

Online Supplemental Material:
The Evolution of National Constitutions

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This appendix to “An Institutional Common Score of National Constitutions” includes a number of results noted in the paper, robustness checks and additional models noted in the paper, and additional results not directly mentioned in the paper. Below is a table of contents for this document.

1. We describe the general topics that are included in the constitutional data in the Comparative Constitutions Project and show the number of features contained in each of the thirteen broad categories.
2. We outline the method by which we convert the constitutional data in the Comparative Constitutions Project into the dataset that we use to estimate the IRT model of constitutional similarities.
3. We outline the decision theoretical model underlying our statistical estimator.
4. We show the distribution of features, constitution length, and the number of enumerated rights.
5. We calculate the *ConScore* using four different IRT scaling methods and show that they are highly correlated.
6. We show the correlation between our preferred model and models that account for within-country correlation and correlation between countries that share the same past colonial power.
7. We show the correlation among models run when sequentially omitting one category of constitutional features.
8. We present the limited improvement in the model using the aggregate proportional reduction in error (APRE).
9. We investigate the presence of a second dimension in the *ConScore* procedure. To do this, we discuss the angle of the cutting lines when estimating the constitutional

data using the NOMINATE procedure. We also show the correlation between the first dimension estimates and the second dimension estimates. We find that the within country correlation between the first and second dimension estimates is extremely high.

A Details of Constitutional Questions

For a complete description of each constitutional “question”, see the Comparative Constitutions Project. We present here a brief description of the general topics and related questions associated with each topic.

- General Characteristics
 - Constitutional models, transitional provisions, preamble, Treatment of colonies, regional references, reconciliation commission, previous leaders, democracy, oaths, socialism, capitalism, foreign investment, right to overthrow government
- Amending
 - Form and structure, proposal rights, approval rights, vote thresholds, limits, procedures
- Executive
 - Form and structure, term limits, age limits, additional restrictions, removal and replacement, head of state, head of government, depute executive, cabinet, attorney general, emergency powers and provisions
- Legislature
 - Form and structure, first chamber, second chamber, method of selection, term limits, removal and replacement, oversight powers, legislation, special legislation, rules and restrictions
- Judiciary
 - Form and structure, supreme court, ordinary court, administrative, constitutional court, judicial review, removal, membership

- Federalism
 - General structure, secession and accession, autonomy of indigenous groups
- Elections
 - Political parties, referenda and initiative, suffrage, oversight, characteristics, mandatory voting, secret ballot, scheduling of elections, public financing of elections, census
- Regulatory and Oversight Bodies
 - Ombudsman, central bank, media, judicial council, corruption, human rights, additional independent agencies
- International
 - Relationship to international law, war, foreign policy, treaties, declarations of war,
- Criminal Procedures
 - State obligation to provide employment, health care, culture or cultural rights, taxes, military service, trade union membership
- Criminal Procedures
 - Jury rights, capital punishment, due process, ex post fact laws, fair trails, miranda rights, bankruptcy law
- Special Issue Domains
 - Environment, arts and sciences, media and communications, military, economic legislation, race, ethnicity, language, education

