

Methodological Background of the Analysis CONREASON Project

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About the CONREASON project

The aim of the project was to create a systematic analysis of constitutional reasoning with statistical methods. For this purpose 40 selected constitutional cases from 19 countries were analysed with different statistical methods. This paper summarizes the methodologies the constitutional cases were analysed with. The major part of the statistical analyses was run with SPSS PASW Statistics version 18.0 and the results are collected in Microsoft Excel tables.

The output of the analysis contains different Excel files with results and graphs. A separate Excel file contains the descriptive statistics by different country categories (*descriptivesstats_new_1119.xlsx*) and by three questions' results (*BYq3q4q5.xlsx*). Another Excel file contains the time series analysis (*Time series.xlsx*). The third one is the 'differentia specifica' which contains the characteristics of how countries differ from each other (*differentia specifica_2.xlsx*). All the correlations in all the country categories are listed in one separate Excel workbook (*total_matrix_new.xlsx*). The cluster analyses on the non-aggregated database and on the aggregated database are in separate Excels (*nonaggregated cluster results.xlsx; aggregated cluster results.xlsx; argument cluster results.xlsx*). The means and variances of the variables are summarized in one workbook (*mean and variance_3.xlsx*). Scatterplots of a few variables correlations are illustrated in another Excel file (*scatterplots_2.xlsx*).

The database

The database includes 40 constitutional law cases from 19 different countries thus altogether it contains 760 cases. Four of the 19 countries are special. The constitutional cases of the European Court of Justice (ECJ) and the European Court of Human Rights (ECtHR) are included in the database as separate countries' cases. Hungary's cases are categorized into two groups: one is between 1990 and 2010 and the other is after 2011 because of the change of the constitution in Hungary in 2011.

The 19 countries in the database: *Australia, Austria, Brazil, Canada, Czech Republic, ECJ, ECtHR, France, Germany, Hungary 1990-2010, Hungary 2012-2013, Ireland, Israel, Italy, South Africa, Spain, Taiwan, UK, US*

During the project the constitutionalists of the countries were asked to select the 40 most important constitutional law cases of their countries without time limit. Thus selection was not random because it was based on the constitutionalists' subjective opinion. However, random sampling would not be appropriate either because the constitutional cases are supposedly not homogeneous. The non-random selection can cause the special characteristics of the cases which are not necessarily typical in the specific constitutional system, but typical among the cases the specific constitutionalist has found important. During the analysis this aspect was ignored. The final analysis should be interpreted as the typical constitutional reasoning in the leading cases of the countries' constitutional system.

The indefinite time caused another problem in the database, specifically in cases of countries with long constitutional history. This means the constitutionalist of these countries may have selected early cases from centuries ago which can result unreliability in all the calculations especially in the time series analyses. The difficulty of the non-limited time was only handled during the time series analyses by excluding the early cases.

The constitutionalists were asked to categorize the cases by 37 questions (*1. Table*), including general questions, questions that refer to the type of the argument, and questions that refer to the content of the argument. All cases were divided by all questions into two categories (yes and no), except the questions regarding the reference of the decision, the year when the decision was made, the general topic of the case, the concrete issue, and the structure of the argument. However, the questions referring to the general topic (fundamental rights, state organisation, other) and the structure of arguments (only chain type, also leg of chair, dialogic arguments) were multiple choice questions thus they were transformed into binary variables (yes=1, no=0) to make the calculations easier. The domination of binary variables in the database had to be considered in the selection of the methods.

General Questions

- Q1 Reference of the decision? Please give the official reference of the decision in original language
- Q2 Year? Specify year the decision was rendered.
- Q3 Dissenting or concurring opinion in the case? Please indicate Yes or No. If irrelevant (separate opinions not allowed), leave blank.
- Q4 Case disposition? Please indicate (Yes or No) whether the Court found (at least partially) against the law/decision/act challenged.
- Q5 General topic? Please specify: Fundamental Rights (F), State Organisation (S), or Other (O).
- Q6 Concrete issue? Please characterise the issue at hand, using your own words
- Q7 Structure of argument? Please specify: Only Chain Type (C), Also Leg of Chair (L), = Dialogic Argument (D).

