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## WHICH GAME TO CHOOSE?

### In Search of an Acceptable Voting System for the EU Council

#### Introduction

This paper is an extended record of my presentation given at the conference on *Decision Making in the EU Council* which took place March 29, 2004 in Krakow. The conference was jointly organized by the Institute of Strategic Studies (a Polish non-governmental organization), the Chair of European Studies at the Jagiellonian University, and Konrad Adenauer Foundation. The panel discussion was chaired by Bogdan Klich, the ISS president, and vice-chair of the Foreign Affairs Committee at the Polish Parliament (Sejm). He invited all Polish mathematicians and political scientists who were known to have published about voting systems used by the EU governing bodies.

The participants were encouraged to analyze recent attempts to settle the dispute over what voting system should be implemented by the EU Council. Recall that the controversy arose when the EU Convention (a somewhat mysterious body which worked out the EU Constitution draft) had chosen to replace the rules agreed-on in the Nice Treaty by a double majority voting system in which a one state - one vote simple majority rule is combined with a qualified majority system with weights directly proportional to the countries' populations.

The author hopes that his analyses, results and conclusions will appear useful for the EU politicians to cope with the difficult task to achieve a compromise between conflicting expectations of EU member states as to the future political structure of the Union. This paper, for its scientific nature, is not a report for secret use by the diplomats. I insist that it must remain open to everyone interested in the topic: university professors and students, commentators, government officials, political party activists, etc. Thus, I'm placing my text in a pdf file on my homepage: <http://www.cyf-kr.edu.pl/~ussozans/>.

Feel free to write to me (use my email address) to obtain my program named POWERIND with which one can calculate the power distribution corresponding to any voting system considered for use by the EU Council. The program is user-friendly so that every European who happens to encounter in press a statement such as "Germany is ready to consider the double majority 55% plus 55% system", can check by himself or herself what power distribution will be obtained if such a solution is accepted.

Clearly, some competence in the mathematical theory of voting games is necessary to run POWERIND and to understand results. When you load the program, begin from reading the user's guide (35 screens each having some 20 lines, now available also in a pdf file). Read Section 6 entitled 'A personal story' to learn how I joined (in December 2003) the group of Polish scientists working on voting games.

Unless you make your work known to the world through Internet, others may never get informed of what you have been doing. This happened to me and two fellow specialists in applied mathematics, Wojciech Słomczyński and Karol Życzkowski, also working at the Jagiellonian University. In January 2004, they put forward a new proposition of a voting system for the EU Council. Their solution was

presented by the authors at the very the beginning of the Kraków conference. In this paper, I will compare their "single majority game with square root weights" with the range of voting games that are currently being or might be considered by the negotiators representing the EU Member States who are going to resume their meetings now under the presidency of Ireland.

## Europe's population and the Nice Treaty

The Nice Treaty voting system is based on a "political" mapping of Europe's population structure into an allocation of 345 votes among the assembly made up of 27 countries (25 will form the EU since May 1, 2004 and 2, Romania and Bulgaria, are going to join the EU in few years). The Nice Treaty stipulates that

*Acts of the Council shall require for their adoption at least 258 votes in favor, cast by a majority of members, where this Treaty requires them to be adopted on a proposal from the Commission. In other cases, for their adoption acts of the Council shall require at least 258 (74.8% of 245) votes in favor cast by at least two-thirds of the members. When a decision is to be adopted by the Council by a qualified majority, a member of the Council may request verification that the Member States the qualified majority represent at least 62% of the total population of the Union. If that condition is shown not to have been met, the decision in question shall not be adopted.<sup>1</sup>*

This paper focuses on the voting system that is going to be used before the accession of Romania and Bulgaria. When there are 25 member states, the simple majority in the one voter - one vote component game equals 13. Under the total amount of nominal votes restricted to 321, the relative qualified majority of  $\frac{3}{4}$  translates into the quota of 241. The population threshold remains unchanged (62%).

