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Working paper

Voting Power in the UN Security Council: Presentation of Detailed Calculations

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1. Introduction

The voting rule stated in Article 27(3) of the United Nations Charter prescribing how the United Nations Security Council (UNSC) makes decisions on non-procedural matters, serves as one of the most well known examples in the voting-power literature illustrating the calculation how to compute the a priori voting power in a *simple (binary) voting game* (SVG). Yet, as pointed out by Bolger (1993) and by Felsenthal and Machover (1997, 1998, 2001a, 2001b), the fact that an abstention, non-participation, or absence of a permanent member of the UNSC has not been regarded in practice as casting a veto, requires that the *de facto* decision rule according to which the UNSC makes decisions on non-procedural matters should be treated as a mixed SVG and a *ternary voting game* (TVG).

But regardless of whether the voting procedure in the UNSC on non-procedural matters should be treated as an SVG or as a mixed SVG/TVG, there are in the literature two computational errors regarding the *power of the UNSC to act* – one committed by Coleman (1971, Table 1, p. 284) and the other by Felsenthal and Machover (2001b, p. 101). Hence the purpose of this paper is threefold:

• To survey in some detail the historical events that led to the *de facto* interpretation[1] whereby an abstention, non-participation or absence of a permanent member of the UNSC is not be regarded as a veto according to Article 27(3) of the UN Charter.

• To present the detailed computations associated with the mixed (unweighted) SVG/TVG decision rule according to the *de facto* interpretation of article 27(3) of the UN Charter – and thus correct the two computational errors mentioned above.

• Describe the logic and associated algebraic computations underlying the presentation of the decision rule according to article 27(3) of the UN Charter as a weighted SVG if this article would have been exercised as written, i.e., if no resolution of the UNSC on non-procedural matters could pass without the explicit support of all its permanent members.

2. Voting Rules in the UNSC: An Overview

Currently the UNSC is composed of 15 member-states – five permanent members (China, France, Russia, UK, US) and ten rotating members. The current voting rules of the UNSC are stated in Chapter 5, Article 27, of the UN Charter, as follows:[2]

> 1. Each member of the Security Council shall have one vote.

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[1] We use the phrase '*de facto* interpretation' because, as described in the historical survey below, this interpretation has not been made by a legally binding authority. This may explain, in turn, why Article 27(3) of the UN Charter has not been amended to date so as to explicitly reflect this interpretation.

[2] By resolution 1991 of 17 December 1963, the UN General Assembly adopted amendments to Articles 23 and 27 of the UN Charter which enlarged the membership of the UNSC from 11 to 15, and changed the required majority for passing resolutions by the UNSC from seven members to nine. These amendments came into force on 31 August 1965 after being ratified, according to Article 108 of the Charter, by the governments of two-thirds of the UN members including all the permanent members of the UNSC. The article quoted above is the current amended article. In the original Article 27 (which was operational during the period 1945–1965) the word 'seven' appeared instead of the word 'nine' in paragraphs 2 and 3.

2. Decisions of the Security Council on procedural matters shall be made by an affirmative vote of nine members.
3. Decisions of the Security Council on all other matters shall be made by an affirmative vote of nine members including the concurring votes of the permanent members; provided that in decisions under Chapter VI, under paragraph 3 of Article 52, a party to a dispute shall abstain from voting.

However, in practice, since 1946 an explicit declaration 'I abstain' by a permanent member of the UNSC is not interpreted as a veto; and as of 1947 and 1950 the same applies to non-participation in the vote and absence, respectively, of a permanent member.[3]

3. The Mixed SVG/TVG Decision Rule of the UNSC

As an abstention of a permanent member of the UNSC on non-procedural matters is a *tertium quid*, i.e., abstention may have the same effect as a 'yes' or as a 'no' depending on how the other members voted,[4] and as an abstention of a rotating member always counts as a 'no', it follows that in reality, the UNSC can pass resolutions (in non- procedural matters) if:

(1) The resolution is supported by at least nine of the Council's 15 members;
(2) None of the five permanent members casts a veto.

