

Figure 1: Number of Survey Responses by Country

Research Design

- summary stats

Data Descriptions

Different data sources were merged to get a more feature rich dataset.

- **European Social Survey** [ess08]. The ESS is a multi-country scientific survey conducted every two years since 2002 by scientists in several European countries. The objectives of the ESS are to understand the changing attitudes and values in Europe, to explain how European institutions are changing and to develop a range of European social indicators and values [ess08]. The data for the present analysis were collected from different survey waves the latest for each country.
- **Chapel Hill Expert Survey**. Since 1999 CHES provides party positioning scores on European integration, ideology and policy issues for national parties in a variety of European countries. The more recent survey waves also comprise questions on non-EU policy issues, such as immigration, redistribution, decentralization, and environmental policy.

<https://www.chesdata.eu/our-surveys/>

... variables as well.

Data Transformations

Model Based Clustering

Voting for a right wing party is often approximated by left-right scales or is time-consumingly coded. This analysis adopts Cas Mudde’s clear minimalist definition of populism to identify core features that all subtypes of populism have in common. In line with this definition, we suggest that populist parties are primarily shaped by their degree of anti-establishment attitudes as well as their opposition to globalization. Subsequently, we propose to classify European populist parties along a progressive and traditionalist left-right dimension.

This multidimensional classification problem is best approached by model-based hierarchical clustering [mclust]. This toolset is already adopted in political science and praised for estimating meaningful clusters on high-dimensional data political science [mclust_pol1; mclust_pol2]. Model-based clustering assumes the data generating process to be driven by a mixture of underlying probability distributions in which each component represents a different cluster. Consequently each sub population is separately estimated and summarized by a mixture of these subpopulations. Therefore the density tends to be centered at the multidimensional means (μ_k), with shape, volume, and orientation of the clusters being determined by the parameters of the covariance matrices Σ_k , which may also induce cross-cluster conditions [mclust_pol1]. In a nutshell the Finite Normal Mixture model assumes a d-dimensional dataset y_1, \dots, y_n to calculate G components with the likelihood

$$\ell_{MIX}(\theta_1, \dots, \theta_G | y) = \prod_{i=1}^n \sum_{k=1}^G \tau_k f_k(y_i | \theta_k)$$

where f_k is the density of the θ_k mixture parameters, and τ_k represents the probability of a given observation belonging to the k component [mclust_pol1]. Unsupervised machine learning algorithms are often criticized for introducing bias by hyperparameter settings. `mclust` estimates a grid of different model and hyperparameter constellations and provide Bayesian Information Criterion (BIC) to pick the most useful model [mclust]. The metric is penalized for the complexity of the model to ensure Occam’s Razor.

The data used for clustering involves two dimensions:

1. Anti-Establishment (Anti-Establishment vs. Establishment)
2. Liberalism (Progressivism vs Traditionalism)

Following Milligan and Cooper’s (1988) finding that standardization by dividing each variable by its range gives consistently superior recovery of the underlying cluster structure, all the variables are standardized by dividing by each variable’s range.

There is a clear indication of a four-component mixture with covariances having different shapes but the same volume and orientation (EVE). Note that all the top three models are among the models added to the latest major release of `mclust`.

K-Nearest Neighbour clustering identifies four clusters, traditionalist and progressive populist parties as well as their two establishment counterparts that are merged into a single establishment cluster.

EFA Scores

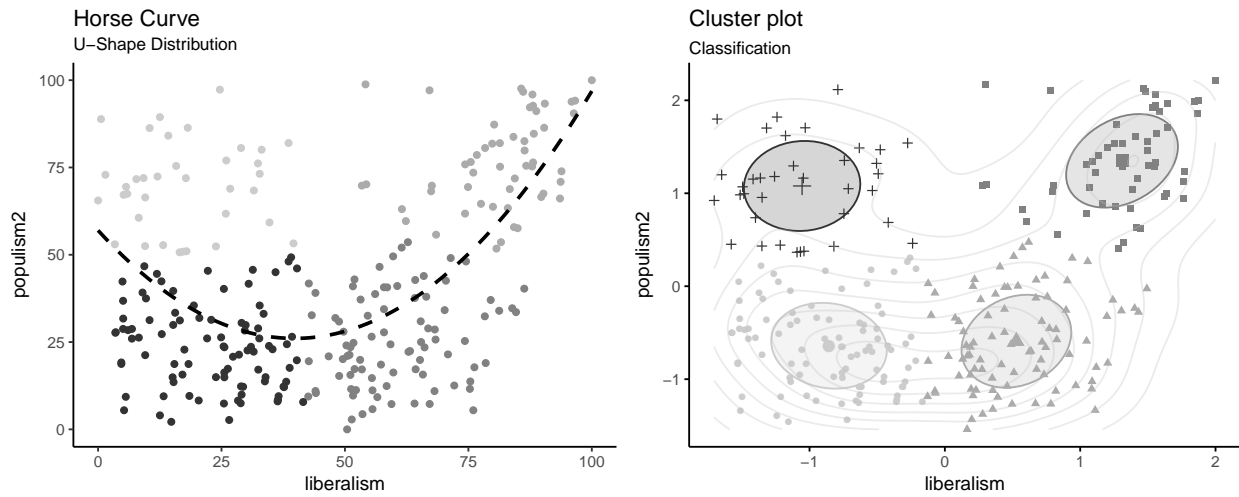


Figure 2: Cluster Contours and Distribution

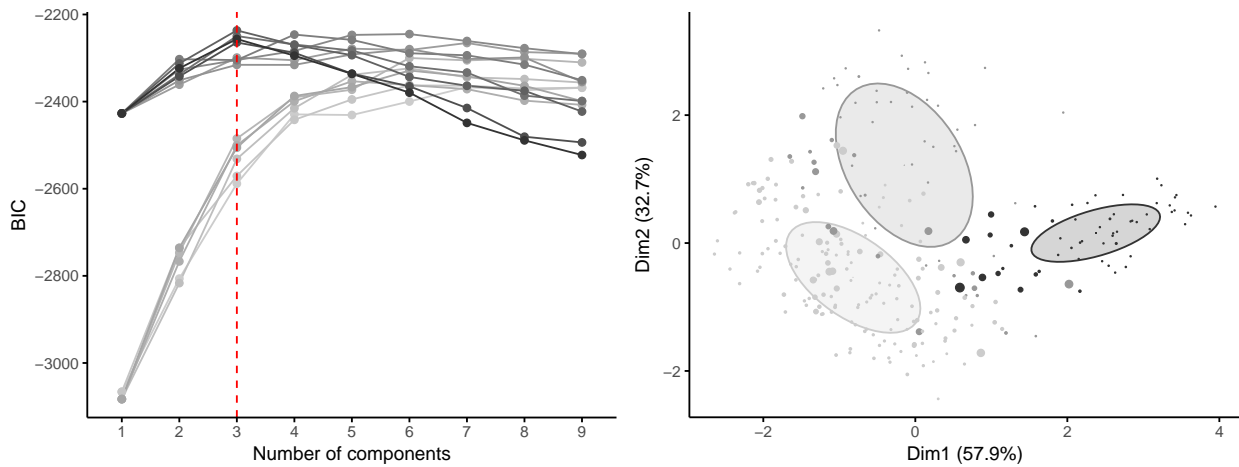


Figure 3: BIC Model Selection and Uncertainty Boundaries