Type of the argument

- Q8 Establishing or discussing the text of the constitution? Please indicate (Yes or No) whether the opinion explicitly discusses what counts as constitutional text.
- Q9 Is the applicability of constitutional law discussed? Please indicate (Yes or No) whether the opinion explicitly considers whether constitutional law can be applied by the Court to the case at hand (e.g. because/despite political question doctrine).
- Q10 Analogy? Please indicate whether the opinion features any instance(s) of analogical reasoning.
- Q11 Ordinary meaning of words? Please indicate (Yes or No) whether the opinion explicitly considers the ordinary meaning of the text of the constitution.
- Q12 Domestic harmonising arguments? Please indicate (Yes or No) whether the opinion seeks to conciliate different constitutional requirements with one another. In case harmonising involves international law identification should be in Q13.
- Q13 Harmonising with international law requirements? Please indicate (Yes or No) whether the opinion seeks to interpret constitutional law in light of international law (including EU law, if applicable).
- Q14 Precedent-based arguments? Please indicate (Yes or No) whether the opinion considers previous rulings of the court.
- Q15 Invokes concept or principle not mentioned in the text of the constitution? Please indicate Yes or No.
- Q16 Arguments from silence? Please indicate (Yes or No) whether the opinion considers argument from silence.
- Q17 Teleological (textual) arguments? Indicate (Yes or No) whether the opinion invokes or considers the supposed purpose of the constitutional text or part thereof.
- Q18 Teleological (historical-intentional) arguments? Indicate (Yes or No) whether the opinion invokes or considers the purpose of the constitution-makers.
- Q19 Non-legal arguments? Please indicate (Yes or No) whether the opinion explicitly considers economic, sociological or moral arguments.
- Q20 Reference to scholarly work? Please indicate (Yes or No) whether the opinion explicitly mentions academic literature.
- Q21 Reference to foreign legal material? Please indicate Yes or No.
- Q22 Other types of argument or method? Please indicate Yes or No.

Content of the argument

- Q23 The rule of law invoked as argument? Please indicate (Yes or No) whether the opinion invokes the rule of law or a similar concept.
- Q24 Democracy? Please indicate (Yes or No) whether the opinion invokes democracy.
- Q25 Sovereignty? Please indicate (Yes or No) whether the opinion invokes sovereignty.
- Q26 State form? Please indicate (Yes or No) whether the opinion invokes arguments related to the form of the state (republic, monarchy.).
- Q27 Government form? Please indicate (Yes or No) whether the opinion invokes arguments related to the government form (parliamentary, presidential).
- Q28 Secularism? Please indicate (Yes or No) whether the opinion invokes arguments related to the separation of state and religion.
- Q29 Nation? Please indicate (Yes or No) whether the opinion invokes the concept of nation.
- Q30 Federalism? Please indicate (Yes or No) whether the opinion invokes federalism (including 'regionalism', 'autonomous regions', 'devolution', 'autonomy of local governments', 'subsidiarity').
- Q31 Proportionality? Please indicate (Yes or No) whether the opinion invokes proportionality or similar means-end test.
- Q32 Core of constitutional rights or competences? Please indicate (Yes or No) whether the opinion considers doctrines referring to the core content (Wesengehalt) of either fundamental rights or of

- competences*
- *Q33 Human dignity? Please indicate (Yes or No) whether the opinion explicitly invokes the concept of human dignity.*
 - *Q34 Equality? Please indicate (Yes or No) whether the opinion invokes equality.*
 - *Q35 Basic procedural rights? Please indicate (Yes or No) whether the opinion invokes basic procedural rights.*
 - *Q36 Freedom of expression? Please indicate (Yes or No) whether the opinion invokes freedom of expression rights.*
 - *Q37 Privacy rights? Please indicate (Yes or No) whether the opinion invokes the right to privacy.*

1. Table – Questions

A few questions were irrelevant (2. Table) in some cases or sometimes generally because of the constitutional system of a country thus these cases had to be left out from some analysis (e.g. the correlations and the time series analysis).

