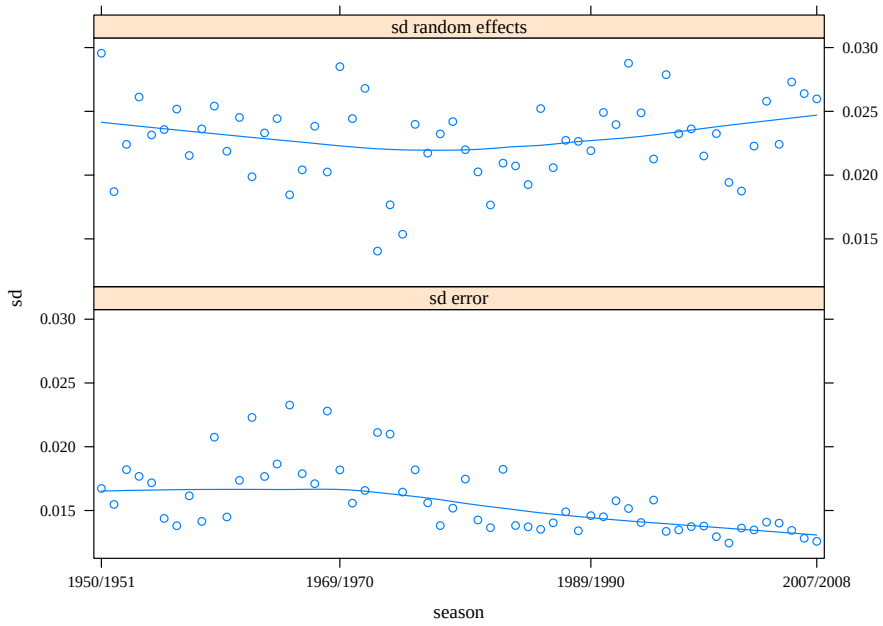

Figure A-4: Development of standard deviation random effects and residual standard deviation