Formally, the Nice Treaty voting system is a combination of three *weighted voting games*, that is, any set  $C$  of  $k$  states is a *winning coalition* (the will of all members of  $C$  suffices to take a decision by the EU Council) if and only if three conditions are met simultaneously: (1)  $k \geq 13$  ( $C$  is a winning coalition for the simple majority game with 25 players); (2) the sum of *political weights*, or votes allocated to these states, equals at least 241; (3) the sum of *relative population weights* equals at least  $620^2$ .

Whereas high complexity distinguishes the *Nice Treaty game* from single majority games used earlier by the European Community Council of Ministers, the allocation of political weights in the second component of the triple majority game, still reflects the *parity principle* which has so far guided institutional changes necessitated by each consecutive enlargement. According to this principle four largest EU member states, Germany, France, United Kingdom and Italy have always been granted the same amount of votes as shown in Table 1. The parity principle was not questioned when the EU came into being by virtue of the Maastricht Treaty nor on the occasion of the 1995 enlargement. Population disparity within the *Big Four* following the reunification of Germany had been ignored until the Convention proposed the Union's reform. Political leaders of united Europe who had so far been faithful to the agreement concluded by the father founders of European Community changed their mind.

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<sup>1</sup> *The Nice Treaty. Official Journal of the European Communities. 10.3.2001, C 80/82,83.*

<sup>2</sup> Following Bilbao et al. ("Voting Power in the European Union Enlargement." *European Journal of Operational Research* 143 (2002): 181-196) we express the relative quota as an integer  $q$  where  $q$  stands for  $q/1000$ . The relative population weight assigned to a given country is obtained by dividing its population by the total EU population, multiplying the fraction by 1000 and rounding the number obtained to an integer.

Table 1. Single majority voting systems used by the Council of Ministers 1973-1995

| State              | EU-9      | EU-10     | EU-12     | EU-15     |
|--------------------|-----------|-----------|-----------|-----------|
|                    | 1973      | 1981      | 1986      | 1995      |
| Germany            | 10        | 10        | 10        | 10        |
| France             | 10        | 10        | 10        | 10        |
| Italy              | 10        | 10        | 10        | 10        |
| UK                 | 10        | 10        | 10        | 10        |
| Netherlands        | 5         | 5         | 5         | 5         |
| Belgium            | 5         | 5         | 5         | 5         |
| Denmark            | 3         | 3         | 3         | 3         |
| Ireland            | 3         | 3         | 3         | 3         |
| Luxembourg         | 2         | 2         | 2         | 2         |
| Greece             |           | 5         | 5         | 5         |
| Spain              |           |           | 8         | 8         |
| Portugal           |           |           | 5         | 5         |
| Sweden             |           |           |           | 4         |
| Austria            |           |           |           | 4         |
| Finland            |           |           |           | 3         |
| Total              | 58        | 63        | 76        | 87        |
| Qual. majority (%) | 41 (70.6) | 45 (71.4) | 54 (71.1) | 62 (71.3) |

I had not been aware of the significance of this change until I found in Internet a conference paper<sup>3</sup> whose author quoted Jean Monnet's record of his meeting with Konrad Adenauer in April 1951.

**Monnet:** *I am authorized to propose you that the relationship between Germany and France within the Community be governed by the parity principle in the Council, as well as in the Assembly and in all European institutions, current or future, whether France's participation includes the Union française and whether Germany be that of the West or reunified.[...].*

**Adenauer:** *I am happy to give my full agreement to your proposal because I don't conceive the Community without total parity.*

Why did the Convention resolve on rejecting the parity principle? Why did France, Britain and Italy give their consent to such a radical move? The *population principle* which makes 82 million Germany more powerful than each of three 60 million states must have been recognized as the only remedy to stop the process shown in Table 2.<sup>4</sup> and described by Bobay in the following words. *Over time, at each enlargement, the share of the overall votes of the large member states tended to shrink significantly in comparison to the overall votes of small members.*

<sup>3</sup>Frédéric Bobay. *Political Economy of the Nice Treaty: Rebalancing the EU Council*. Paper presented at French-German Economic Forum, 9th meeting, June 25-26 2001.

