Ant Climate Project

Path analysis using PCA - Global using conditional averaging

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Contents

1 Initial comments

- Read in the ant data and prepare the variables for path analysis. There are 474 species for which data is available for colony size and climatic variables, excluding special ants. Process repeated on the 4 different PCA datasets created using the 4 different MCC trees.

- We use PCA for phylogenetic path analysis as path analysis with both temperature and rainfall variables in the same models were always rejected, unless causal paths were drawn between climatic variables. This is likely because of the correlation between climatic variables. Path analaysis with PCA allows us to analyse both temperature and rainfall in the same causal models.

- The potential model set is reduced to just four models for each analysis, assuming that colony size has a direct effect on the number of worker castes (Bell-Roberts et al., 2023).

2 Summary

- Model 3 (climate affects colony size) most often comes out as the best model across trees. But there is no real pattern of any strong effect of climate and social complexity. Results also quite sensitive to phylogenetic uncertainty.
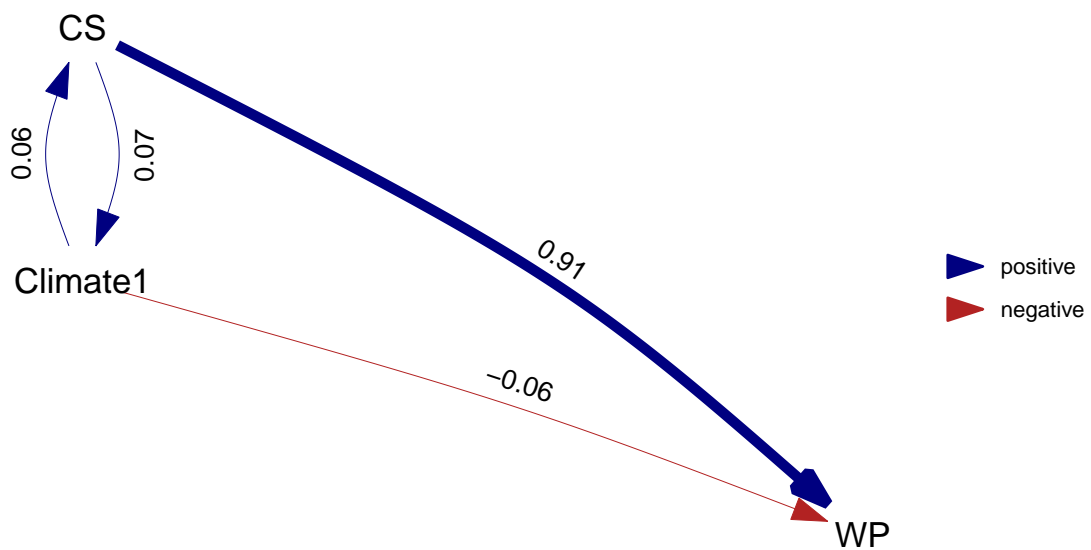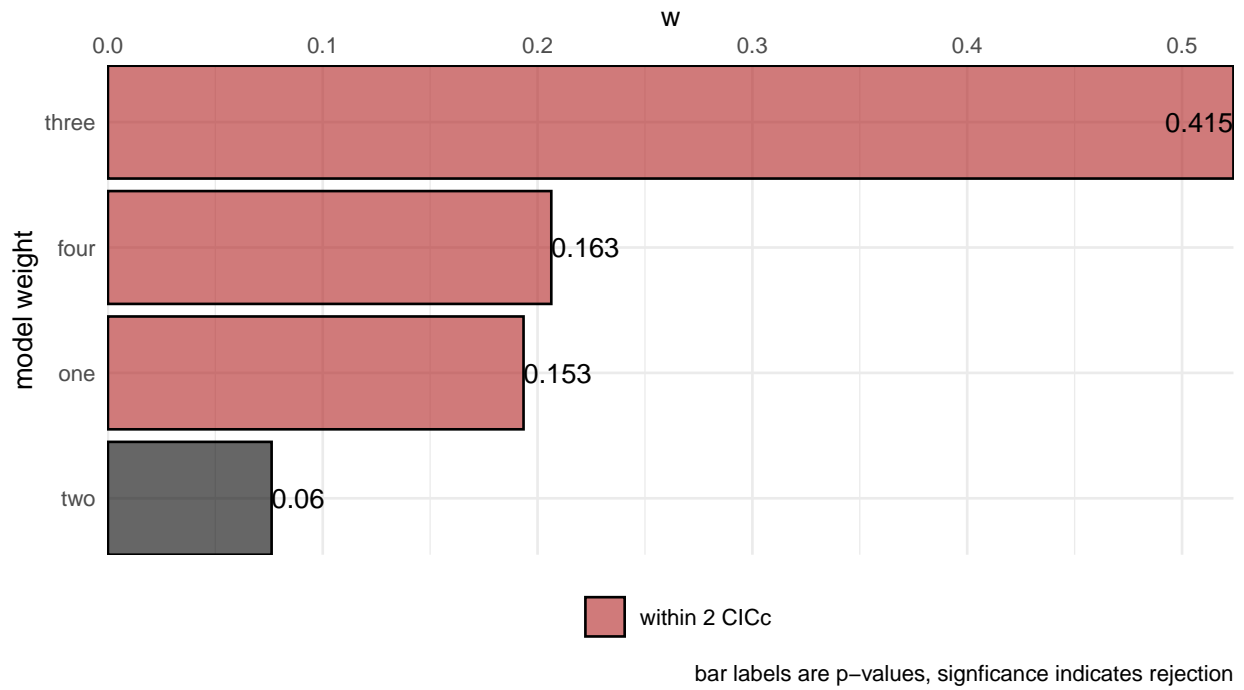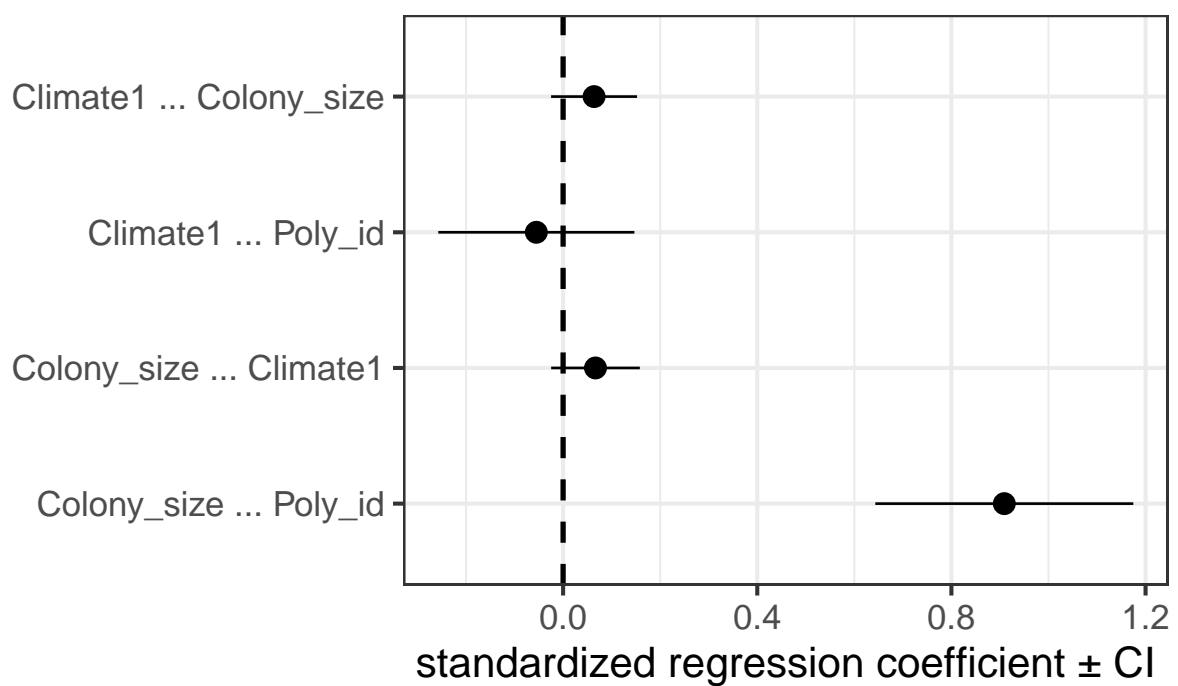
3 Create alternative causal models
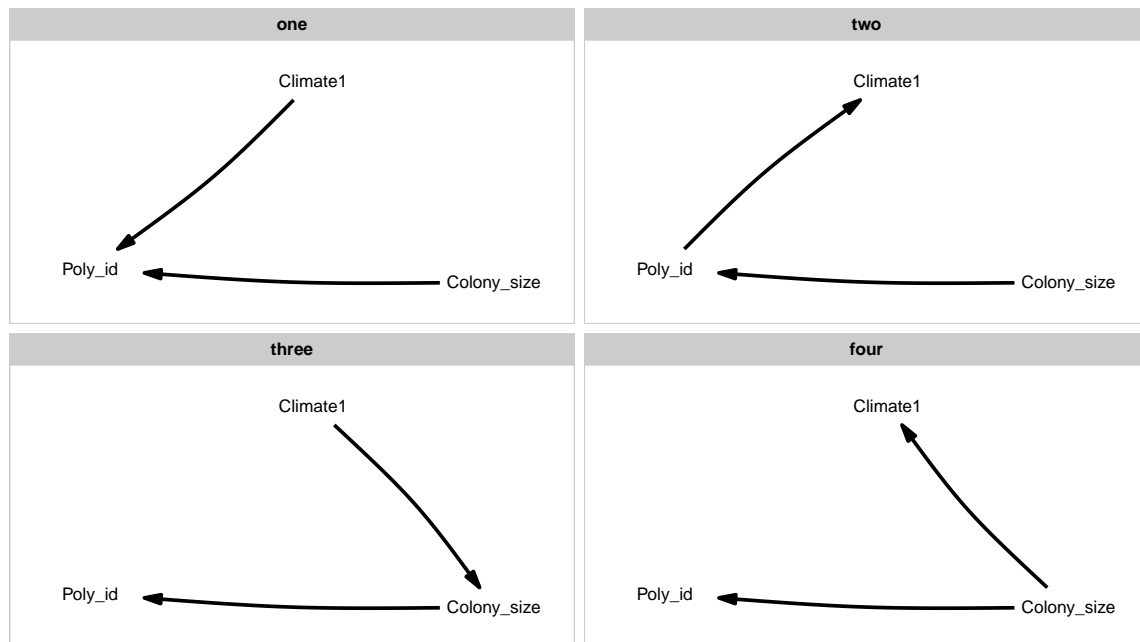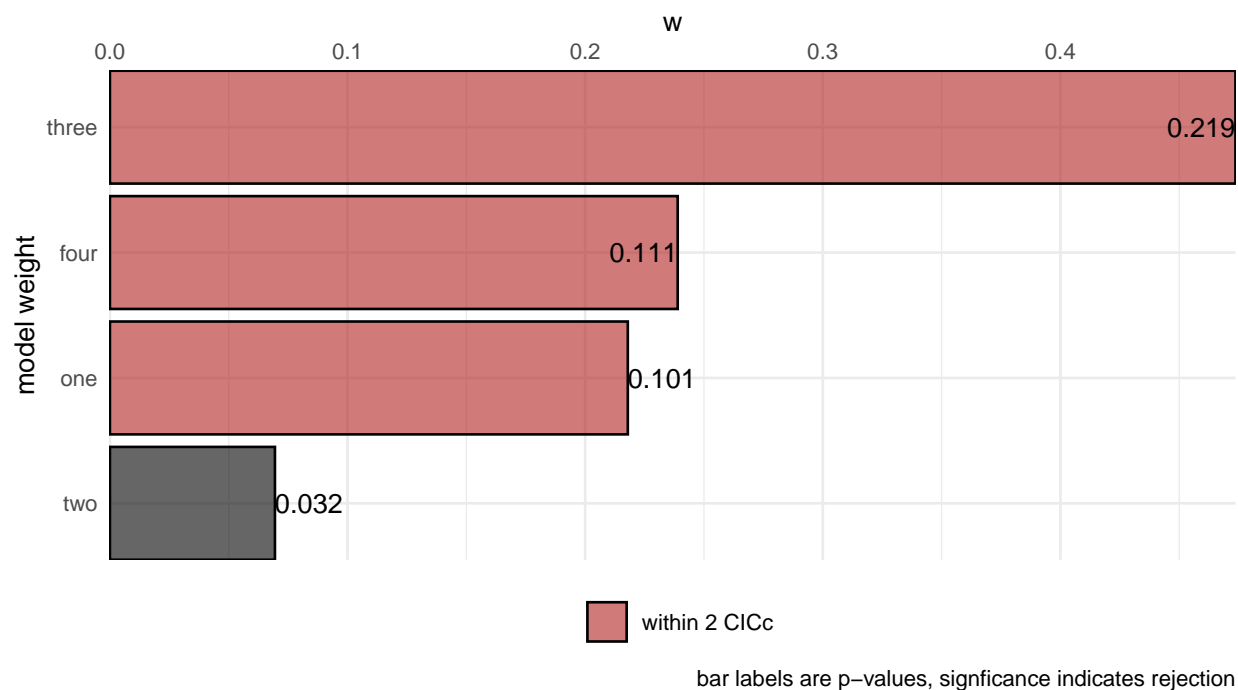
4 Path analysis