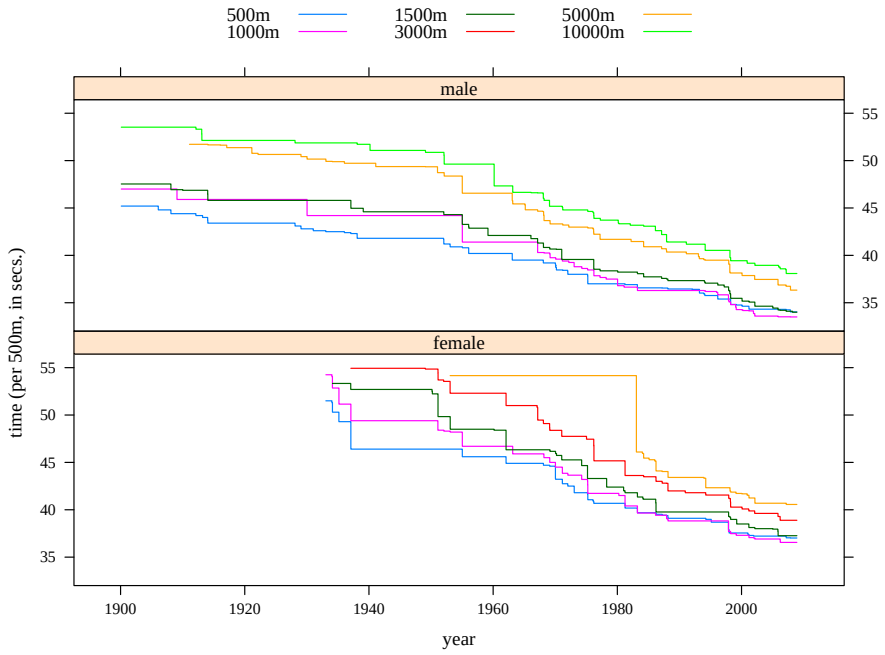

Figure A-5: Development of world records, by sex

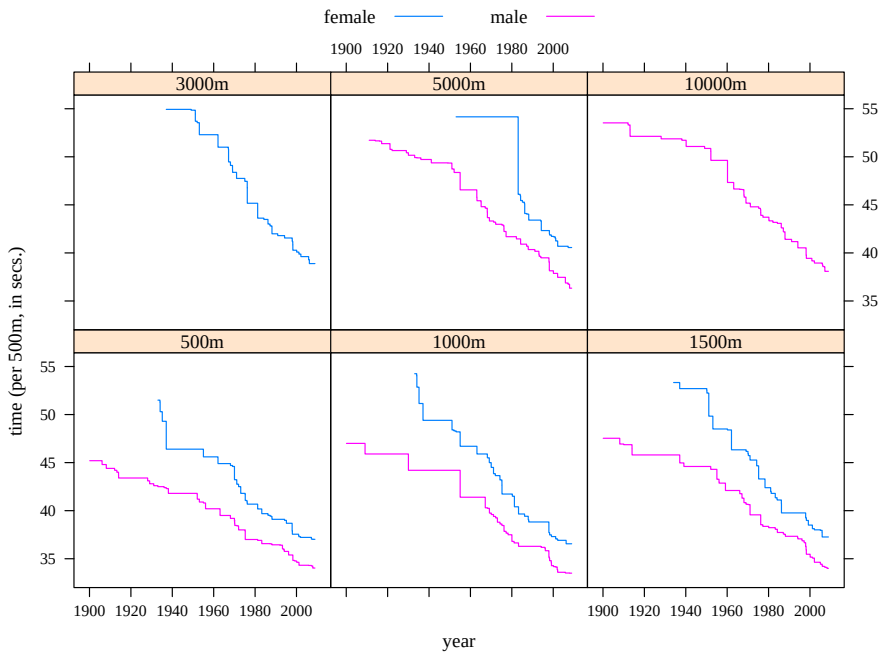

Figure A-6: Development of world records, by distance

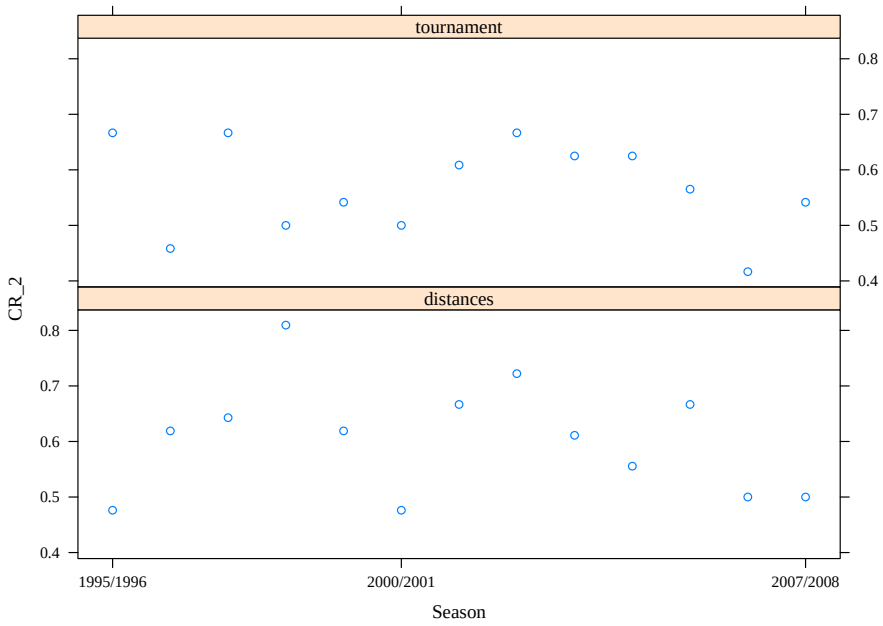

Figure A-7: Concentration ration CR_2 of medal count