<sup>4</sup>Table 1 and Table 2 are based on the data provided by Felsenthal and Machover in Chapter 5 (*Weighted Voting in the CMEC*) of their book *The Measurement of Voting Power. Theory and Practice, Problems and Paradoxes*. Cheltenham, UK-Northampton, MA, USA 1998.

Table 2. The share of the total EU population and the share of the total amount of votes of 4 largest EU member states at 5 enlargements.

| Enlargements                     | 1973 | 1981 | 1986 | 1995 | 2004 |
|----------------------------------|------|------|------|------|------|
| Pct of the EU total population   | 87.7 | 84.2 | 71.4 | 68.7 | 57.3 |
| Pct of the total amount of votes | 69.0 | 63.5 | 52.6 | 46.0 | 36.1 |

To examine how the Nice Treaty vote allocation is related to the EU population structure after the last enlargement, let us divide the set of 25 countries into 6 groups which, except for the "tail" made up of 11 smallest states, reveal remarkable homogeneity with respect to the number of citizens. In statistical terms, the between-groups population variance by far exceeds the within-groups variance.

1. The first group is formed by **Germany**, Europe's population leader with 82 million citizens, or .182 of the total EU-25 population.
2. The second group consists of 3 big states, **France, UK, and Italy** which are nearly same size approaching 60 million citizens.
3. **Spain and Poland**, two middle-size countries with population by some 20 million smaller than the Big Three, and by over 20 million larger than the country coming next in the decreasing population ordering.
4. The **Netherlands** must be classified a single member of the fourth group because its population (closest to the mean over 25 countries equal to 18 million) is by 6 million larger than that of the leader of the next group.
5. The group of five 10-million countries, **Greece, Portugal, Belgium, Czech Republic, Hungary** together with two a little smaller countries, **Sweden and Austria**.
6. The remaining 11 smallest EU member states with populations ranging from 5.4 to .4 million people: **Denmark, Slovakia, Finland, Ireland, Lithuania, Latvia, Slovenia, Estonia, Cyprus, Luxembourg, Malta**.

Table 3 shows where the Nice Treaty vote allocation departs from the population structure. Whereas the middle-size states, Spain, Poland, and the Netherlands (groups 3 and 4) received equally large share of overall votes (20.9%) as their share in the total EU-25 population (21.0%), 18 smaller countries (groups 5 and 6) were given more votes to the detriment of the Big Four (groups 1 and 2).

Detailed population figures and votes allotted to 25 countries are given in Table 4. The state of Europe's population as for January 1, 2003 is quoted from an official bulletin of Eurostat (*Statistics in focus*, Theme 3–1/2004) with each country's population rounded to 5 figures.<sup>5</sup> Next to the Nice Treaty vote allocation there is given an alternative allocation with nominal votes calculated by

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<sup>5</sup>In the first draft of this paper, I used the population data from the latest 2003 edition of the *Yearbook of International Statistics*, an official publication of the Polish Central Statistical Office. I switched to the official EU statistics following a suggestion by W. Słomczyński. The main difference between the two sources is the population of Greece. According to Eurostat Greece has moved ahead of other 10 million countries, while the Polish Yearbook has still Belgium in the leading position in group 5.

multiplying relative “square root weights” by the same total amount of votes (321) and rounding each product to closest integer.