B Number of Constitutional Features by Category

Number of Features by Category

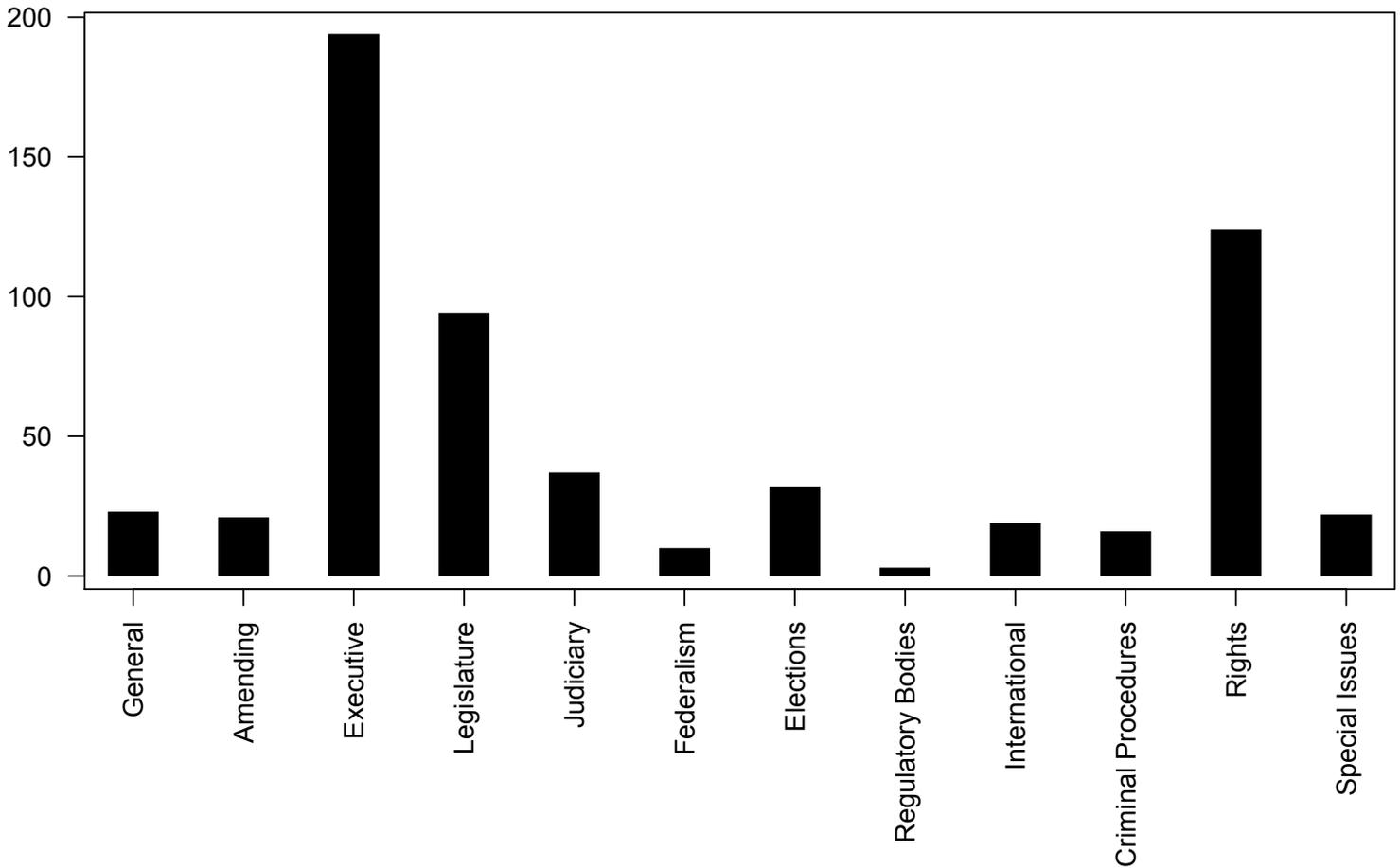


Figure A1: This figure shows the number of constitutional features in the CCP data by category.

C Coding of Constitutional Questions

Traditional IRT models require data to be presented in a binary “yes/no” format. In the context of educational testing, this corresponds to indicating whether the student correctly answered each exam question. When used in roll-call voting, the binary model applies quite easily to whether the legislator cast a “yea” or “nay” vote. In the context of constitutional questions, we code the data to indicate whether or not the country does or does not include the particular question in their constitution. As an example, we illustrate how we translate a specific question regarding the identity of the executive into a series of binary outcomes. The Comparative Constitutions Dataset includes a question asking:

Is the executive identified explicitly as the Head of State or Head of Government?

- Head of State
- Head of Government
- Neither
- Both
- Other
- Unable to Determine

Using this question, we then create three new binary variables. The first variable is equal to 1 if the head of state is identified as the executive. The second binary variable is equal to 1 if the head of government is identified as the executive. Finally, the third binary variable is equal to 1 if the country uses neither the head of state nor the head of government as their executive. To avoid problems of perfect collinearity, we omit the final variable that would equal 1 if the country uses both the head of state and the head of government as the executive.

We repeat this procedure for each question contained in the CCP dataset. Outlining how this procedure for each question would require hundreds of pages as there are thousands of questions included in the CCP codebook. We present this particular question merely as an example. The full list of questions is available from the CCP website (<http://comparativeconstitutionsproject.org/>).

