I assume that the observed indicators for each state-year are functions of a single dimensional latent variable (the Judicial Independence Common Space) that represents the level of *de jure* judicial independence. For each state-year observation, let i index the state and t index the year. or each model, there are J indicators $J = 1,...,J$ each of which is ordinal.[1] I estimate each θ_{it}, which is the latent level of *de jure* judicial independence of each state i in year t (**?**, 7).

Let $i = 1,...,N$ index cross-sectional units and $t = 1,...,T$ index time periods. In each time, period, I observe values y_{ij} for each of $j = 1,...,J$ indicators for each unit. Each indicator is assumed to be ordinal and can take on K_j values.[2] The responses to each of the items depend on a single latent variable θ_{it}, which may vary across units and over time. I assume that all indicators are independently drawn from a logistic distribution (**?**, 7).

For each indicator, there is an "item discrimination" parameter β_j and a set of $Kj - 1$ difficult cut-points.[3] (**?**, 7). A benefit of using institutional arrangements, which are observable with readily available data is that any error that is introduced into the indicators is the result of coding errors rather than perceptual errors found in survey responses.

The probability distribution for a given response to item j is observed as:

$$P[y_{ij} = k] = F(\alpha_{jk} - \theta_{it}\beta_j) - F(\alpha_{jk-1} - \theta_{it}\beta_j) \tag{1}$$

$F(\cdot)$ is the logistic cumulative distribution function. I assume the local independence of responses across units, the likelihood function for β, α, and θ given the data is[4]:

$$\mathscr{L}(\beta, \alpha, \theta | y) = \prod_{i=1}^{N} \prod_{t=1}^{T} \prod_{j=1}^{J} [F(\alpha_{jy_{itj}} - \theta_{it}\beta_j) - F(\alpha_{jy_{itj}-1} - \theta_{it}\beta_j)] \tag{2}$$

If θ, (*de jure* judicial independence), was able to be observed, the likelihood function shown in Equation 2 would be equivalent to an independent ordinal logistic regression model (**?**, 8). All IRT models have local independence assumptions. The implication of this is that each y_{itj} are independently drawn conditional on θ. The only relationship between two item responses is that they are both measure the same latent variable, θ. **?**, 8 discuss the assumptions made in this model. However, their Assumption 3, is a matter of concern in this model for the same reason. Assumption 3 relates to the local independence

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[1] For definitions of each level of indicators, see Table **??**

[2] For term length indicators, these have been collapsed into five ordered categories. This is due to the relative infinite value of a life or quasi-life term. A previous specification of this model was considered using the average length of term in office for each justice that had served on the court under the life or quasi-life term. This specification was rejected as introducing a questionable degree of *de facto* independence into what is a purely *de jure* measurement model.

[3] For more detail on these cut-points see (**??**).

[4] For a more detailed explanation of the assumptions made in this likelihood, see (**?**, 8).

of indicators across years within states (**?**, 8). Rather than attempting to measure a regime's respect for human rights as in **?**, I am measuring an institutional arrangement by each state. In each state there is a yearly potential to change selection methods, keeping intact a relaxed version of this assumption. This relaxation of Assumption 3 comes from the informative priors used by **?**, 8.