4.1 NCuniform stem tree

Factor loading PC1: TMP: negative; PRE: negative

bar labels are p−values, signficance indicates rejection

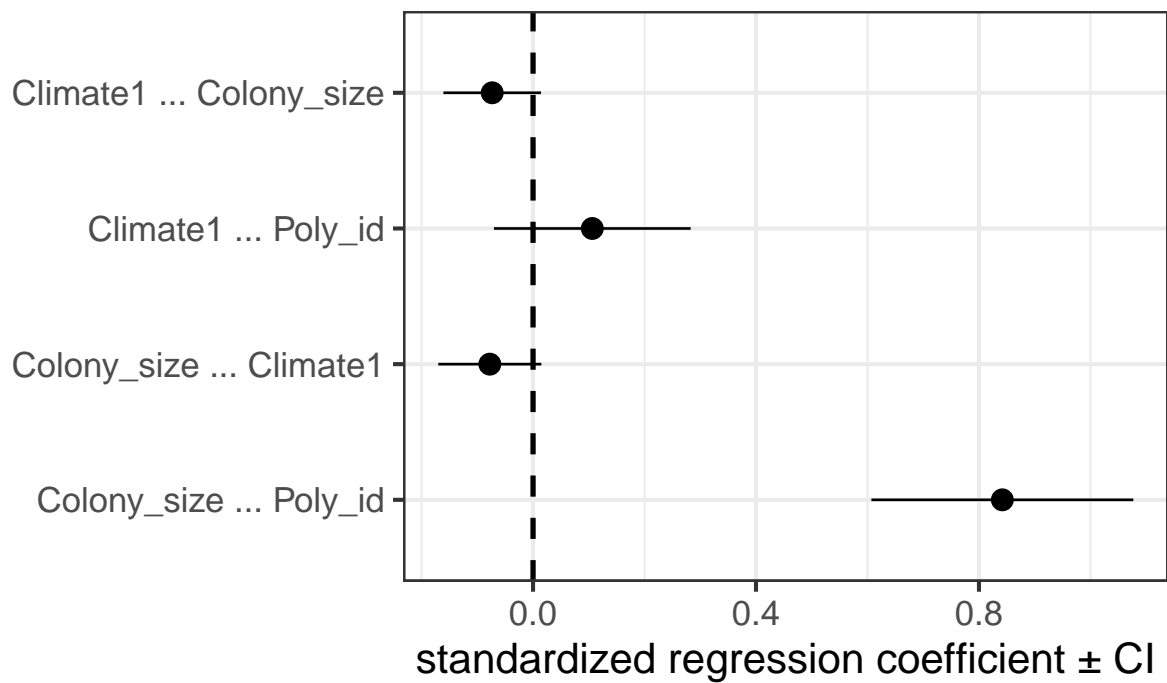standardized regression coefficient ± CI