Table 3. Relative population distribution and two vote allocations by 6 groups of member states

| Group | Pct of the total EU population | Pct of the total amount of Nice Treaty votes | Pct of the total amount of sq. root votes |
|-------|--------------------------------|--|---|
| 1     | 18.2                           | 9.0  | 10.3                                      |
| 2     | 38.8                           | 27.0   | 26.1                                      |
| 3     | 17.4                           | 16.8   | 14.4                                      |
| 4     | 3.6                            | 4.1  | 4.7                                       |
| 5     | 15.2                           | 24.7   | 25.0                                      |
| 6     | 6.8                            | 18.4   | 19.5                                      |

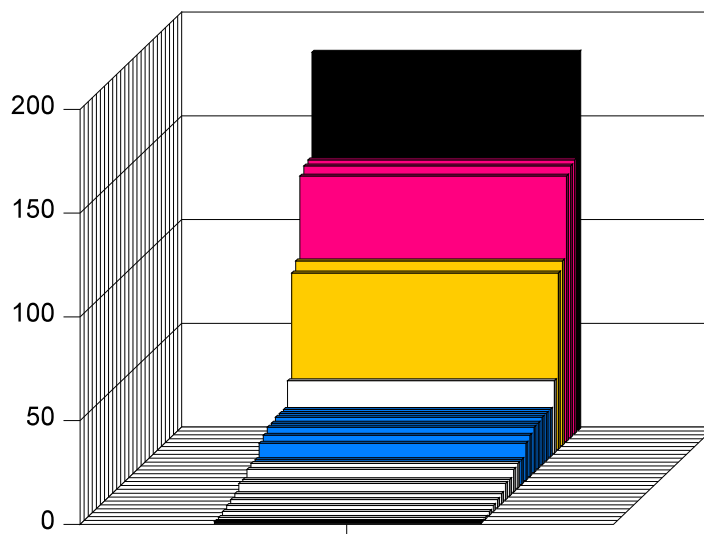


Figure 1. EU-25 population structure

Square root weights will be explained later in this paper. For now, notice that Germany has 33 votes instead of 29, while Poland and Spain have each by 4 votes less compared to the Nice Treaty. France, UK, and Italy have by 5 votes more than Spain and Poland, and by 5 less than Germany. Thus, the square root vote allocation breaks with the parity principle, resembling in this respect the voting system proposed in the EU Constitution Draft. Would such a change in weights produce a shift in relative power distribution? According to a widespread belief, a share of the total amount of nominal votes, and similarly, a share of the total population, or, in general, a country's *relative weight* in a weighted voting game should automatically translate into a greater or smaller *voting power*. Under the Nice Treaty allocation of nominal votes, Poland's relative weight equals  $27/321=8.4\%$ . By dividing Poland's population (38.2 mln.) by the population of EU-25 (453.7 mln.), we get the same fraction.

Therefore, if relative weight were to entirely determine voting power, Poland should not object to population weights, and Spain whose share of the EU population reaches 9% should welcome the reform proposed the Convention. Why did the two governments reject the voting system based on replacing “political” weights with population weights?

Table 4. The EU population by member states. The Nice Treaty and square root vote allocations.