Hence a proposed resolution on non-procedural matters passes in the UNSC in each of the 27 situations outlined in Table 1.[5]

[3] For details on the interpretation in practice of Article 27(3) of the UN Charter with respect to abstention, non-participation or absence of a permanent member, see Simma (1982, pp. 447–454) and references cited therein.

[4] Thus, for example, if at least nine rotating members voted 'yes' and all permanent members abstained regarding a proposed resolution, then this resolution would pass and the abstention of the permanent members would have the same effect as a 'yes'; but if fewer than nine rotating members voted 'yes' while all the permanent members abstained, then the resolution would not pass and the abstention of the permanent members would have the same effect as a 'no'.

[5] We assume that for a rotating member there is an equal a priori probability (1/2) of voting 'yes' or 'no'. We also make the (more debatable) assumption that there is an equal a priori probability (1/3) for a permanent member to vote 'yes', 'no', or to abstain.

Table 1: **Alternative Situations for Passing Resolutions in the UNSC on Non-Procedural Matters According to the Mixed SVG/TVG Model**

Situation Number	Number of permanent members voting 'yes'	Number of permanent members abstaining	Number of rotating members voting 'yes'	Number of such combinations	Number of such combinations in which a permanent member *i* is decisive[6]	Number of such combinations to which a rotating member *i* belongs[7]
1	5	0	10	1	0	1
2	4	1	10	5	1·1=1	5
3	3	2	10	10	4·1= 4	10
4	2	3	10	10	6·1= 6	10
5	1	4	10	5	4·1= 4	5
6	0	5	10	1	1·1 = 1	1
7	5	0	9	10	0	9
8	4	1	9	50	1·10 = 10	45
9	3	2	9	100	4·10 = 40	90
10	2	3	9	100	6·10 = 60	90
11	1	4	9	50	4·10 = 40	45
12	0	5	9	10	1·10 =10	9*
13	5	0	8	45	0	36
14	4	1	8	225	1· 45 = 45	180
15	3	2	8	450	4· 45 = 180	360
16	2	3	8	450	6 · 45 = 270	360
17	1	4	8	225	5 · 45 = 225	180*
18	5	0	7	120	0	84
19	4	1	7	600	1· 120 = 120	420
20	3	2	7	1,200	4· 120 = 480	840
21	2	3	7	1,200	10· 120 =1200	840*
22	5	0	6	210	0	126
23	4	1	6	1,050	1· 210 = 210	630
24	3	2	6	2,100	10·210 =2100	1,260*
25	5	0	5	252	0	126
26	4	1	5	1,260	5· 252 =1,260	630*
27	5	0	4	210	1· 210 = 210	84*
Total				9,949	6,476	6,476

[6] The numbers in this column denote, for each situation, the number of configurations in which a given permanent member, *i*, can change the outcome from positive to negative by lowering his support by *one* grade (from 'yes' to 'abstention', or from 'abstention' to 'no'). Cf. Felsenthal and Machover (1998, Defs. 8.2.5 and 8.3.4). Cells in this column containing 0 denote that a given permanent member can change the outcome from positive to negative only by lowering his support by *two* grades (from 'yes' to 'no'). In situations # 17, 21, 24, 26 a given permanent member can change the outcome from positive to negative both by changing his vote from 'yes' to 'abstain', as well as by changing it from 'abstain' to 'no'. In situation #27 a given permanent member can change the outcome from positive to negative only if s/he changes his/her vote from 'yes' to 'abstain', while in all the remaining 16 situations a given permanent member can change the outcome from positive to negative only if s/he changes his/her vote from 'abstain' to 'no'.

[7] Numbers in this column followed by an asterisk denote configurations in which a given rotating voter, *i*, is decisive. These numbers sum to 3,003.