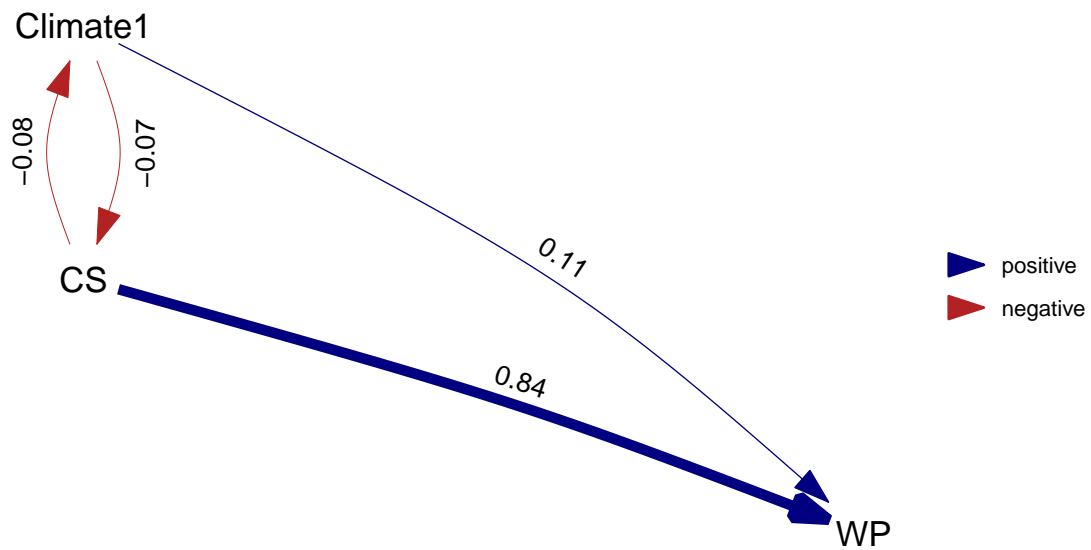
4.2 NCuniform crown tree
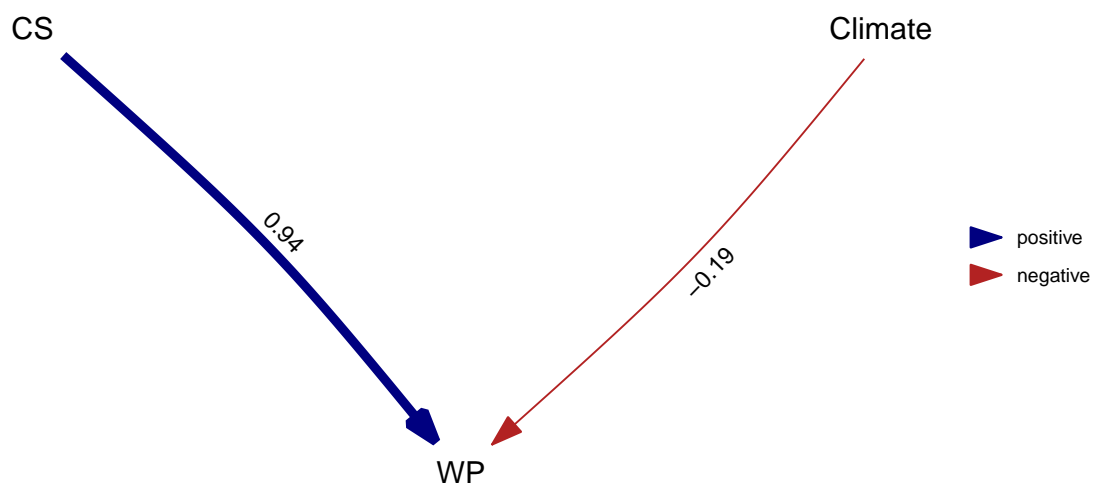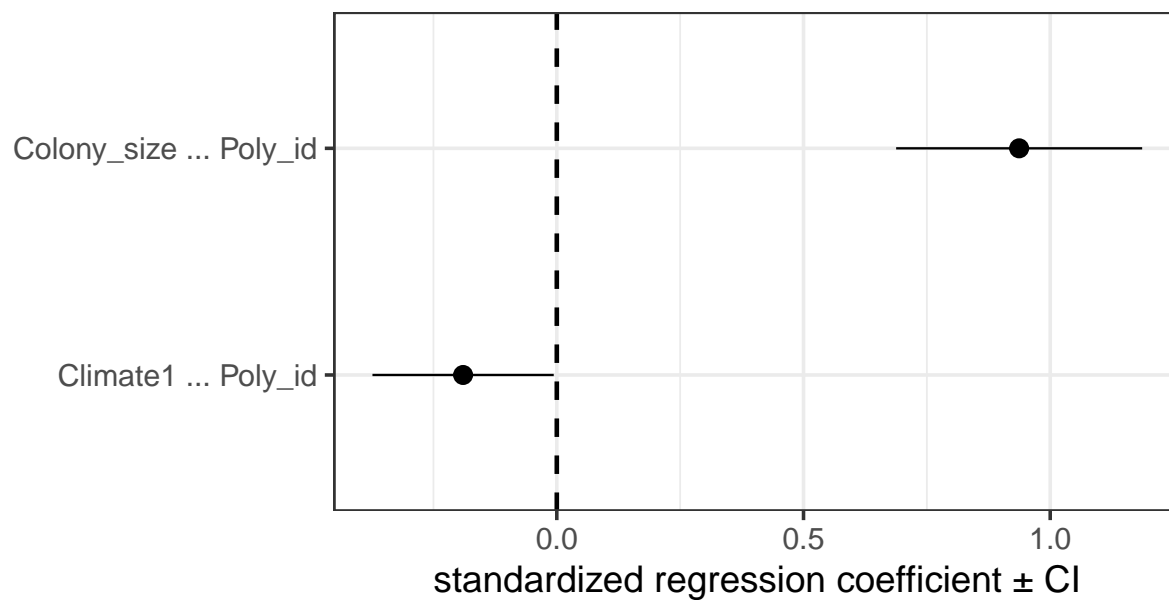
Factor loading PC1: TMP: positive; PRE: positive

