



# The distribution of power within the EU: perspectives on a Ukrainian accession and a Turkish accession

Werner Kirsch<sup>1</sup>

Accepted: 9 May 2022 / Published online: 18 May 2022  
© The Author(s) 2022

## Abstract

On February 28th, 2022, Ukraine submitted an application concerning accession to the European Union. As Ukraine is already linked to the European Union through an Association Agreement and the Deep and Comprehensive Free Trade Agreement—signed in 2014—there might be a chance for the Ukraine to join the EU within the next decade. With about 41 million inhabitants, Ukraine is a rather large country and the 65% majority requirement under the EU’s Qualified Majority Voting rules would give Ukraine some significant power in a future EU28. Herein, it is shown how relative political power indices—as measured by the Banzhaf index—would change in the case of an EU enlargement to allow accession by Ukraine: The large economies would lose power and, surprisingly, many small countries would gain political power. Such perspectives might lead one to reconsider the voting procedures of the Council of the European Union at the EU level in the course of future negotiations on amendments to the Lisbon Treaty. The case of Turkey’s accession is also considered as is the case of Montenegro joining the European Union.

**Keywords** EU enlargement · Ukraine · Banzhaf index · Power · Majority voting

**JEL Classification** C0 · F0 · H0 · K0

## 1 Introduction

Triggered by the Russian invasion of Ukraine on February 24th, 2022, the Ukrainian government quickly filed an application for membership of the European Union (EU) on February 28th. Soon after, the governments of Moldova and Georgia followed suit. With a population of more than 40 million, Ukraine is—by far—larger than any other potential candidate country with the exception of Turkey which has a population of more than 80 million.

---

✉ Werner Kirsch  
werner.kirsch@fernuni-hagen.de

<sup>1</sup> Faculty of Mathematics and Computer Science, FernUniversität in Hagen, Hagen, Germany

The accession of Ukraine to the EU or the rejection thereof will have profound and complex consequences in both the political and economic spheres. Many of these consequences are hard to predict.

In this note, we look at a computable implication: We investigate the impact an accession of Ukraine to the European Union would have on the distribution of power within the Council of the European Union and compare this with selected other accession scenarios. Since Ukraine is comparable in terms of population size with Spain or Poland, two of the larger current EU member countries, it is interesting to learn the extent to which an accession of Ukraine might change or even disturb the balance of power in the Council.

In the following, we measure the influence a country has in the Council by employing the Banzhaf index (for an in-depth explanation of the index itself, please see below or Felsenthal and Machover (1998), Taylor and Pacelli (2010), Kirsch (2016a), and the references provided therein). Changes in the Banzhaf power index were also particularly relevant in the case of BREXIT due to which it was the relatively larger EU countries in the EU27 which gained power, while smaller countries were losing power (Kirsch 2016b); relative winners in the power changes were Spain and Portugal in particular. To the extent that the EU budget lines are influenced by such relative power changes, one may expect that the EU budget will show a change in favor of those countries which are the political power winners in relative terms as measured by the Banzhaf index—an issue which will not be analyzed further herein.

The analytical interest of the present contribution places a focus on changes in the internal power balance within the Council of the European Union the context of a future enlargement concerning the accession of Ukraine; indeed, the emphasis is on those policy fields in the EU—which concerns Council of the European Union meetings—which involve majority voting, which excludes issues such as taxation or foreign policy which require unanimous voting. Section 2 takes a closer look at voting requirements in the context of the Council of the European Union and presents results for an enlarged EU (i.e., including Ukraine and some other countries). Section 3 offers basic conclusions.

## 2 Voting in the Council of the European Union

The Council of the European Union is one of the legislative bodies of the European Union. Each member state is represented by one government official. The voting procedure in the Council is regulated by the Treaty of Lisbon.

In most fields of politics, the Council reaches policy decisions by means of “double majority”. A double majority is achieved if the supporters of a proposal represent both 65% of the population of the European Union as a whole and 55% of the member states. This voting procedure was introduced as a compromise between a qualified majority of the citizens (i.e., the population criterion) and a qualified majority of the member countries (i.e., the states criterion). The second criterion makes sure that the votes of smaller member states, for example Malta or Luxembourg, do not become completely irrelevant.

