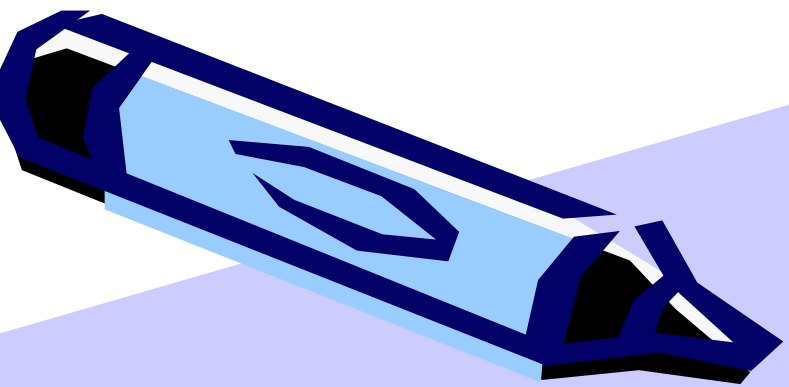


ALEX4

A simulation program to compare electoral systems

Marie-Edith Bissey, Guido Ortona

AL.EX – Laboratorio di economia sperimentale e simulativa
(http://alex.unipmn.it)

Presentation

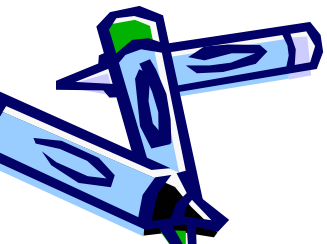
- ALEX4 is a cosmetic update of ALEX3.
- A presentation of ALEX3 has been published in
  - M-E. Bissey, M. Carini e G. Ortona, "Alex3: a simulation program to compare electoral systems", Journal of Artificial Societies and Social Simulation, 7, 3, 2004
  - Downloadable from http://jasss.soc.surrey.ac.uk
- A general discussion on the simulation of electoral systems is in V. Fragnelli, G. Monella and G. Ortona, "A simulative Approach for Evaluating Electoral Systems", Homo Oeconomicus, 22 (4), 2005

Why resort to simulation for comparing electoral systems?

- For the comparison to be effective, it is necessary to refer to the same set of *preferences* of the voters. Preferences are *not* proxied by the votes, because votes are affected by the electoral systems.
- The composition of the preferences through an electoral system to produce a parliament is completely *downstream* with reference to the formation of the preferences. Hence a virtual voter is not analogous, but *identical* to a real one. The goodness of the results of the simulation depends entirely on the validity of the simulation program

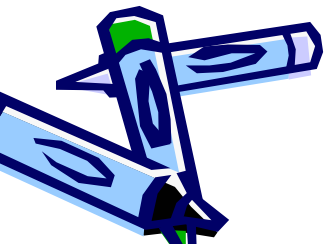
Characteristics

- Allows to simulate the preferences of voters and the composition of the districts, according to:
  - The size of the parliament
  - The number of voters
  - The number of parties
  - The size of the electoral districts
  - The weight of the parties in the population
  - The number of electoral districts
  - The size of the plurinominal districts *(optional)*



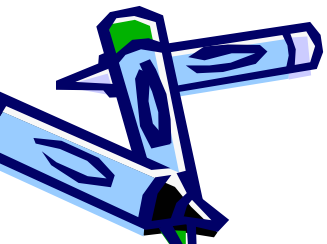
Characteristics

- Other parameters can be set:
  - The concentration of the parties in the districts
  - The parameters that are used to create the voters' preference ordering for the parties
  - The parameters that are used to create the voters preference for candidates (for the Single Transferable Vote system)



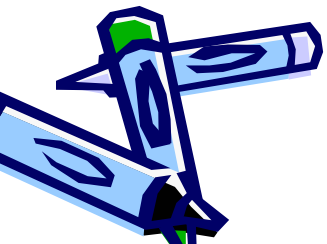
What the program does

- Given the parameters set up by the user, the program
  - Computes the voters preference order for parties
  - Finds out the composition of the uninominal districts in terms of voters
  - Finds out the composition of the plurinominal districts in terms of uninominal districts
  - Show the resulting parliament according to the system chosen by the user

