The cross-nested logit model

Estimating partially nested structures

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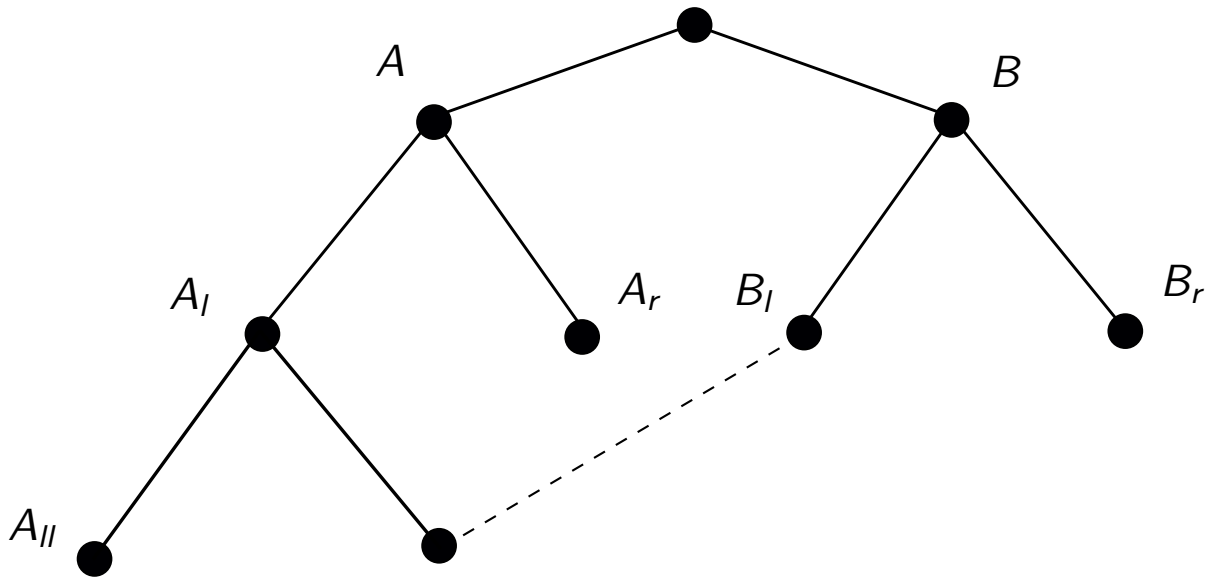
Research question

- Show how the cross-nested logit model can extend the concepts of nested choices to a range of complex choice puzzles.
- Implement an estimator for the cross-nested logit on synthetic and real data (for the Danish unemployment benefits systems).



Motivation:

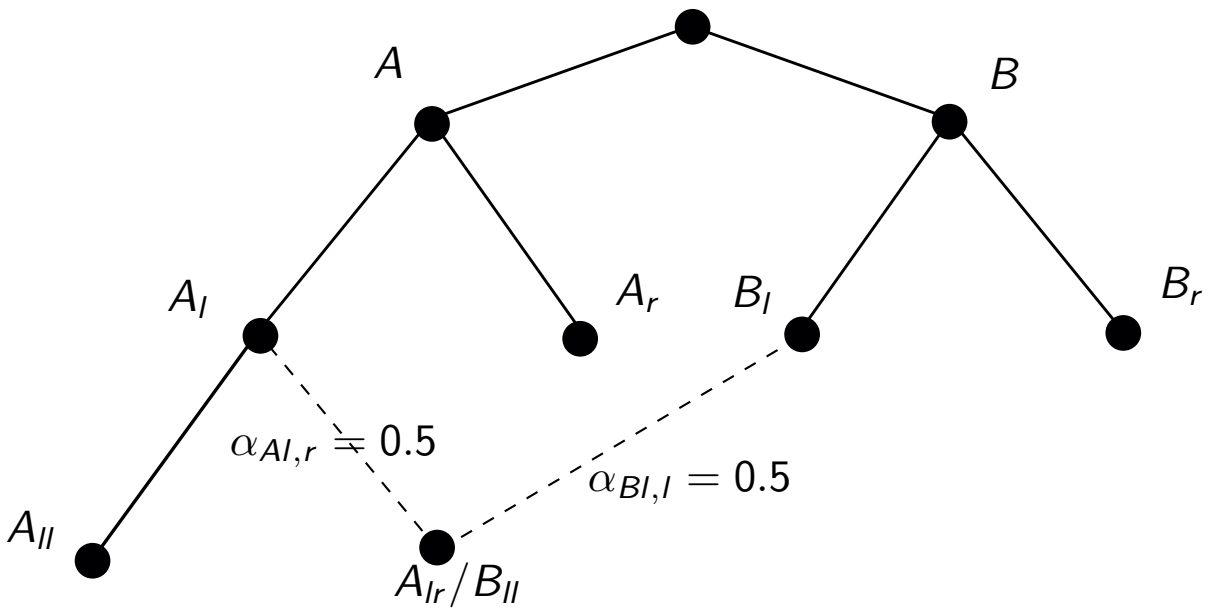
- To loosen the restriction that each option is only accessible through one tree-path, but not duplicated.

The cross-nested logit model

The CNL models are simply a generalization of the Multinomial Logit model, within the GEV (Generalized Extreme Value) class where

$$G(x_1, ..., x_J) = \sum_m \left(\sum_{j \in \mathcal{J}} \alpha_{jm} x_j^{\mu_m} \right)^{\frac{\mu}{\mu_m}} \tag{1}$$

Where m is a nest index, α_{jm} gives how much choice j is in nest m and is restricted to $\sum_m \alpha_{jm} > 0 \ \forall j$. It is somewhat common to require $\sum_m \alpha_{jm} = 1$.



So what's next?

- Simulate the DGP described by the CNL - we want a visual understanding of the data. Also successfully code the estimator.
- It's typically assumed that α's are a priori known (?) to keep the number of parameters down $\rightarrow$ can parameter tuning give optimal α's?
- The estimation requires either heavy computer power or analytically derived derivatives from complex functions (although they do exits!) $\rightarrow$ how sensitive is numerical optimization in this setting?
- Use CNL to estimate choice probabilities for those on sick leave within the *unemployment benefits system* using Danish registry data from the DREAM group.