- *Question 3 (whether there was dissenting or concurring opinion in the case) was irrelevant in Austria, in the ECJ, in France, in Italy, and in two cases in the ECtHR and in six cases in Germany.*
- *Question 4 (whether the Court found (at least partially) against the law/decision/act challenged) was irrelevant almost in all the cases in the ECJ, in a few cases in Australia, in France, in Germany, in Hungary between 1990 and 2010, in Spain, in Taiwan and in the UK.*
- *Question 10 (whether the opinion features any instance(s) of analogical reasoning) was irrelevant in one case in Germany.*

2. Table – Missing cases

Methodology

The aims of the analyses were to find the typical characteristics in the constitutional systems, search for similarities and the differences among them and create country groups with similar constitutional systems.

The variables in the database, as presented above, were binary which is a special type of nominal variables with two value (yes-no) therefore Chi-square test was used in several cases because it is the common test for nominal (non-hierarchical categorical) data. When countries were compared – because of the very small number of cases in each category – Fischer’s test could be used. But comparing the countries with such a small sample size and with not randomly sampled cases would be unreliable either way. The Chi-square test for

independence is a test for a null hypothesis which sets the frequency of an outcome equally in two groups.

Chi square test:

$$\chi^2 = \sum_i \sum_j \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where O_{ij} is the observed frequency and E_{ij} is the expected frequency for the cell corresponding to the i^{th} condition and the j^{th} group.

Fischer test for 2x2 crosstab:

$$P = \frac{(A + B)!(C + D)!(A + C)!(B + D)!}{N! A! B! C! D!}$$

where (A, B, C, D) are the count of the four cells of the crosstab, $A + B$ and $C + D$ are the row totals, $A + C$ and $B + D$ are the column totals and N is the table total.

The original database was analysed as a whole, by countries, and by different country categories. These categories are based on the different constitutional systems of the countries and by region. (3. table) The cases were also analysed in an aggregated database which contains the means of the questions by countries.

The first country category is based on the constitutional system of the countries whether they have civil law system or common law systems.

- The countries with **civil law system** are: Austria, Brazil, Czech Republic, France, Germany, Hungary between 1990-2010 and Hungary after 2010, Italy, Spain and Taiwan;
- The countries with **common law system** are: Australia, Ireland, the UK and the US;
- There are countries which have law system **between civil law and common law systems:** Canada, Israel and South Africa; the ECJ and the ECtHR;

Other grouping criteria based on the countries' constitutional system is whether the country has centralised or diffuse law system

- The countries with **centralised law system** are: Austria, the Czech Republic, France, Germany, Hungary between 1990-2010 and Hungary after 2010, Italy, Spain and Taiwan;
- The countries with **diffused law system** are: Australia, Canada, South Africa, the UK and the US;
- There are countries which have **hybrid law system** between centralised law and diffuse law systems: Brazil, the ECJ, the ECtHR, Ireland and Israel;

The third country category is by region, one group is the European countries included ECJ and ECtHR, the other contains the non European countries.

- **European** countries: Austria, Czech Republic, the ECJ, the ECtHR, France, Germany, Hungary between 1990-2010, Hungary after 2010, Ireland, Italy, Spain, UK
- **Non European** countries: Australia, Brazil, Canada, Israel, South Africa, Taiwan, US

3. table - country categories

Descriptive statistics

Descriptive statistics were run by countries, by the three country categories (common law-civil law system; centralised law-diffuse law system; European-non European countries) and also by the results of three questions (Q3, Q4 and Q5). The output contains the number of cases also given in percentage.

In the descriptive statistics beside the values in each category, the differences among the countries and country categories were also tested. It was tested with Cramer's V as the measure of association because this value is used for nominal variables with more than two categories. Cramer's V is based on the Pearson's Chi square statistics and it varies between 0 and 1. When its value is close to 0 it means weak association and when it is close to 1 it indicates strong association.