D Underlying Theory of Induced Institutional Choice

Consider the choice over a given constitutional feature as being taken by a single actor, the constitution writer. This is a reduced form way of capturing the preferences of the decisive political actor in a given polity. In democracies this may reflect the median legislator or member of the constitutional convention. In autocratic regimes it may be the median member of the selectorate or the decisive member of a military junta. Regardless, we are agnostic as to the particular aggregation function used to arrive at a constitutional choice and simply recognize that all polities face a set of overlapping decisions when composing or amending a constitution. The theoretical model we adopt allows us to compare these choices.

Let $\mu_{i,j}^d$ represent the utility that constitution writer i gets from making choice d over institutional feature j . The utility of constitution writer i is a function of their underlying preference over institutions, ρ_i^d , the institutional feature proposed, τ_j^d , and a random disturbance term, $\xi_{i,j}^d$. Following convention, utility is modeled with a quadratic loss function of the form: $\mu_{i,j}^d = -|\rho_i^d - \tau_j^d|^2 + \xi_{i,j}^d$ which has the simple interpretation of representing “distance” between an institution and the constitution writer’s bliss-point. The utility the writer gets from adopting (or not adopting) a given institutional feature increases as the institution (absence of the institution) gets closer to their preferred point. We allow for idiosyncratic factors to influence this by incorporating the error term $\xi_{i,j}^d$.

The country will choose to adopt (A) a given institutional feature or reject (R) if it receives a higher utility from implementing this feature than from failing to implementing it. That is, if the net payoff to the incorporation of a constitutional feature is positive the writer will choose to adopt it. This can be written as $z_{i,j} = \mu_{i,j}^A - \mu_{i,j}^R$. Substitution in the

above definition of $\mu_{i,j}^d$ and then simplifying we obtain:

$$\begin{aligned}
z_{i,j} &= \mu_{i,j}^A - \mu_{i,j}^R \\
&= -|\rho_i^A - \tau_j^A|^2 + \xi_{i,j}^A + |\rho_i^R - \tau_j^R|^2 - \xi_{i,j}^R \\
&= (\tau_j^R \tau_j^R - \tau_j^A \tau_j^A) + 2(\tau_j^A - \tau_j^R)\rho_i + (\xi_{i,j}^A - \xi_{i,j}^R) \\
&= \alpha_j + \beta_j \rho_i + \epsilon_{i,j}
\end{aligned} \tag{1}$$

Which is identical to the two-parameter IRT model we use.¹

¹See Baker and Kim (2004) for more details of IRT estimation theory and procedures.