within 2 ClCc

bar labels are p−values, signficance indicates rejection

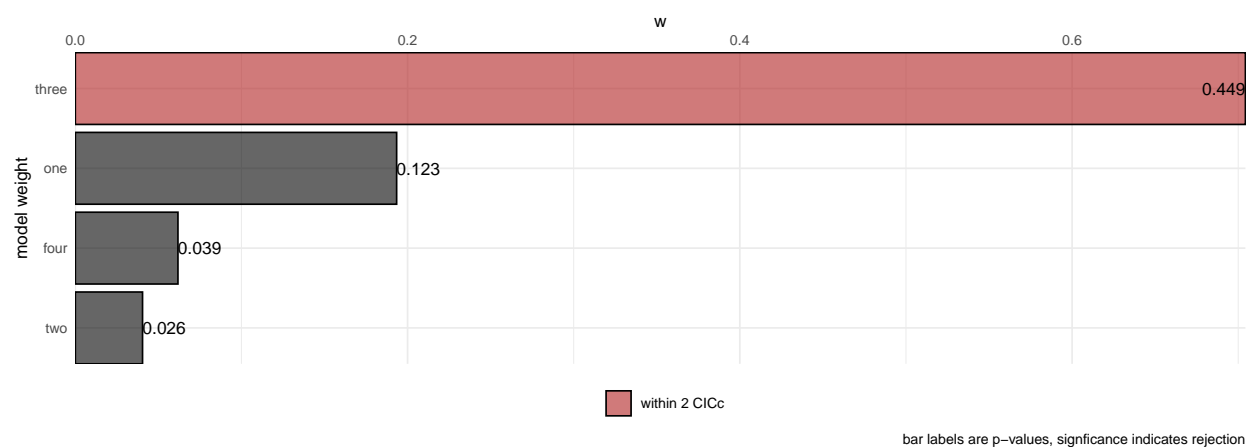## 4.3 FBD stem tree

Factor loading PC1: TMP: negative; PRE: negative
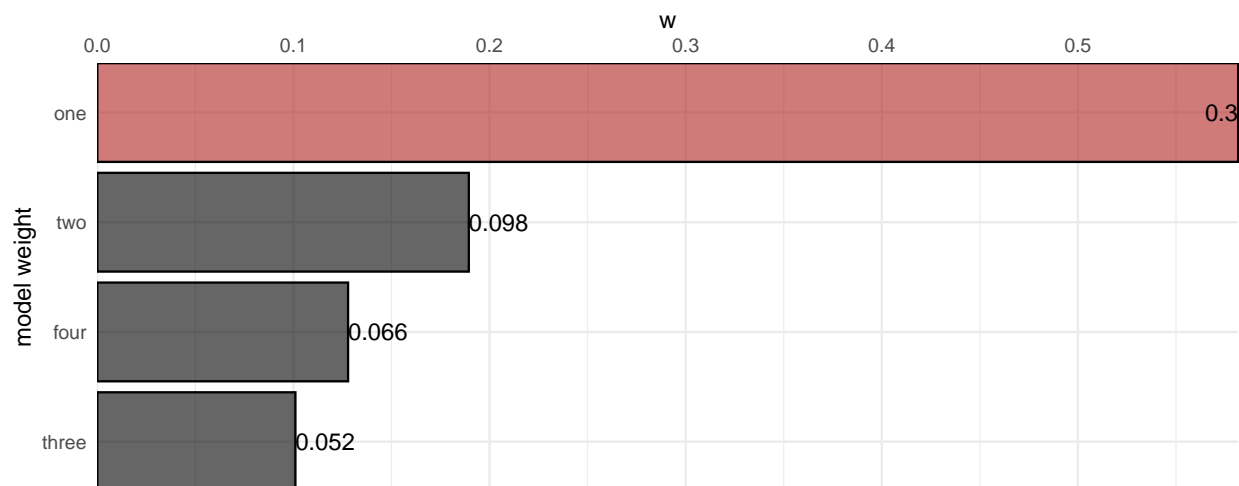
bar labels are p–values, signficance indicates rejection

4.4 FBD crown tree