Cramer's V measure of association:

$$V = \sqrt{\frac{\chi^2}{n(k-1)}}$$

where n is the number of all cases and k is the lower value of the number of rows or columns in the table.

The differences among the countries are just approximate because of the low number of cases these results are hardly reliable. The differences among the countries were tested in a more reliable way in the ‘*differentia specifica*. In this analysis each country was compared to the average of the other countries utilizing Chi square test here as well.

The results of a test statistics were also calculated with France left out of the analysis because, according to constitutional experts, France is an outlier in several aspects. This theory was underlined in the ‘*differentia specifica*’ analysis, which tested the differences between countries: France differs from the others in 21 aspects (However, Australia also differs from the others in 24 aspects and South Africa in 22; nevertheless they were not suggested to be dropped from the analysis). Even though in the output of the descriptive statistics it can be observed that several differences appear or disappear when France is being left out.

In connection with the descriptive statistics the variances of the means of the questions of all cases were tested. These values show how standard the frequency of a characteristic in the database is or how big differences among the countries can be found. (SPSS calculates the corrected standard deviation and the corrected variance):

Standard Deviation (corrected):

$$S = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{X})^2}{n - 1}}$$

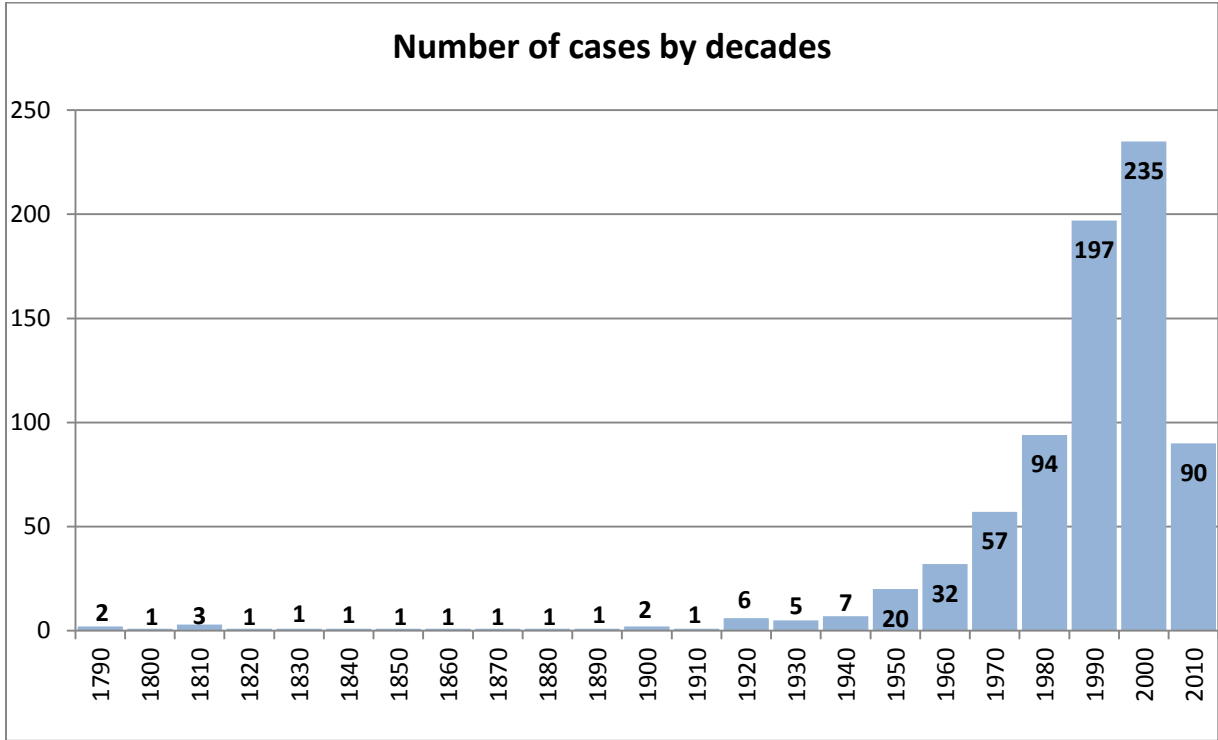
Variance (corrected):

$$S^2 = \frac{\sum_{i=1}^n (x_i - \bar{X})^2}{n - 1}$$

where x_i is one value, \bar{X} is the average and n is the number of cases.