E Number of Features, Length, and Enumerated Rights

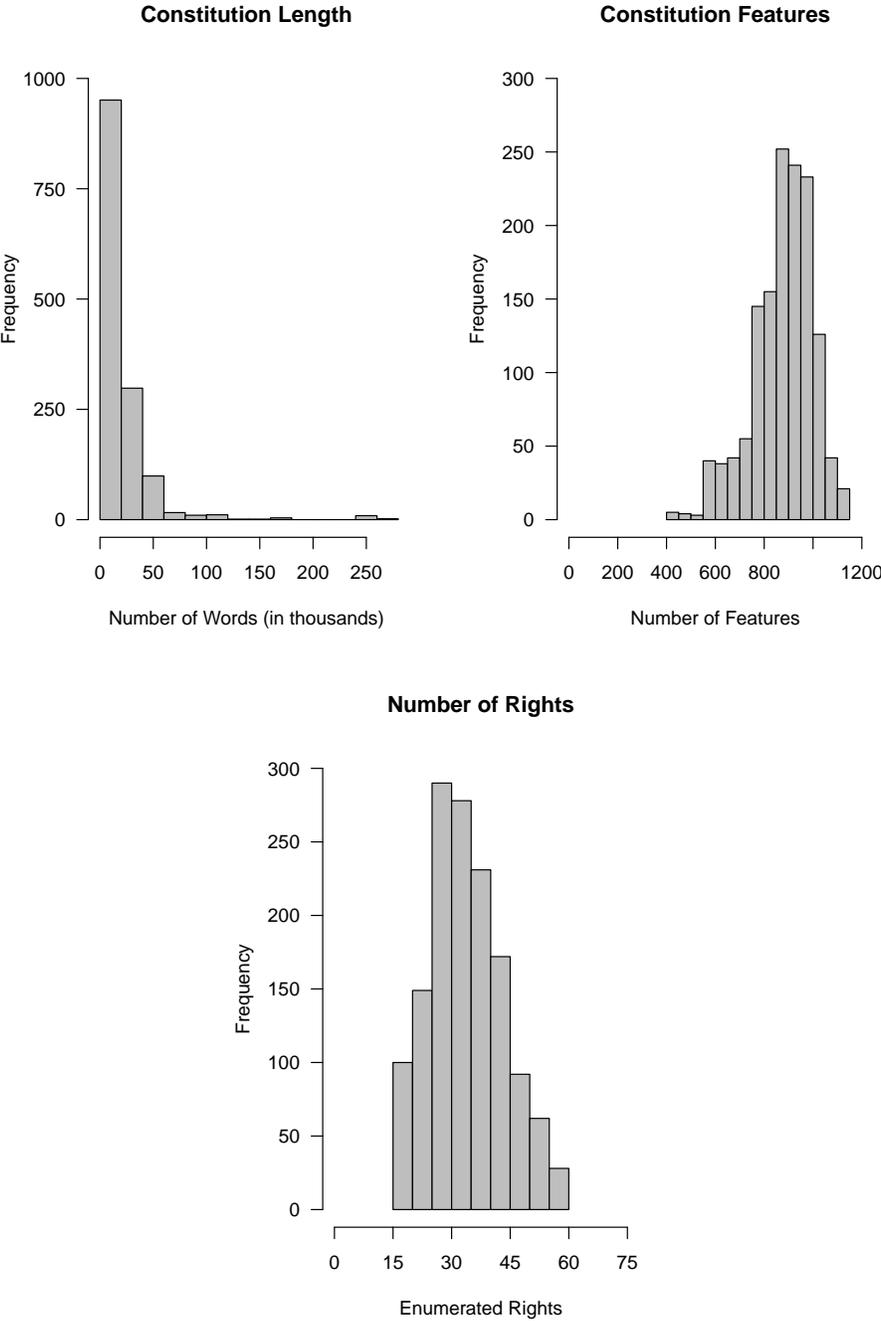


Figure A2: This figure shows the distributions of constitutional length, the number of unique constitutional features, and the number of enumerated rights that are included in each document.

