

EURO 2020 groupstage predictions: 3rd match day

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The statistical model (in brief)

We use a **double 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 May 27th, 2021, whereas `att` and `def` denote the attack and the defence abilities, respectively.

$$X_i | \lambda_{1i} \sim \text{Poisson}(\lambda_{1i}), \quad (1)$$

$$Y_i | \lambda_{2i} \sim \text{Poisson}(\lambda_{2i}), \quad (2)$$

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

$$\log(\lambda_{2i}) = \text{att}_{a_i,t} + \text{def}_{h_i,t} - \frac{\gamma}{2}(\text{ranking}_{h_i} - \text{ranking}_{a_i}), \quad i = 1, \dots, n \text{ (matches)}, \quad (4)$$

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

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

$$\sum_{k=1}^{n_t} \text{att}_{k,t} = 0, \quad \sum_{k=1}^{n_t} \text{def}_{k,t} = 0, \quad k = 1, \dots, n_t \text{ (teams)}, \quad t = 1, \dots, T \text{ (times)}. \quad (7)$$

Lines (1)-(2) display the likelihood's equations (two Poisson distributions); lines (3)-(4) display the log-linear models for the scoring rates λ_1, λ_2 ; lines (5)-(6) display the dynamic prior distributions for the attack and the defence parameters, respectively; line (7) displays the sum-to-zero identifiability constraints. Model fitting has been obtained through the Hamiltonian Monte Carlo sampling, 2000 iterations, 4 chains (`rstan` package). The historical data used to fit the models come from: **Nations' League** (2019-2020), **Euro UEFA Qualifiers** (2020-2021), **World Cup UEFA Qualifiers** (2021), **UEFA Euro 2020** (1st and 2nd groupstage matches).

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.

Groupstage predictions: 3rd day (20-23 June)

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
Italy	Wales	0.553	0.260	0.187	1-0 (0.15)
Switzerland	Turkey	0.553	0.242	0.205	1-0 (0.127)
Ukraine	Austria	0.436	0.256	0.308	1-1 (0.116)
Netherlands	FYR Macedonia	0.743	0.163	0.094	2-0 (0.13)
Denmark	Russia	0.694	0.187	0.119	2-0 (0.124)
Finland	Belgium	0.081	0.150	0.769	0-2 (0.131)
Scotland	Croatia	0.272	0.274	0.454	0-1 (0.134)
England	Czech Republic	0.677	0.202	0.121	1-0 (0.135)
Sweden	Poland	0.466	0.263	0.270	1-0 (0.124)
Spain	Slovakia	0.677	0.206	0.117	1-0 (0.145)
Portugal	France	0.387	0.276	0.337	1-1 (0.124)
Germany	Hungary	0.639	0.199	0.162	2-0 (0.105)