Time series analysis

It would not be possible to run time series analysis on all cases because in the database the variance of the year of the cases was very high. The earliest cases were in the US from the end of the 18th and the beginning of the 19th century and altogether 35 cases were dated before 1950. (1. figure) The cases were analysed with a categorical variable, which was the continuous time variable divided into decades. All the cases before 1950 were left out of the analysis because the 35 cases from 150 years would make the decades' sample size zero in several cases. Also the cases after 2010 were left out because this period would be dominated by Hungary-specific characteristics for one of the two Hungarian groups refers to the period following 2010 due to the change of the constitution in Hungary in 2011.



1. figure – number of cases by decades

The analysis was also run using the Chi-square test. In a few aspects clear tendency can be found in the last 60 years (e.g. harmonising with international law requirements has been becoming more common, especially in Europe) and in several aspects some significant changes can be observed by the decades.

The number of cases was even lower in this analysis because of the early cases that were excluded from the calculation. Therefore the results by country categories are more likely to be unreliable. In the Excel tables the number of cells with expected count less than

five (if any) is marked. Those statistics where at least in one cell the expected count is less than five are not reliable and the results need to be interpreted carefully.

Correlations

The correlations were calculated with Chi square test and Phi correlation coefficient (The Phi coefficient is used when the crosstab is 2X2 which means that all the variables are binary in the analysis). Furthermore all the correlation indicators would give the same results with 0-1 variables and for the easier understanding the correlations were tested with similar methods to the ones used in the previous calculations.

Phi correlation coefficient:

$$\varphi = \sqrt{\frac{\chi^2}{n}}$$

The output of the correlations contains the correlation results between all the variable pairs by total and by all the country categories. When the correlation is significant (the confidence level being 95%) the P value and the Phi value are indicated (the Phi value contains the direction of the correlation). The matrix contains a reliability indicator when the expected number of cases is less than five in at least one of the cells in the crosstab. This indicator contains the number of cells with expected count less than five and the value of the lowest expected count.

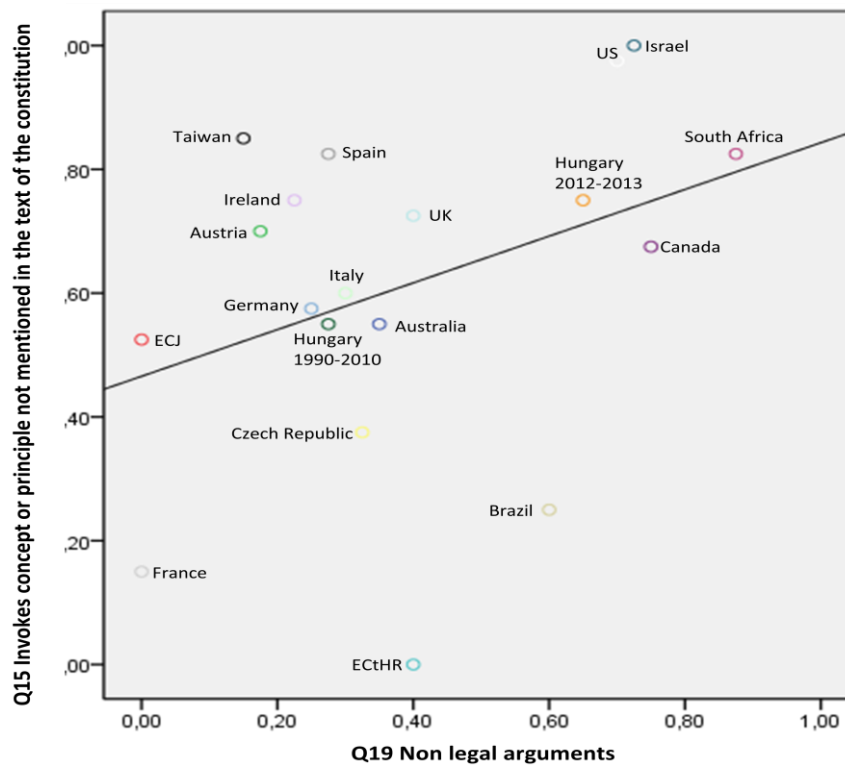
For example the correlation between Q25 (Sovereignty) and Q5_S (General topic is state organisation) is significant and positive **P value: 0,000 (Phi: 0,179)** which means that in cases where the general topic is state organisation it is more likely that the opinion invokes sovereignty. While the correlation between Q31 (Proportionality) and Q5_S is significant and negative **P value: 0,000 (Phi: -0,225)** which means that in cases where the general topic is state organisation it is less likely that the opinion invokes proportionality or similar means-end test.