There is also an additional rule: If only three member states vote against a proposal, then the proposal is accepted even if the double majority is not reached. This rule prevents three large countries, e.g., Germany, Italy, and Poland, from joining forces to block a decision. There are very few combinations of three countries which together represent more than 35% of the population of the EU: In the current EU27, there are only 22 such combinations possible.

This system is what is known as qualified majority voting (QMV).

## 2.1 Voting systems and the Banzhaf power index

A voting system consists of a set of voters (for example, members of a parliament or member states in the Council of the European Union) and the rule(s) which determines when a collection of voters is *winning*. A set of voters supporting a particular proposal is called a *coalition*. For example, in a parliament of 100 members, a coalition will typically be winning if it comprises at least 51 members.<sup>1</sup> Sometimes, such as to pass an amendment of the constitution, a simple majority is not sufficient for a coalition to be winning, a two-thirds or three-quarters majority may be required (i.e., a qualified majority). Moreover, voting systems may be more complicated than this, for example in bicameral systems or, as explained above, in the Council of the European Union.

Power indices have been developed to measure the influence (“power”) any voter has in a given voting system. In a typical parliament where every voter (i.e., every member of parliament) has just one vote, all voters have the same voting power. However, in a weighted voting system, where voters may have different weights, it is not so clear how powerful a particular voter is. Let us consider a simplified voting system with two voters, one with a weighting of 51, the other with weighting of 49. If a winning coalition needs at least 51 votes, then the first voter obviously holds all the power, as she or he can push through any proposal he or she wants while the second can never reach the threshold. On the other hand, if 67 votes are required, then the two voters have the same power: Both voters are needed for an affirmative decision.

This way of looking at voting power is systematized by the Banzhaf index. For a given voter  $v$ , we look at all winning coalitions in which  $v$  is included. We call  $v$  decisive if a defection of  $v$  would make this coalition a losing coalition. The Banzhaf power  $BP(v)$  is the number of all coalitions for which  $v$  is decisive. The *Banzhaf index*  $BI(v)$  is the share of power the voter  $v$  has among all voters. More precisely

$$BI(v) = \frac{BP(v)}{\sum_{w \in V} BP(w)}$$

To compute the Banzhaf index, one has to check all possible coalitions. If there are  $N$  voters, the number of coalitions is  $2^N$ , so for the Council of the European Union with 27 member states, it is 134,217,728. It is clear that in such a case we

<sup>1</sup> Here, and in the following, we do not allow or consider abstentions.

need a computer to do the job. To compute the tables below, we used the program *iop 2.0* (Bräuninger and König 2005).

The effect of the aforementioned “additional rule,” i.e., forbidding blocking decisions by only three states, is negligible in the present context. For the current EU, there are only 22 coalitions of 24 states which do *not* represent 65% of the total population of the EU. This number is of (almost) no consequence for the power indices.

We also look at a type of voting measure known as Coleman’s “power of a collectivity to act” or as *decision probability*. It describes the “probability” that a proposal will get approved, in other words the percentage of winning coalitions among all coalitions. In a parliament with simple majority rule, decision probability is (about) 50%. In systems with qualified majority requirements, the decision probability is—as a rule—much lower. In fact, if the relative quota required for an affirmative action is kept fixed, then the decision probability declines when more voters are admitted (Kirsch 2016a).

## 2.2 Accession of Ukraine and its effect on power indices

Table 1 shows the distribution of power in the context of both the current Council of the European Union and after Ukraine joining the Union. Countries are ranked in terms of their population in decreasing order. The second column gives the population of the respective state in millions of inhabitants. The third and fourth columns contain the Banzhaf power indices in the current Council (EU27) and in the Council after the accession of Ukraine, respectively. The last column shows the relative gains or losses of power.