F Similarity of ConScore Scaling Methods

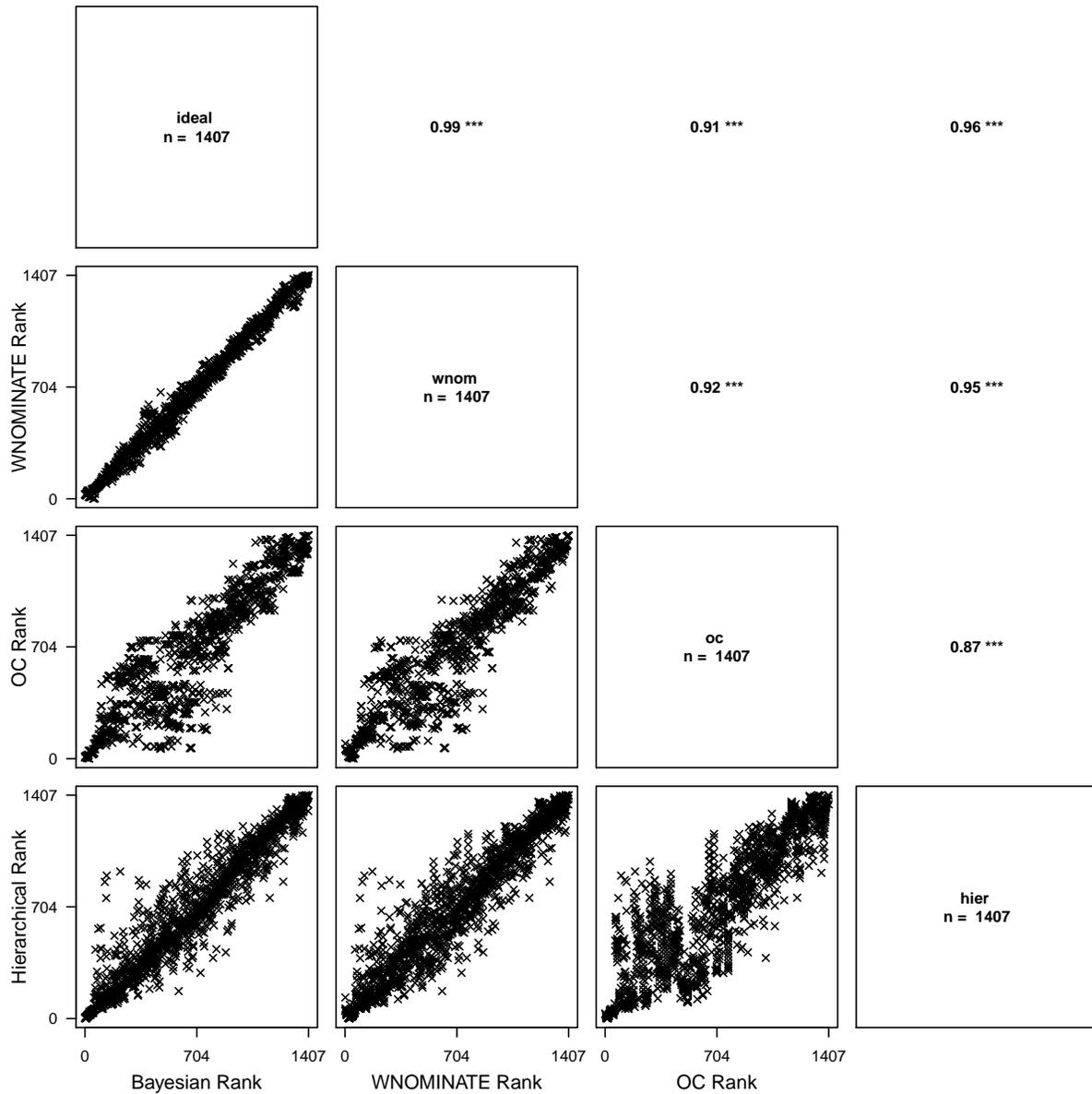


Figure A3: **Similarity of ConScore Scaling Methods** - Using four different IRT scaling methods, we show the similarity across methods. In each case, the correlation is quite high, ranging from .87 (OC Method and Hierarchical Method) to .99 (Bayesian Method to WNOMINATE Method).

G Modeling Violations of Independence Assumption

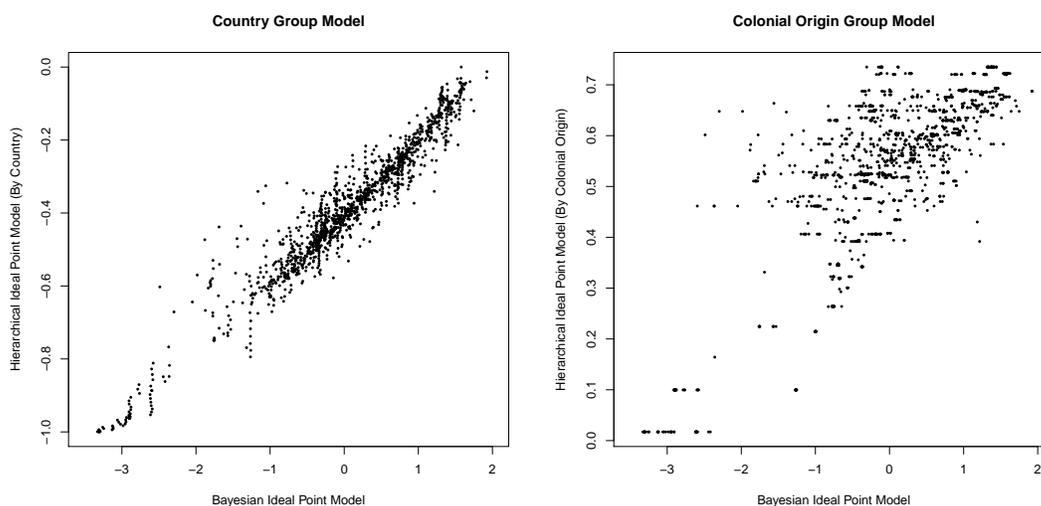


Figure A4: **Similarity of ConScore Scaling Methods** - The left panel shows the similarity between a traditional IRT model and a model that allows for correlations within countries over time. The correlation is very high (0.97). The right panel shows the similarity between the traditional IRT model and a model that allows for correlations across countries that share the same colonial origins. The correlation is quite high (0.77).