Relations between a few important questions (4. table) are illustrated in scatterplots. (see 2. figure as an example) With these figures the similarities and the differences of the countries can be observed by the aspects of the selected question pairs.

The illustrated questions are:

- Q15 Invokes concept or principle not mentioned in the text of the constitution? Please indicate Yes or No.
- Q19 Non-legal arguments? Please indicate (Yes or No) whether the opinion explicitly considers economic, sociological or moral arguments.
- Q20 Reference to scholarly work? Please indicate (Yes or No) whether the opinion explicitly mentions academic literature.
- Q21 Reference to foreign legal material? Please indicate Yes or No.
- Q23 The rule of law invoked as argument? Please indicate (Yes or No) whether the opinion invokes the rule of law or a similar concept.
- Q24 Democracy? Please indicate (Yes or No) whether the opinion invokes democracy.

4. table - questions illustrated on scatterplots



2. figure - Q15 and Q19

Cluster analysis

Cluster analyses were run with different variable groups as clustering variables. (5. table) The analyses were run on the whole database to cluster the cases and also on an aggregated database to separate the countries.

<u>A1 Openness</u>	<i>q13 - harmonising with international law requirements</i> <i>q21 - reference to foreign legal material</i> <i>q25 - sovereignty</i>
<u>A2 Openness</u>	<i>Q12 - Domestic harmonising arguments</i> <i>q13 - harmonising with international law requirements</i> <i>q21 - reference to foreign legal material</i> <i>q25 - sovereignty</i>
<u>B Textual reason</u>	<i>Q9 - The applicability of constitutional law discussed</i> <i>Q10 - Analogy</i> <i>Q11 - Ordinary meaning of words</i> <i>Q15 - Invokes concept or principle not mentioned in the text of the constitution</i> <i>Q17 - Teleological (textual) arguments</i> <i>Q18 - Teleological (historical-intentional)</i> <i>Q19 - Non-legal arguments</i>
<u>D Activism</u>	<i>Q4 - Case disposition</i> <i>Q23 - The rule of law invoked as argument</i> <i>Q24 - Democracy</i>
<u>E Substance</u>	<i>Q10 - Analogy</i> <i>Q11 - Ordinary meaning of words</i> <i>Q14 - Precedent-based arguments</i> <i>Q17 - Teleological (textual) arguments</i> <i>Q18 - Teleological (historical-intentional)</i> <i>Q19 - Non-legal arguments</i>
<u>F Non obligatory arguments</u>	<i>Q20 - Reference to scholarly work</i> <i>Q21 - Reference to foreign legal material</i>
<u>+Argument</u>	<i>Q8-Q22 - Type of arguments</i> <i>Q23-Q37 - Number of arguments</i>

5. table – clustering variables

The aggregated clusters were analysed with WARD linkage method and squared Euclidean distant measurement. The aim of WARD linkage method is to minimize the variance of the merged cluster. It tends to produce clusters with similar numbers of observations, but it is sensitive to outliers.