For these computations, we used the most recent population estimates available from Eurostat as of the end of April 2022. Ukraine would be the fifth largest member state by population; its population size ranks Ukraine between Spain and Poland.

There is a caveat to be noted here: At the point in time of a future EU accession, Ukraine’s population figure might be somewhat different depending on how many more refugees might follow those who left Ukraine during the first 4 months of 2022 in the months and years to come and how many may have returned subsequently to Ukraine. Under the worst circumstances, emigration from the Ukraine could indeed raise the population figures of for example Germany, Italy, Austria, and particularly Poland. Whether or not a considerable share of Ukrainian immigrants in EU27 countries would want to get the citizenship of the respective destination country remains to be seen. In the subsequent table, current population figures for the end of 2021 are used.

It seems obvious that with the accession of new member states, the share of power of “old” members should decrease (the “cake” needs to be distributed among more people). This loss of power occurs indeed for the 18 largest member states. Bigger states tend to lose more power and the biggest losses occur for Spain and Poland, the states closest in population to Ukraine. Any single loss of power, however, remains well below 15%.

At first glance, it is quite surprising that the nine smallest states actually *win* power through Ukraine’s joining the EU. This unexpected effect—or rather its

**Table 1** Population statistics on a potential EU enlargement by the Ukraine and the changes in the Banzhaf power index

Country	Pop. (mio.)	BI: EU27	BI: EU27+UA	Rel. diff
Germany	83.2	12.09%	10.83%	-10.41%
France	67.7	10.08%	8.89%	-11.80%
Italy	59.2	8.88%	7.83%	-11.86%
Spain	47.4	7.66%	6.65%	-13.29%
Ukraine	41.4		5.96%	
Poland	37.8	6.41%	5.54%	-13.55%
Romania	19.2	3.95%	3.73%	-5.49%
Netherlands	17.5	3.75%	3.56%	-5.11%
Belgium	11.6	3.05%	2.95%	-3.35%
Czechia	10.70	2.95%	2.86%	-3.01%
Greece	10.68	2.95%	2.86%	-3.00%
Sweden	10.4	2.91%	2.83%	-2.88%
Portugal	10.3	2.90%	2.82%	-2.84%
Hungary	9.7	2.83%	2.76%	-2.59%
Austria	8.9	2.74%	2.68%	-2.23%
Bulgaria	6.9	2.50%	2.47%	-1.12%
Denmark	5.8	2.37%	2.36%	-0.43%
Finland	5.53	2.33%	2.33%	-0.24%
Slovakia	5.46	2.32%	2.32%	-0.18%
Ireland	5.0	2.27%	2.27%	0.13%
Croatia	4.0	2.15%	2.17%	0.86%
Lithuania	2.8	2.00%	2.04%	1.98%
Slovenia	2.1	1.92%	1.97%	2.69%
Latvia	1.9	1.90%	1.95%	2.92%
Estonia	1.3	1.83%	1.89%	3.54%
Cyprus	0.90	1.77%	1.85%	4.06%
Luxembourg	0.63	1.74%	1.82%	4.39%
Malta	0.53	1.73%	1.81%	4.55%
Decision probability		13.2%	11.36%	

inverse—was already observed in connection with Brexit (for more, see Koczy (2016) and Kirsch (2016b)). After Brexit, the larger member states gained or won more power, while the smaller states lost power.

This counterintuitive phenomenon has to do with the “states criterion” in the voting procedure of the Council. The threshold of 55% of member states jumps from 14.85 for 27 member states in the EU to 15.4 for 28 member states. As the number of states is an integer, this results in an effective jump from 15 to 16. This increase of the threshold in the “states criterion” gives the small states more power, while their power through the “population criterion” is negligible anyway. In fact, if only the population criterion is considered, then Malta’s and Luxembourg’s Banzhaf index is