H Omit Categories of Constitutional Features

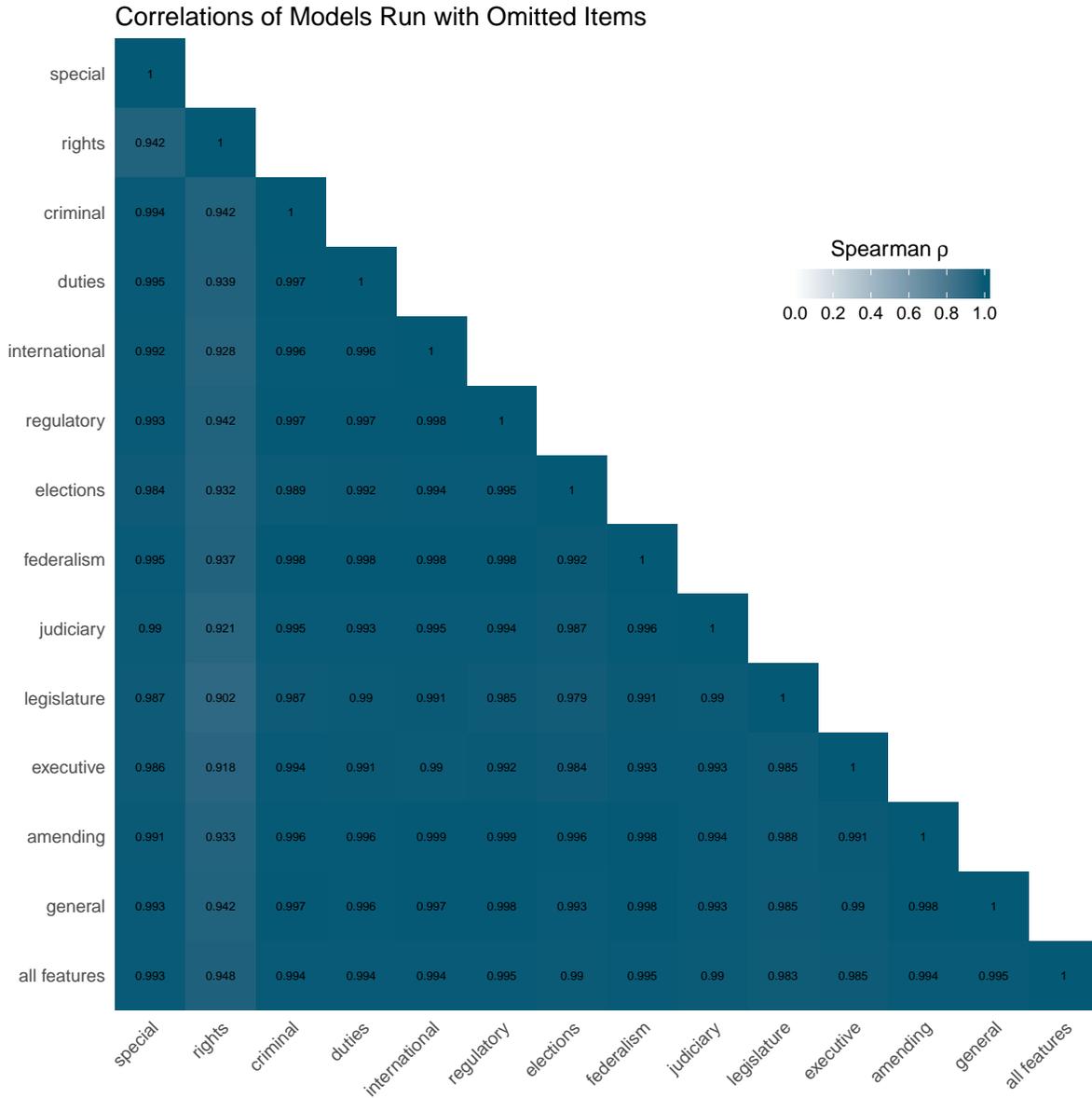


Figure A5: **Correlation of models with omitted votes** - The CCP divides constitutional features into 13 different categories. We run the IRT model 13 times and omit one category of features in each model. We then compare the correlation between these models and the full model that does not omit any features. We see that the correlations are very high (mean = .98).