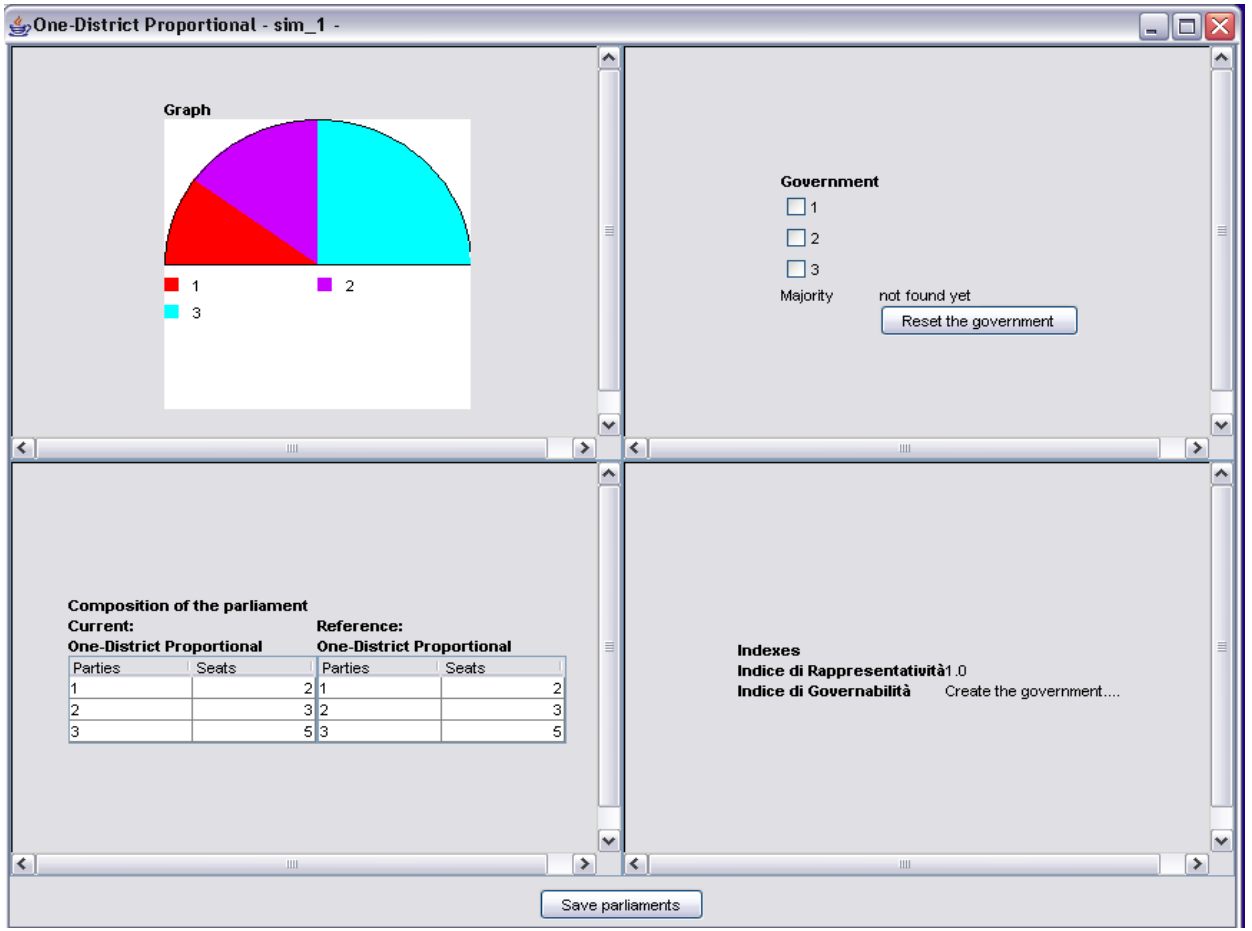


And now…

- A real example

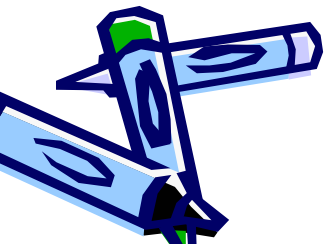


The resulting screen



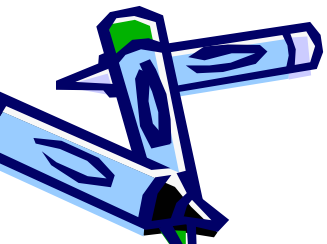
The electoral systems included in the program

- Borda Criterion
- Condorcet Winner
- First past the Post
- Runoff Majority
- Mixed Member I
- Mixed Member II
- One District Proportional
- Threshold Proportional
- Multi District Proportional
  - D'Hondt
  - Hare
  - Imperiali
  - Droop
- Single Transferable Vote
  - Droop
  - Hare
  - N.B.
- VAP