**Table 2** Future potential EU enlargement by Turkey and changes in the Banzhaf power index

Country	Pop. (mio.)	BI: EU27	BI: EU27 + TR	Rel. diff
Turkey	84.7		9.92%	
Germany	83.2	12.09%	9.75%	− 19.39%
France	67.7	10.08%	8.03%	− 20.37%
Italy	59.2	8.88%	7.34%	− 17.33%
Spain	47.4	7.66%	6.09%	− 20.51%
Poland	37.8	6.41%	4.94%	− 22.89%
Romania	19.2	3.95%	3.57%	− 9.57%
Netherlands	17.5	3.75%	3.41%	− 8.88%
Belgium	11.6	3.05%	2.88%	− 5.69%
Czechia	10.70	2.95%	2.80%	− 5.08%
Greece	10.68	2.95%	2.80%	− 5.06%
Sweden	10.4	2.91%	2.77%	− 4.83%
Portugal	10.3	2.90%	2.76%	− 4.77%
Hungary	9.7	2.83%	2.71%	− 4.33%
Austria	8.9	2.74%	2.64%	− 3.67%
Bulgaria	6.9	2.50%	2.45%	− 1.79%
Denmark	5.8	2.37%	2.36%	− 0.59%
Finland	5.53	2.33%	2.33%	− 0.23%
Slovakia	5.46	2.32%	2.32%	− 0.14%
Ireland	5.0	2.27%	2.28%	0.41%
Croatia	4.0	2.15%	2.19%	1.69%
Lithuania	2.8	2.00%	2.08%	3.54%
Slovenia	2.1	1.92%	2.01%	4.75%
Latvia	1.9	1.90%	1.99%	5.14%
Estonia	1.3	1.83%	1.94%	6.20%
Cyprus	0.90	1.77%	1.90%	7.10%
Luxembourg	0.63	1.74%	1.88%	7.66%
Malta	0.53	1.73%	1.87%	7.93%
Decision probability		13.2%	11.40%	

about 0.1%. Thus, again as regards Malta and Luxembourg, it could be an attractive EU policy strategy for both countries to team up with special partner countries—Luxembourg, for example, might try to cooperate rather strongly with Belgium or the Netherlands in the future—countries whose Banzhaf index is clearly much larger than that of Luxembourg itself. It is noteworthy that the combined power index for Belgium plus the Netherlands exceeds the power index of the Ukraine.

Table 1 also shows that the power of the Council to act decreases from 13.2 to 11.4%. A decrease of this index after enlarging the body is to be expected from general considerations (Kirsch 2016a).

**Table 3** Changes in the Banzhaf power index in the case of EU eastern enlargement by Montenegro

Country	Pop. (mio.)	BI: EU27	BI: EU27+MNE	Rel. diff
Germany	83.2	12.09%	10.93%	-9.61%
France	67.7	10.08%	9.16%	-9.15%
Italy	59.2	8.88%	8.10%	-8.80%
Spain	47.4	7.66%	7.07%	-7.80%
Poland	37.8	6.41%	5.90%	-7.99%
Romania	19.2	3.95%	3.84%	-2.87%
Netherlands	17.5	3.75%	3.66%	-2.27%
Belgium	11.6	3.05%	3.06%	0.42%
Czechia	10.70	2.95%	2.98%	0.93%
Greece	10.68	2.95%	2.97%	0.94%
Sweden	10.4	2.91%	2.94%	1.13%
Portugal	10.3	2.90%	2.94%	1.18%
Hungary	9.7	2.83%	2.88%	1.54%
Austria	8.9	2.74%	2.80%	2.09%
Bulgaria	6.9	2.50%	2.59%	3.66%
Denmark	5.8	2.37%	2.48%	4.65%
Finland	5.53	2.33%	2.45%	4.94%
Slovakia	5.46	2.32%	2.44%	5.01%
Ireland	5.0	2.27%	2.39%	5.47%
Croatia	4.0	2.15%	2.29%	6.54%
Lithuania	2.8	2.00%	2.17%	8.11%
Slovenia	2.1	1.92%	2.10%	9.08%
Latvia	1.9	1.90%	2.07%	9.39%
Estonia	1.3	1.83%	2.01%	10.26%
Cyprus	0.90	1.77%	1.97%	11.01%
Luxembourg	0.63	1.74%	1.94%	11.47%
Montenegro	0.62		1.94%	
Malta	0.53	1.73%	1.93%	11.70%
Decision probability		13.2%	11.36%	

### 2.3 A few other accession scenarios

Turkey is about twice as big in terms of population as Ukraine. Should it join the European Union, it would be the largest member state. Tables 2 and 3 show the results of the computation for the Banzhaf power index in the context of various cases of potential EU enlargements in the future.