I APRE

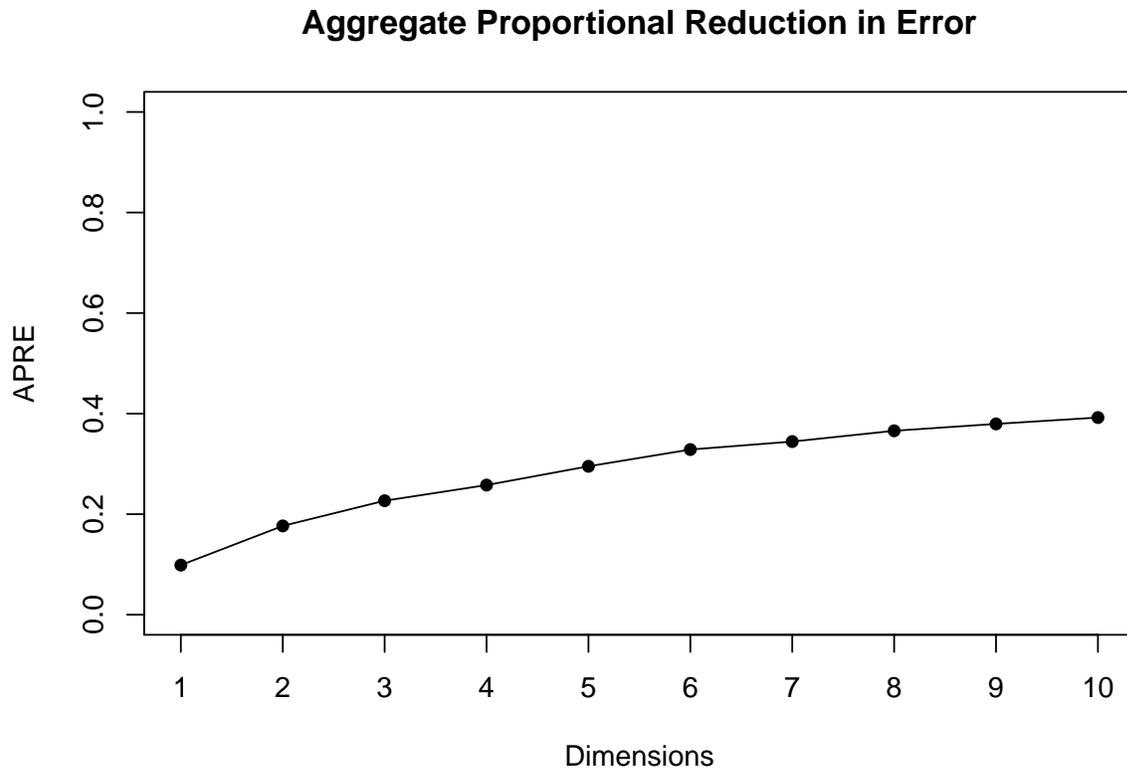


Figure A6: Similar to the results presented in the main text, the largest reduction of error is in the first dimension. Additional dimensions do not dramatically improve the fit of the model.

J The Second Dimension

As an additional test of the dimensionality of the data, we use the cutting lines derived from the NOMINATE procedure. If the data can truly be described using one dimension, the angle of the cutting lines that optimally separates constitutions (contains the lowest number of incorrect predictions) should be close to 90 degrees. This would suggest that the latent values for each constitution can be neatly arrayed on a one dimensional line with a single cutting point accurately dividing the data between constitutions with a particular feature from those without the particular feature. If on the other hand, the data require more than one dimension, then on votes that discriminate among constitutions in the 2nd latent dimension, the angle of the cutting lines will no longer be perpendicular to first dimension but will be closer to 0 (180) degrees. This would suggest that the data are better described in two or more dimensions and that a cutting line, rather than a one dimensional point is needed to best sort the data.