| Group | EU Member State | Population in mln. | Rel. pop in .001 | Nice T. weight | Sq. root weight |
|-------|-----------------|--------------------|------------------|----------------|-----------------|
| 1     | Germany         | 82.537             | 182              | 29             | 33              |
| 2     | France          | 59.629             | 131              | 29             | 28              |
|       | UK              | 59.329             | 131              | 29             | 28              |
|       | Italy           | 57.321             | 126              | 29             | 28              |
| 3     | Spain           | 40.683             | 90               | 27             | 23              |
|       | Poland          | 38.219             | 84               | 27             | 23              |
| 4     | Netherlands     | 16.193             | 36               | 13             | 15              |
| 5     | Greece          | 11.018             | 24               | 12             | 12              |
|       | Portugal        | 10.408             | 23               | 12             | 12              |
|       | Belgium         | 10.356             | 23               | 12             | 12              |
|       | Czech R.        | 10.203             | 22               | 12             | 12              |
|       | Hungary         | 10.142             | 22               | 12             | 12              |
|       | Sweden          | 8.941              | 20               | 10             | 11              |
|       | Austria         | 8.067              | 18               | 10             | 10              |
| 6     | Denmark         | 5.384              | 12               | 7              | 9               |
|       | Slovakia        | 5.379              | 12               | 7              | 9               |
|       | Finland         | 5.206              | 11               | 7              | 8               |
|       | Ireland         | 3.964              | 9                | 7              | 7               |
|       | Lithuania       | 3.463              | 8                | 7              | 7               |
|       | Latvia          | 2.332              | 5                | 4              | 6               |
|       | Slovenia        | 1.995              | 4                | 4              | 5               |
|       | Estonia         | 1.356              | 3                | 4              | 4               |
|       | Cyprus          | 0.715              | 2                | 4              | 3               |
|       | Luxembourg      | 0.448              | 1                | 4              | 2               |
|       | Malta           | 0.397              | 1                | 3              | 2               |
| Total |                 | 453.685            | 1000             | 321            | 321             |

(June 5, 2004, to be continued).

## Appendix A

The Banzhaf power index distributions for 30 voting games  
obtained by combining one state – one vote games with  
games based on relative population weights

Table A1

6 voting games whose one state – one vote component has a quota of 13

| Grp            | EU-25 Member State | Double majority games |        |        |        |        |        |
|----------------|--------------------|-----------------------|--------|--------|--------|--------|--------|
|                |                    | 13/550                | 13/600 | 13/650 | 13/700 | 13/750 | 13/800 |
| 1              | Germany            | 1174                  | 1336   | 1457   | 1445   | 1470   | 1318   |
| 2              | France             | 849                   | 949    | 1052   | 1135   | 1186   | 1240   |
|                | UK                 | 849                   | 949    | 1052   | 1135   | 1186   | 1240   |
|                | Italy              | 821                   | 918    | 1012   | 1099   | 1144   | 1214   |
| 3              | Spain              | 640                   | 696    | 724    | 848    | 856    | 847    |
|                | Poland             | 606                   | 674    | 667    | 797    | 832    | 760    |
| 4              | Netherlands        | 378                   | 365    | 381    | 356    | 392    | 430    |
| 5              | Greece             | 317                   | 296    | 290    | 269    | 275    | 296    |
|                | Portugal           | 314                   | 291    | 283    | 262    | 266    | 285    |
|                | Belgium            | 314                   | 291    | 283    | 262    | 266    | 285    |
|                | Czech R.           | 308                   | 285    | 275    | 254    | 256    | 274    |
|                | Hungary            | 308                   | 285    | 275    | 254    | 256    | 274    |
|                | Sweden             | 298                   | 273    | 262    | 238    | 237    | 252    |
|                | Austria            | 288                   | 262    | 246    | 223    | 218    | 229    |
| 6              | Denmark            | 259                   | 227    | 201    | 176    | 161    | 162    |
|                | Slovakia           | 259                   | 227    | 201    | 175    | 161    | 162    |
|                | Finland            | 254                   | 222    | 194    | 168    | 152    | 150    |
|                | Ireland            | 244                   | 210    | 179    | 152    | 131    | 128    |
|                | Lithuania          | 240                   | 204    | 172    | 144    | 123    | 117    |
|                | Latvia             | 225                   | 187    | 150    | 120    | 94     | 83     |
|                | Slovenia           | 220                   | 181    | 142    | 112    | 85     | 71     |
|                | Estonia            | 215                   | 175    | 135    | 104    | 75     | 60     |
|                | Cyprus             | 210                   | 169    | 127    | 96     | 66     | 49     |
|                | Luxembourg         | 205                   | 164    | 120    | 88     | 56     | 37     |
|                | Malta              | 205                   | 164    | 120    | 88     | 56     | 37     |
| Efficiency (%) |                    | 29.42                 | 22.52  | 16.12  | 10.17  | 6.04   | 2.80   |
| Std. deviation |                    | 258                   | 315    | 363    | 400    | 422    | 420    |