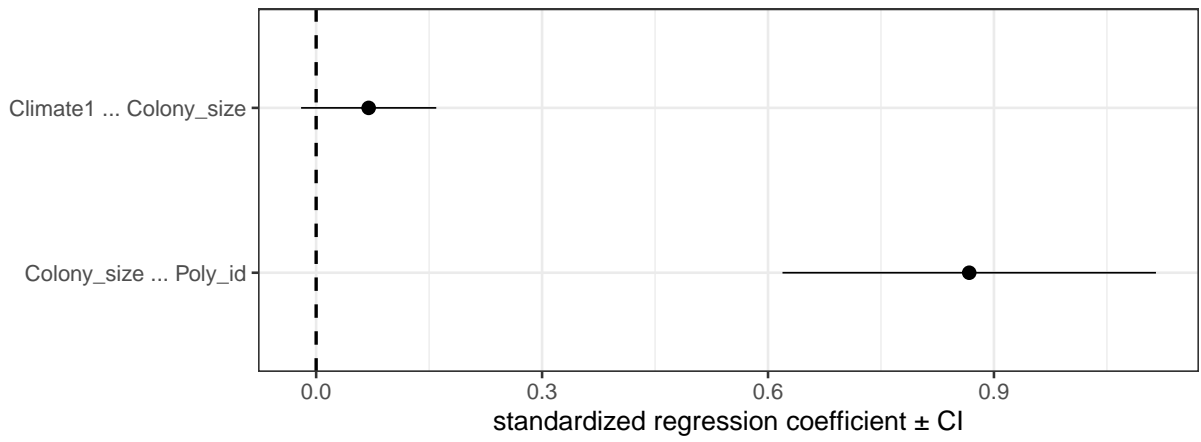
Factor loading PC1: TMP: negative; PRE: negative

bar labels are p−values, signficance indicates rejection

5 Panel plots

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## pdf
##   2
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