Euclidean distance:

$$d = \sqrt{\sum_{i=1}^n (x_i - y_i)^2}$$

Squared Euclidean distance:

$$d^2 = \sum_{i=1}^n (x_i - y_i)^2$$

The non aggregated cluster analyses were run with Within-group average linkage method and Simple matching measurement which calculates the ratio of the number of matches to the total number of characteristics. The aim of the Within-group average linkage method is to combine those two clusters where the average distance between members of the new cluster will be the smallest.

Simple matching measurement:

$$SM(x, y) = \frac{a + d}{a + b + c + d}$$

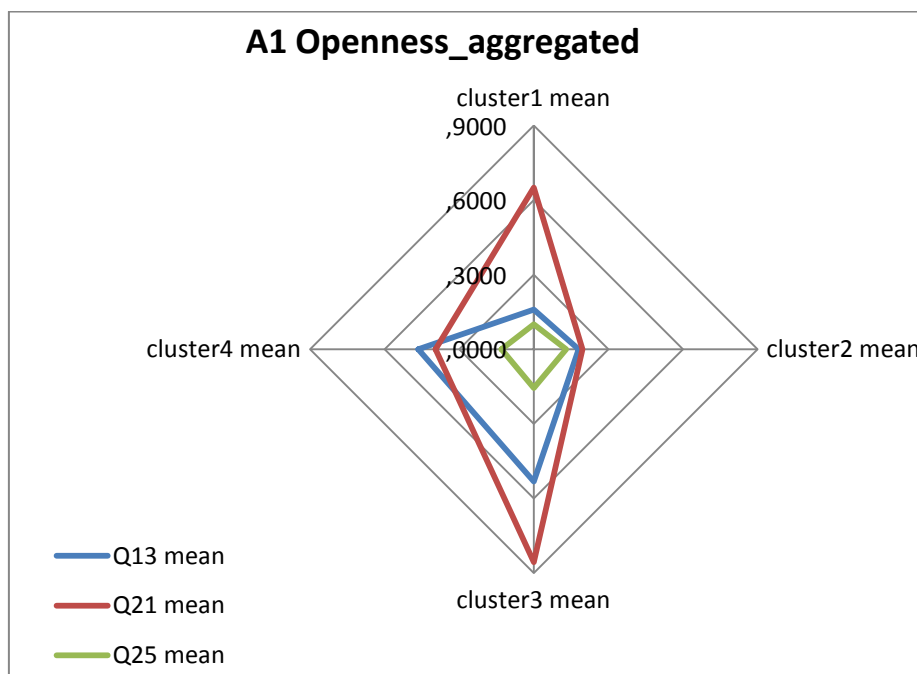
Cluster results on the aggregated database

While all the clusters were run both on the aggregated and non aggregated database the pairs can be analysed together.

The A1_openness clusters are based on questions q13 (harmonising with international law requirements), q21 (reference to foreign legal material) and q25 (sovereignty). The first cluster contains Australia, Brazil, Canada, Ireland and Taiwan, the second contains Austria, France, Germany, Italy and the US, the third contains the Czech Republic, Israel, South

Africa and the UK and the last cluster contains the ECJ, the ECtHR, Hungary between 1990 and 2010, Hungary after 2010 and Spain.

As a result of the cluster analysis on the aggregated database four clusters were created. (3. figure) The first cluster is characterized by high foreign law reference rate and low harmonizing with international law requirements and sovereignty rate. The second cluster has low rate of all the three characteristics. The third cluster has high rate of harmonizing with international law requirements, higher rate of reference to foreign legal material and low rate of sovereignty. The fourth cluster also has low rate of sovereignty and the rates of harmonizing with international law requirements and reference to foreign legal material are neither especially high.