The following will be added soon

- Approval
- Multi DistrictThreshold Proportional
- Majority Premium



Output of the program

- The composition of the parliament
- An index of representativeness
- An index of governability

The representativeness index

- The index of representativeness for electoral system j is

$$rj = 1-(\Sigma|Sj,i - Spp,i|) / (\Sigma|Swta,i - Spp,i|)$$

The representativeness index

$$r_j = 1 - (\Sigma |S_{j,i} - S_{pp,i}|) / (\Sigma |S_{wta,i} - S_{pp,i}|)$$

- *First sum:* The loss of representativeness incurred by party i is the (absolute) difference between the seats it would get under PPR and those actually obtained. Summing losses across all parties we obtain the total loss of representativeness.

The representativeness index

$$rj = 1 - (\Sigma|Sj,i - Spp,i|) / (\Sigma|Swta,i - Spp,i|)$$

- To be normalized (0 to 1), the total loss of representativeness is divided by the *maximum possible loss*. This maximum is obtained when "winner takes all" in a very strict sense, that is when the relative majority party takes all the seats.

The representativeness index

$$r_j = 1 - (\Sigma|S_{j,i} - S_{pp,i}|) / (\Sigma|S_{wta,i} - S_{pp,i}|)$$

- *1-the ratio of the sums:* up to now we got a *loss of representativeness index*, normalized in the range 0-1. Subtracting it from 1 we transform it into a *representativeness* index.

The index of governability

- The index of governability for electoral system j is

$$g = gm + gf$$

- It is made of two components, added lexicographically. The first and more important, gm, refers to the *number of parties of the governing coalition*; the second, gf, to the *number of seats of the governing coalition.*

The index of governability

- The index of governability for electoral system j is

$$g = gm + gf$$

- First component:

$$gm = 1/(m+1)$$

- m = number of parties great enough for the government to lose the majority if they withdraw.

The index of governability

- The index of governability for electoral system j is

$$g = gm + gf$$

- Second component:

$$gf = 2(f - 0.5)*[1/m - 1/(m+1)]$$

- f = share of seats of the majority
- gf tends to 0 if the majority is of just 1 seat, in which case g tends to 1/(m+1), and is equal to 1/m - 1/(m+1) if the majority has all the seats, in which case g = 1/m

Other characteristics of the program

- It is possible to save all the data of the simulation
  - Initial parameters
  - Voters' preferences for the parties, the candidates
  - Composition of the uninominal and the plurinominal districts
  - Simulated parliament
- It is possible to import these data in the program
- It is possible to recreate these data (e.g. from surveys) to simulate parliaments using real data.

Other characteristics of the program

- It is written in Java and will run on any operating system
- Multilingual: so far it exists in
  - Italian
  - English
  - French
- Adding another language only requires the translation of some text files, no further programming is involved.

Uses of the program

- Confront the existing electoral systems to see for instance how in any given situation the system is use performs with respect to possible alternatives
- Search for the best electoral system in a given situation
- Find out how a new electoral system may perform with respect to existing systems.

Some results obtained with alex4 or its ancestors

numbers are of working papers of dep. POLIS of this university

- 60: Under plausible conditions, the mixed system employed in Italy in the last decade was dominated either by proportionality or plurality; the present one may be the best one, but it is unlikely
- 47: An experiment on the choice of the electoral system by the electors produced the Condorcet system as the best one
- 32: An Italian-like case with the preferences of the end of the 90s suggest that proportional systems are preferable, but there are hints that the sensitivity is very high.
- 4: Assessment of a new system, successful.

Publications using ALEX3 and ALEX4

- http://jasss.soc.surrey.co.uk
  - This paper presents the program (in its previous version), simulates and confronts some electoral systems for the case of Italy and the United Kingdom.
- http://polis.unipmn.it/pubbl/
  - W.P. n. 4 – evaluation of new electoral systems
  - W.P. n. 32, 38, 47 e 60 – choosing the best electoral system

Scaricare il programma

- [beta version] http://alex.unipmn.it/activities/ALEX4.zip
- The program is freeware, we only ask for the authors who use it to say so in their papers ...
- and to send us a copy of the paper!
- For further information, please write to guido.ortona@sp.unipmn.it (theoretical matters) or marieedith.bissey@sp.unipmn.it (whatever has to do with the program itself)