Table A2

6 voting games whose one state – one vote component has a quota of 14

| Grp            | EU-25<br>Member<br>State | Double majority games |        |        |        |        |        |
|----------------|--------------------------|-----------------------|--------|--------|--------|--------|--------|
|                |                          | 14/550                | 14/600 | 14/650 | 14/700 | 14/750 | 14/800 |
| 1              | Germany                  | 943                   | 1088   | 1248   | 1266   | 1348   | 1248   |
| 2              | France                   | 705                   | 805    | 901    | 1007   | 1071   | 1169   |
|                | UK                       | 705                   | 805    | 901    | 1007   | 1071   | 1169   |
|                | Italy                    | 686                   | 781    | 872    | 975    | 1033   | 1142   |
| 3              | Spain                    | 568                   | 613    | 647    | 758    | 807    | 781    |
|                | Poland                   | 543                   | 597    | 607    | 708    | 792    | 701    |
| 4              | Netherlands              | 381                   | 374    | 375    | 371    | 387    | 439    |
| 5              | Greece                   | 341                   | 326    | 311    | 296    | 288    | 311    |
|                | Portugal                 | 338                   | 320    | 306    | 289    | 280    | 301    |
|                | Belgium                  | 338                   | 320    | 306    | 289    | 280    | 301    |
|                | Czech R.                 | 335                   | 316    | 301    | 283    | 272    | 290    |
|                | Hungary                  | 335                   | 316    | 301    | 283    | 272    | 290    |
|                | Sweden                   | 328                   | 308    | 290    | 269    | 256    | 269    |
|                | Austria                  | 322                   | 299    | 279    | 256    | 240    | 248    |
| 6              | Denmark                  | 303                   | 273    | 246    | 216    | 193    | 184    |
|                | Slovakia                 | 303                   | 273    | 246    | 216    | 193    | 184    |
|                | Finland                  | 300                   | 269    | 240    | 209    | 185    | 174    |
|                | Ireland                  | 294                   | 261    | 229    | 196    | 168    | 152    |
|                | Lithuania                | 290                   | 256    | 224    | 189    | 160    | 142    |
|                | Latvia                   | 281                   | 243    | 208    | 169    | 136    | 109    |
|                | Slovenia                 | 278                   | 239    | 202    | 162    | 128    | 99     |
|                | Estonia                  | 275                   | 235    | 197    | 155    | 120    | 88     |
|                | Cyprus                   | 272                   | 231    | 191    | 147    | 112    | 77     |
|                | Luxembourg               | 268                   | 226    | 186    | 142    | 104    | 66     |
|                | Malta                    | 268                   | 226    | 186    | 142    | 104    | 66     |
| Efficiency (%) |                          | 23.00                 | 18.22  | 13.56  | 8.86   | 5.48   | 2.63   |
| Std. deviation |                          | 178                   | 231    | 283    | 329    | 367    | 382    |

Table A3.

