EURO 2024 knockout predictions: round of 16

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The statistical model (in brief)

We use a **diagonal-inflated Bivariate-Poisson model with dynamic team-specific abilities** for the attack and the defence. Let (X_i, Y_i) denote the random number of goals scored by the home and the away team in the i-th game, $i = 1, \dots, n$, respectively. ranking denotes the Coca-Cola FIFA ranking at April 4th, 2024, whereas att and def denote the attack and the defence abilities, respectively.

$$(X_i, Y_i) \sim \begin{cases} (1-p)\text{BP}(x_i, y_i|\lambda_1, \lambda_2, \lambda_3) & \text{if } x \neq y \\ (1-p)\text{BP}(x_i, y_i|\lambda_1, \lambda_2, \lambda_3) + pD(x, \eta) & \text{if } x = y, \end{cases}, \tag{1}$$

$$\log(\lambda_{1i}) = \text{att}_{h_i,t} + \text{def}_{a_i,t} + \frac{\gamma}{2}(\text{ranking}_{h_i} - \text{ranking}_{a_i}) \tag{2}$$

$$\log(\lambda_{2i}) = \text{att}_{a_i,t} + \text{def}_{h_i,t} - \frac{\gamma}{2}(\text{ranking}_{h_i} - \text{ranking}_{a_i}), \quad i = 1, \dots, n \text{ (matches)}, \tag{3}$$

$$\log(\lambda_{3i}) = \rho, \tag{4}$$

$$\text{att}_{k,t} \sim \mathcal{N}(\text{att}_{k,t-1}, \sigma^2), \tag{5}$$

$$\text{def}_{k,t} \sim \mathcal{N}(\text{def}_{k,t-1}, \sigma^2), \tag{6}$$

$$\rho,\ \gamma \sim \mathcal{N}(0, 1) \tag{7}$$

$$p \sim \text{Uniform}(0, 1) \tag{8}$$

$$\sum_{k=1}^{n_t} \text{att}_{k,} = 0,\ \sum_{k=1}^{n_t} \text{def}_{k,} = 0, \quad k = 1, \dots n_t \text{ (teams)},\ t = 1, \dots, T \text{ (times)}. \tag{9}$$

Lines (1) displays the likelihood's equations (diagonal inflated bivariate Poisson); lines (2)-(4) display the log-linear models for the scoring rates λ_1, λ_2 and the covariance parameter λ_3; lines (5)-(6) display the dynamic prior distributions for the attack and the defence parameters, respectively; lines (7)-(8) display prior distributions for the other model parameters; line (9) displays the sum-to-zero identifiability constraints. Model fitting has been obtained through the Hamiltonian Monte Carlo sampling, 2000 iterations, 4 chains using the `footBayes` `R` package (with the underlying `rstan` package). The historical data used to fit the models come from *all the international matches played during the years' range 2020-2024*.

The idea is to provide a dynamic predictive scenario: at the end of each match-day, the model will be refitted to predict the remaining matches.

Knockout predictions: round of 16 (29th June - 02th July)

Posterior matches probabilities from the posterior predictive distribution of the model above are displayed in the table below. **mlo** denotes the *most likely exact outcome* (in parenthesis, the corresponding posterior probability). Darker regions in the plots below denote more likely outcomes: on the x-axis the home goals, on the y-axis the away goals.

home	away	home win	draw	away win	mlo
Switzerland	Italy	0.288	0.273	0.439	0-1 (0.123)
Germany	Denmark	0.448	0.263	0.289	1-0 (0.12)
England	Slovakia	0.714	0.206	0.080	1-0 (0.16)
Spain	Georgia	0.726	0.186	0.088	2-0 (0.139)
France	Belgium	0.406	0.301	0.293	0-0 (0.152)
Portugal	Slovenia	0.653	0.220	0.127	1-0 (0.145)
Romania	Netherlands	0.163	0.213	0.624	0-1 (0.109)
Austria	Turkey	0.550	0.231	0.218	1-0 (0.101)