3. figure – A1 aggregated cluster analysis

Cluster results on the non-aggregated database

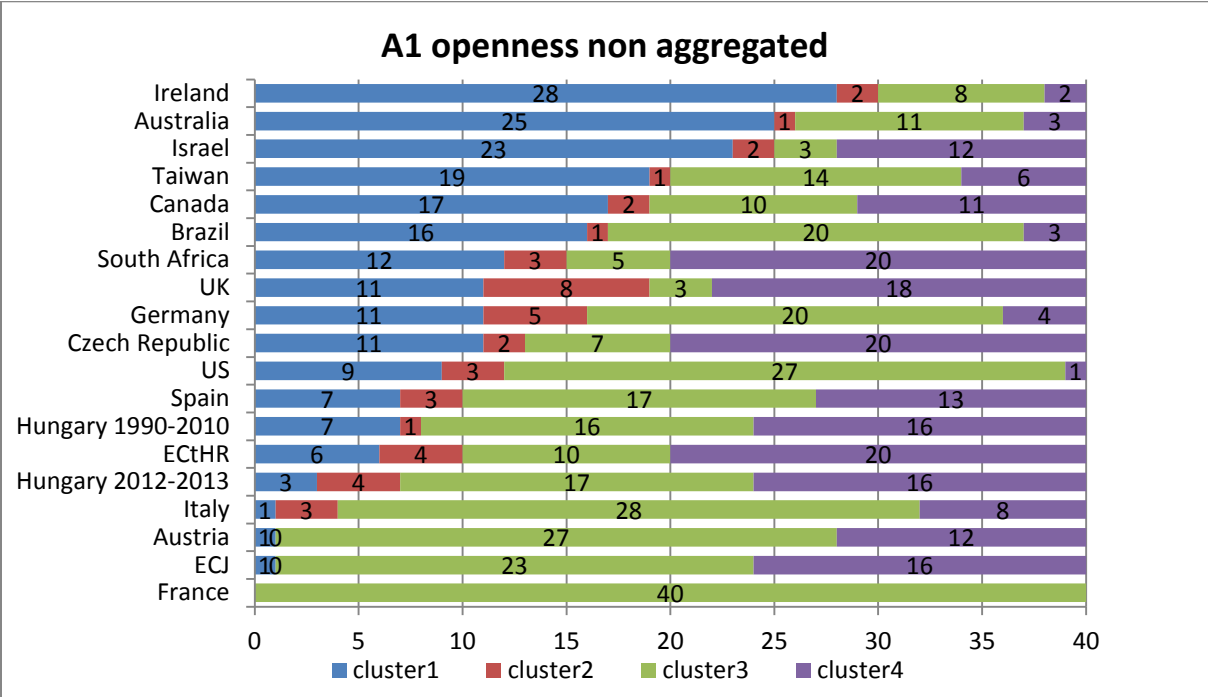
The A1_openness cluster run on the non aggregated database, based on the same variables as in the aggregated database, also resulted four clusters. (6. table) The first cluster has none of its cases harmonising with international law requirements, all of its cases have reference to foreign legal material and most of its cases do not invoke sovereignty. The second cluster has all of its cases harmonising with international law requirements, around two thirds of its cases referring to foreign legal material and all of it cases invoke sovereignty.

The third cluster has none of its cases harmonising international law requirements, none referring to foreign legal material and almost none of its cases invoke sovereignty. The fourth cluster has all of its cases harmonising with international law requirements, almost three quarters of its cases have reference to foreign legal material and none of its cases invoke sovereignty.

A1 Openness	Q13 - Harmonising with yes %	Q21 - Reference to foreign legal material? yes %	Q25 – Sovereignty? yes %
cluster1	,0%	100,0%	12,5%
cluster2	100,0%	68,9%	100,0%
cluster3	,0%	,0%	8,5%
cluster4	100,0%	72,6%	,0%

6. table - characteristics of the clusters (A1)

It can be observed (4. figure) that all of France’s cases are in cluster 3 while the other countries’ cases are divided into several different clusters. Austria and the ECJ do not have cases in cluster 2 and only 10-10 cases are in cluster 1. All the other countries have cases in every cluster; however, cluster 2 contains only a few cases from every country.



4. figure - A1 non aggregated cluster analysis