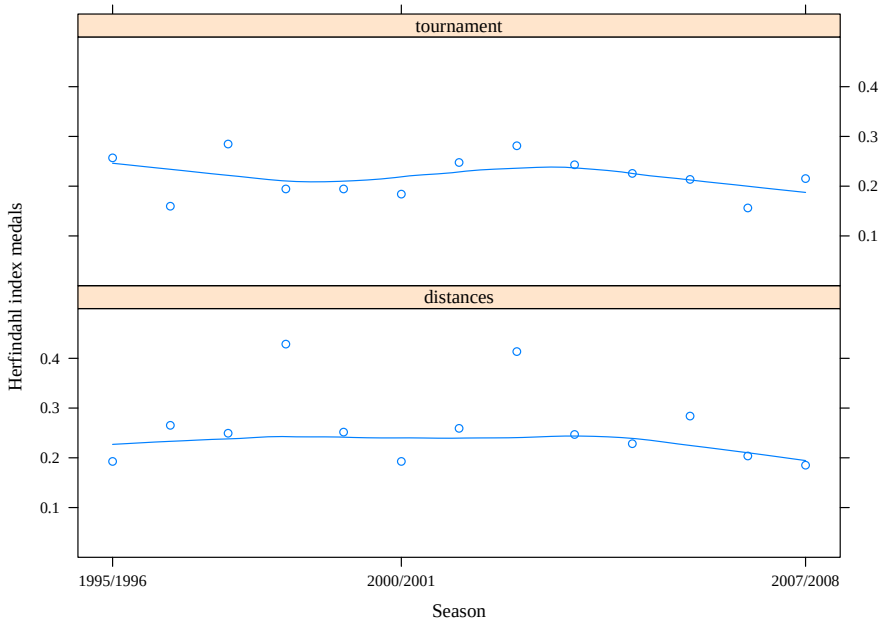

Figure A-8: Herfindahl index $\sum_i m_i^2$ of medal count

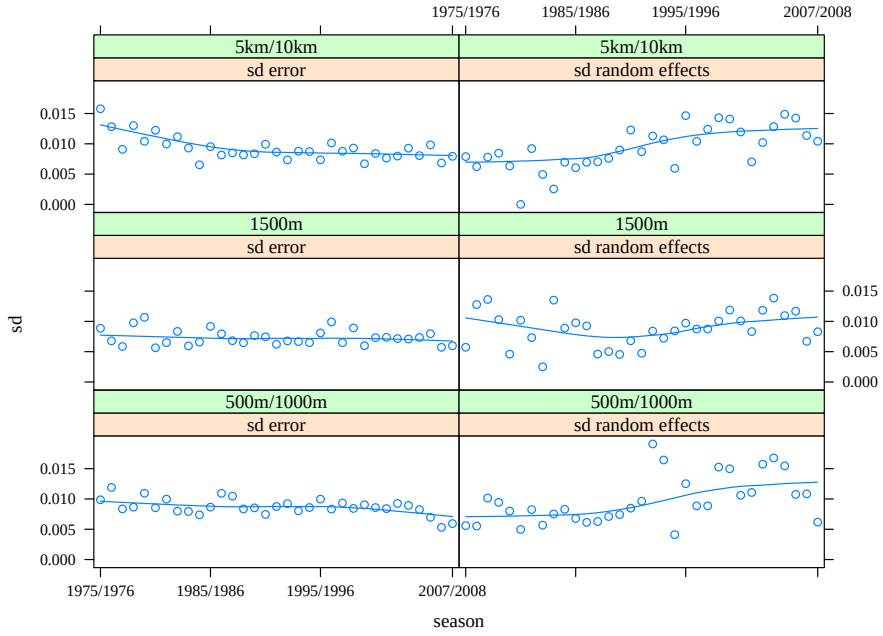

Figure A-9: Development of standard deviation random effects and residual standard deviation, by season and distance