To test this, we estimate the *ConScores* in two dimensions and plot the angles of the cutting lines. If many of the lines are near 90 degrees, then we know that the addition of the second dimension is not yielding additional predictive power. The left panel of Figure A7 plots a histogram of the cutting lines from this procedure. We see that the distribution of cutting lines is centered at 90 degrees and most of the lines are at or near 90 degrees. As a point of comparison, we plot the distribution of cutting lines for the 112th U.S. House when estimated using a two dimensional NOMINATE procedure. Scholars of the U.S. Congress suggest that the modern U.S. house is best described using one dimension (Poole 2005; McCarty *et al.* 2006; Clinton *et al.* 2004), so this provides us with an excellent reference point for whether or not our constitutions data are also unidimensional. We see that both panels in Figure A7 have peaks near 90 degrees with most of the cutting lines centered near 90 degrees. The similarity of the constitutions data to the modern U.S. House suggests again that these data are best analyzed using a single latent dimension.

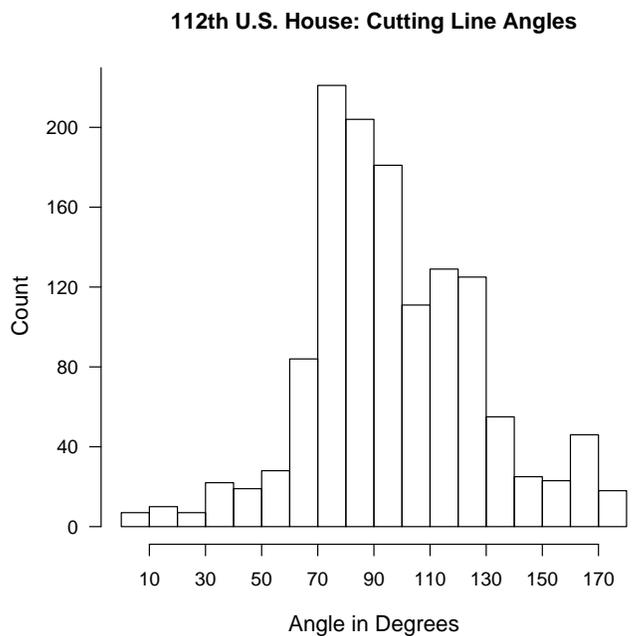
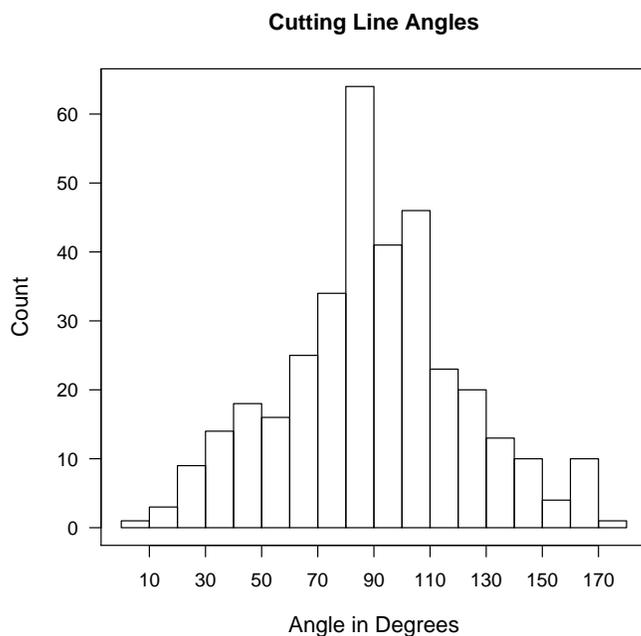


Figure A7: **Angle of Cutting Lines in Two Dimensions** - If the data can be described well in one dimension, we should see many cutting lines at or near 90 degrees when estimating the data in two dimensions. We see that this is the case. For comparison, the right panel shows the cutting angles when estimating ideal points using roll call data for the 112th U.S. House, which is frequently cited as a clear example of a one dimensional space.

References

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- Clinton, J., Jackman, S., and Rivers, D. (2004). The statistical analysis of roll call data. *American Political Science Review* **98**, 02, 355–370.
- McCarty, N., Poole, K., and Rosenthal, H. (2006). *Polarized America: The Dance of Ideology and Unequal Riches*. MIT Press.
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