6 voting games whose one state – one vote component has a quota of 15

| Grp            | EU-25<br>Member<br>State | Double majority games |        |        |        |        |        |
|----------------|--------------------------|-----------------------|--------|--------|--------|--------|--------|
|                |                          | 15/550                | 15/600 | 15/650 | 15/700 | 15/750 | 15/800 |
| 1              | Germany                  | 763                   | 875    | 1041   | 1079   | 1193   | 1148   |
| 2              | France                   | 595                   | 682    | 759    | 871    | 932    | 1066   |
|                | UK                       | 595                   | 682    | 759    | 871    | 932    | 1066   |
|                | Italy                    | 584                   | 664    | 739    | 843    | 902    | 1038   |
| 3              | Spain                    | 509                   | 544    | 578    | 665    | 744    | 697    |
|                | Poland                   | 492                   | 532    | 555    | 618    | 736    | 632    |
| 4              | Netherlands              | 382                   | 382    | 376    | 387    | 380    | 441    |
| 5              | Greece                   | 360                   | 348    | 333    | 323    | 304    | 328    |
|                | Portugal                 | 358                   | 345    | 329    | 318    | 298    | 317    |
|                | Belgium                  | 358                   | 345    | 329    | 318    | 298    | 318    |
|                | Czech R.                 | 356                   | 342    | 325    | 312    | 292    | 309    |
|                | Hungary                  | 356                   | 342    | 325    | 312    | 292    | 309    |
|                | Sweden                   | 352                   | 336    | 318    | 302    | 280    | 291    |
|                | Austria                  | 348                   | 330    | 310    | 291    | 268    | 272    |
|                |                          |                       |        |        |        |        |        |
| 6              | Denmark                  | 337                   | 313    | 288    | 258    | 231    | 216    |
|                | Slovakia                 | 337                   | 313    | 288    | 258    | 231    | 216    |
|                | Finland                  | 335                   | 310    | 284    | 253    | 225    | 207    |
|                | Ireland                  | 332                   | 304    | 276    | 242    | 213    | 188    |
|                | Lithuania                | 330                   | 301    | 273    | 237    | 207    | 178    |
|                | Latvia                   | 324                   | 292    | 261    | 220    | 188    | 150    |
|                | Slovenia                 | 323                   | 289    | 258    | 214    | 182    | 140    |
|                | Estonia                  | 321                   | 286    | 254    | 209    | 176    | 130    |
|                | Cyprus                   | 319                   | 283    | 250    | 203    | 170    | 121    |
|                | Luxembourg               | 317                   | 280    | 246    | 198    | 163    | 111    |
|                | Malta                    | 317                   | 280    | 246    | 198    | 163    | 111    |
|                |                          |                       |        |        |        |        |        |
| Efficiency (%) |                          | 15.84                 | 13.09  | 10.15  | 7.00   | 4.52   | 2.31   |
| Std. deviation |                          | 116                   | 160    | 208    | 254    | 299    | 329    |

Table A4.

6 voting games whose one state – one vote component has a quota of 16

| Grp            | EU-25 Member State | Double majority games |        |        |        |        |        |
|----------------|--------------------|-----------------------|--------|--------|--------|--------|--------|
|                |                    | 16/550                | 16/600 | 16/650 | 16/700 | 16/750 | 15/800 |
| 1              | Germany            | 629                   | 709    | 860    | 911    | 1029   | 1031   |
| 2              | France             | 519                   | 585    | 644    | 746    | 799    | 939    |
|                | UK                 | 519                   | 585    | 644    | 746    | 799    | 939    |
|                | Italy              | 513                   | 572    | 631    | 723    | 779    | 910    |
| 3              | Spain              | 465                   | 495    | 523    | 581    | 673    | 617    |
|                | Poland             | 455                   | 485    | 510    | 542    | 666    | 574    |
| 4              | Netherlands        | 385                   | 390    | 382    | 396    | 372    | 432    |
| 5              | Greece             | 374                   | 366    | 352    | 345    | 321    | 343    |
|                | Portugal           | 373                   | 364    | 350    | 341    | 317    | 335    |
|                | Belgium            | 373                   | 364    | 350    | 341    | 317    | 335    |
|                | Czech R.           | 372                   | 363    | 347    | 337    | 313    | 328    |
|                | Hungary            | 372                   | 362    | 347    | 337    | 313    | 328    |
|                | Sweden             | 370                   | 359    | 342    | 329    | 304    | 312    |
|                | Austria            | 368                   | 356    | 337    | 321    | 296    | 297    |
| 6              | Denmark            | 362                   | 343    | 322    | 297    | 270    | 252    |
|                | Slovakia           | 362                   | 343    | 322    | 297    | 270    | 252    |
|                | Finland            | 361                   | 341    | 320    | 293    | 266    | 244    |
|                | Ireland            | 359                   | 337    | 314    | 285    | 258    | 229    |
|                | Lithuania          | 358                   | 335    | 312    | 281    | 254    | 221    |
|                | Latvia             | 355                   | 329    | 305    | 267    | 240    | 198    |
|                | Slovenia           | 353                   | 327    | 302    | 264    | 236    | 192    |
|                | Estonia            | 352                   | 325    | 299    | 260    | 232    | 183    |
|                | Cyprus             | 351                   | 323    | 297    | 256    | 228    | 175    |
|                | Luxembourg         | 350                   | 321    | 294    | 252    | 224    | 167    |
|                | Malta              | 350                   | 321    | 294    | 252    | 224    | 167    |
| Efficiency (%) |                    | 9.41                  | 8.15   | 6.59   | 4.86   | 3.28   | 1.82   |
| Std. deviation |                    | 72                    | 104    | 145    | 186    | 230    | 267    |