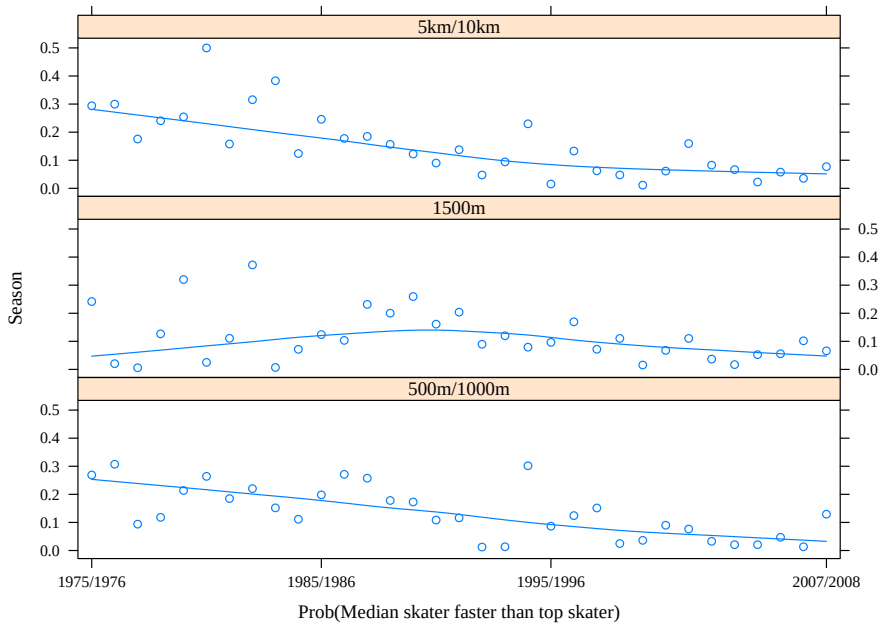

Figure A-10: Probability that top skater beats median skater, by distance

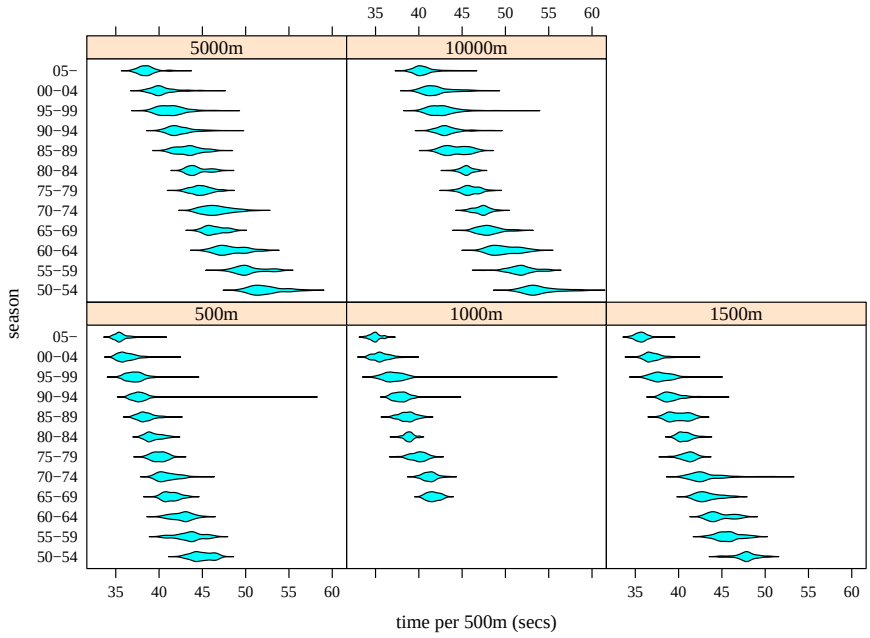

Figure A-11: Distribution of skating times, per five season interval

The probabilities in table 3 were calculated as follows. For soccer, let $\theta_{\max}$ be the largest value among the θ's in a given season, and let θ_{median} be the median value. Then the probability that the median team beats the best team on a neutral venue is

$$\Pr(\text{median team} \succ \text{best team}) = 1 - \Phi\left(\frac{0.5 + \theta_{\max} - \theta_{\text{median}}}{\sigma_\varepsilon}\right), \tag{A-1}$$

with σ_ε the standard deviation of ε in equation (1). In the case of tennis, we take the median player to be ranked eight on the World Ranking, which is consistent with a tournament among the sixteen best players. The winning probability is given by

$$\Pr(R_8 \succ R_1) = \frac{1}{1 + \exp(-\beta(\log 8))}. \tag{A-2}$$

Finally, in the case of skating we estimated the random effects for each season, and choose the sixteen lowest ones (corresponding to the sixteen best skaters on that distance). From these random estimated random effects, we calculate

$$\Pr(T_{\text{median skater}} <= T_{\text{fastest skater}}) = \Phi\left(\frac{\alpha_{\text{median skater}} - \alpha_{\text{fastest skater}}}{\sqrt{2}\sigma_\varepsilon}\right). \tag{A-3}$$

We assume that both times are skated on the same rink, and that any random influences determining the times of the skaters are uncorrelated. That is, we assume

$$\text{var}(\varepsilon_{\text{median skater},t} - \varepsilon_{\text{fastest skater},t}) = 2\sigma_\varepsilon^2$$