The losses in power of the bigger states are larger than in the case of Ukraine, the biggest being the case of Poland again (almost 23%), but all of the bigger states lose about 20% of their Banzhaf power. Again, nine smaller states gain power, even more than through Ukraine's membership.

We contrast this with an assumed accession of the smallest current candidate country, namely Montenegro. Table 3 shows the (relative) gains and losses in this case. As expected, the bigger states lose power, this time Germany is suffering the biggest loss, but all losses stay below 10%. In the case of Montenegro acceding to the European Union, the smallest 20 states win power, even mid-size countries like Belgium or Czechia. The gains of power of some states are above 11%.

The hypothetical case of an enlargement of the EU to include both the Ukraine and Montenegro clearly suggests that a future round of EU enlargement on the Balkans would again change the internal power balance in EU.

Finally, we shall have a brief look at the envisaged accession of both Moldavia and Georgia (with populations of 3.6 and 3.7 million, respectively). In this case, all 27 “old” member states lose power (data available on request). The relative loss ranges from 6.88% for Malta, the smallest state, to 2.37% for Germany, the biggest state.

### 3 Conclusions

The power analyses presented indicate that none of the scenarios would disturb the balance of power in the Council too strongly. An EU enlargement with the accession of Ukraine would raise the relative power of many smaller countries and weaken the position of bigger countries. This could lead to discussions among the larger EU member countries to change the minimum majority requirement in the future or to change the QMV system completely.

Not unexpectedly, the accession of a state as big as Turkey would cause the biggest changes in terms of the distribution of power. The accession of Ukraine would make noticeable changes, but not completely disturb the voting system.

The rather complicated system of QMV produces unexpected and unwanted effects such as the *increase* of power where a decrease would be reasonable. One may regard this as a defect of the voting system, perhaps more a theoretical than a practical problem. However, we believe that a power index analysis can help to understand real-world voting systems like the voting procedure in the Council and may help to improve them.

The question of the possible accession of Ukraine (or Moldavia or Georgia) requires the very careful analysis of all political and economic aspects, possibly also including problems of a military nature.

The voting system in the Council of the European Union has major defects, one of which we described above, which should be avoided by a reform of the system. Nevertheless, the voting system proves to be robust enough to give acceptable results after consideration of various potential enlargements of the European Union, including an accession of Ukraine.

**Acknowledgements** I would like to thank Paul Welfens for suggesting the topic of this note and helping to improve a first draft.



**Funding** Open Access funding enabled and organized by Projekt DEAL.

**Data availability** The datasets generated during and/or analyzed during the current study are available from the author on reasonable request.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

## References

- Bräuninger T, König T (2005) Indices of Power IOP 2.0. [http://www.tbraeuninger.de/wp-content/uploads/2012/07/IOP\\_manual\\_2012.pdf](http://www.tbraeuninger.de/wp-content/uploads/2012/07/IOP_manual_2012.pdf)
- Felsenthal D, Machover M (1998) The Measurement of voting power: theory and practice, problems and paradoxes. Edward Elgar Publishing Ltd., Cheltenham and Northampton, MA
- Kirsch W (2016a) A mathematical view on voting and power. Mathematics and society, 251–279, Eur. Math. Soc., Zürich
- Kirsch W (2016b) Brexit and the distribution of power in the Council of the EU <https://www.ceps.eu/ceps-publications/brexit-and-distribution-power-council-eu/>
- Koczy L (2016) How Brexit affects European Union power distribution <http://ssrn.com/abstract=2781666>
- Taylor A, Pacelli A (2010) Mathematics and politics: strategy, voting, power, and proof. Springer

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.