Table A5.

6 voting games whose one state – one vote component has a quota of 17

| Grp            | EU-25 Member State | Double majority games |        |        |        |        |        |
|----------------|--------------------|-----------------------|--------|--------|--------|--------|--------|
|                |                    | 17/550                | 17/600 | 17/650 | 17/700 | 17/750 | 17/800 |
| 1              | Germany            | 534                   | 590    | 713    | 775    | 873    | 914    |
| 2              | France             | 470                   | 513    | 559    | 639    | 690    | 806    |
|                | UK                 | 470                   | 513    | 559    | 639    | 690    | 806    |
|                | Italy              | 466                   | 504    | 550    | 623    | 678    | 776    |
| 3              | Spain              | 436                   | 461    | 478    | 514    | 602    | 559    |
|                | Poland             | 429                   | 453    | 471    | 488    | 594    | 538    |
| 4              | Netherlands        | 391                   | 394    | 388    | 394    | 368    | 421    |
| 5              | Greece             | 385                   | 379    | 368    | 359    | 338    | 356    |
|                | Portugal           | 383                   | 378    | 366    | 357    | 336    | 350    |
|                | Belgium            | 384                   | 378    | 366    | 357    | 336    | 350    |
|                | Czech R.           | 384                   | 377    | 364    | 354    | 333    | 344    |
|                | Hungary            | 384                   | 377    | 364    | 354    | 333    | 344    |
|                | Sweden             | 383                   | 374    | 361    | 349    | 328    | 333    |
|                | Austria            | 382                   | 372    | 358    | 344    | 322    | 321    |
| 6              | Denmark            | 378                   | 365    | 350    | 329    | 306    | 287    |
|                | Slovakia           | 378                   | 365    | 349    | 329    | 306    | 287    |
|                | Finland            | 377                   | 363    | 347    | 326    | 303    | 281    |
|                | Ireland            | 376                   | 361    | 344    | 321    | 297    | 269    |
|                | Lithuania          | 376                   | 360    | 342    | 319    | 294    | 263    |
|                | Latvia             | 374                   | 357    | 338    | 311    | 285    | 246    |
|                | Slovenia           | 373                   | 355    | 336    | 308    | 283    | 240    |
|                | Estonia            | 373                   | 354    | 334    | 306    | 280    | 234    |
|                | Cyprus             | 372                   | 353    | 333    | 303    | 277    | 229    |
|                | Luxembourg         | 371                   | 352    | 331    | 301    | 274    | 223    |
|                | Malta              | 371                   | 352    | 331    | 301    | 274    | 223    |
| Efficiency (%) |                    | 4.76                  | 4.31   | 3.64   | 2.86   | 2.03   | 1.25   |
| Std. deviation |                    | 42                    | 64     | 96     | 130    | 169    | 205    |

