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Supplementary file 1

Linear mixed effects model

As preliminary analyses showed, there are different intercepts and growth slopes in conflict rates for the provinces under study. Therefore, a linear mixed effects model was applied to evaluate the trend of mean rate in these provinces from 2014 to 2020. This trend has a linear reduction from 2014 to 2017 and a slight linear growth until 2020 (Figure 1). So, we assume a piecewise linear mixed effects model with a knot in 2017. This model has an intercept and two slopes (one slope for changes in the mean rate before 2017, another for after 2017) which can be specified as:

$$\mathrm{E}\left(\mathrm{Y}_{\mathrm{ij}} \middle| b_i\right) = \beta_1 + \beta_2\mathrm{time}_{\mathrm{ij}} + \beta_3(\mathrm{time}_{\mathrm{ij}})_+ + \mathrm{b}_{1\mathrm{i}} + b_{2i}time_{ij} + b_{2i}(time_{ij})_+$$

Where $\mathrm{time}_{\mathrm{ij}}$ denotes year of jth measurement on the ith province before or after 2017, $(\mathrm{time}_{\mathrm{ij}})_+ = \mathrm{time}_{\mathrm{ij}}$ if $\mathrm{time}_{\mathrm{ij}}$>2017 and $(\mathrm{time}_{\mathrm{ij}})_+ = 0$ if $\mathrm{time}_{\mathrm{ij}} \leq 2017$. $(\beta_1 + \mathrm{b}_{1\mathrm{i}})$ is intercept for ith province, $(\beta_2 + \mathrm{b}_{2\mathrm{i}})$ and $\{(\beta_2 + \beta_3) + (b_{2i} + b_{3i})\}$ are the ith province's slope before and after 2017 (18, 19)

Growth Mixture Model (GMM)

$$y_{it}^k = \eta_{i0}^k + \eta_{i1}^k \lambda_t^k + \varepsilon_{it}^k$$

$$\eta_{i0}^k = \eta_{00}^k + \sum_j \beta_{01j}^k x_j + \varsigma_{i0}^k$$

$$\eta_{i1}^k = \eta_{10}^k + \sum_j \beta_{11j}^k x_j + \varsigma_{i1}^k$$

Where y_{it}^k is conflict rate for the ith province at time t; η_{i0}^k and η_{i1}^k are latent variables, λ_t^k is time score which can be specified as linear, nonlinear polynomial functions of time or free time scores; ε_{it}^{k} is residual term for ith country at time t; η_{00}^{k} and η_{10}^{k} are intercept coefficients representing the model estimated overall mean levels of initial and average rate of conflict change over time; β_{01j}^{k} and β_{11j}^{k} are slope coefficients of covariates x_j; ς_{i0}^{k} and ς_{i1}^{k} are error terms (23, 24).