The a priori ability of a body to act is equal in the mixed SVG/TVG model to the total number of possible configurations having a positive outcome divided by the total number of possible divisions (voting patterns), i.e. to $9{,}949/ 3^5 \cdot 2^{10} = 0.0399 \approx 0.04$.[8]

Since a given rotating member has only two possible inputs, the number of configurations with positive outcome in which s/he is decisive (pivotal) is equal to twice the number of configurations having positive outcome to which s/he belongs minus the total number of configurations having positive outcome, i.e., to $(2 \cdot 6{,}476) – 9{,}949 = 3{,}003$. (See Felsenthal and Machover, 1998, Corollary 3.2.11, p. 43). (The 3,003 configurations in which a rotating member is decisive are those followed by an asterisk in the last column of Table 1).

Although a permanent member belongs to all 9,949 configurations with positive outcome, a given permanent member is considered decisive, as noted in footnote #6 and in Felsenthal and Machover (1998, Def. 8.3.4), only when s/he can change the outcome from positive to negative by lowering his/her support by *one* grade. As depicted in the penultimate column of Table 1, there are 6,476 such configurations.

In the mixed SVG/TVG model the Penrose measure of each member is equal to the number of times s/he is decisive (by lowering his/her support by one grade) divided by the total number of divisions (voting patterns) possible for all other 14 members. Hence the Penrose measure of a permanent member is $6{,}476 / 3^4 \cdot 2^{10} = 0.078$ and for a rotating member it is $3{,}003 / 3^5 \cdot 2^9 = 0.024$.

The Banzhaf index of each permanent member is thus $6{,}476 / (5\cdot 6{,}476) + (10\cdot 3{,}003) = 0.1038$, whereas the Banzhaf index of each rotating member is $3{,}003 / (5 \cdot 6{,}476) + (10 \cdot 3{,}003) = 0.0481$ (see Felsenthal and Machover, 1998, p. 288).

The ability of a given member *i* to block action is defined as the (conditional) probability that, given that the outcome is positive, *i* can change this outcome to negative by changing his/her vote.

In view of this definition it is clear that in *any* of the 9,949 possible divisions in which the outcome is positive a permanent member could force a negative outcome by changing his/her vote to 'no' (and in some of these divisions – namely those in which there are exactly nine 'yes' voters including the given permanent member – it is enough for that member to change his/her vote to abstention). Hence the blocking power of a permanent member is $9{,}949 / 9{,}949 =1$,[9] while the blocking power of a rotating member is $3{,}003 / 9{,}949 = 0.3018 \approx 0.302$.

4. Representation of the UNSC Decision Rule as a (Binary) SVG

As we have mentioned, Article 27(3) of the UN Charter states: "Decisions of the Security Council on all other matters [i.e., on matters which are not procedural] shall be made by an affirmative vote of nine members including the concurring votes of the permanent members; provided that in decisions under Chapter VI, and under paragraph 3 of Article 52, a party to a dispute shall refrain from voting."

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[8] There are $3^5 \cdot 2^{10} = 248{,}832$ possible divisions because there are five permanent members each with three possible voting strategies and 10 rotating members each with two voting strategies.

[9] In fact having veto power means just this: having blocking power = 1.

So if the UNSC would indeed behave according to Article 27(3) of the Charter, then abstention by a permanent member (who is not involved in a dispute) would always count as a veto. Consequently, a resolution in the UNSC could pass only in the seven situations depicted in Table 2.

Table 2: Alternative Situations for Passing Resolutions in the UNSC on Non-Procedural Matters According to the (Binary) SVG Model

Situation Number	Number of permanent members voting 'yes'	Number of rotating members voting 'yes'	Number of such combi-nations (winning coalitions)	Number of winning coalitions to which each perma-nent member belongs	Number of winning coalitions to which each rotating member belongs
1	5	10	1	1	1
2	5	9	10	10	9
3	5	8	45	45	36
4	5	7	120	120	84
5	5	6	210	210	126
6	5	5	252	252	126
7	5	4	210	210	84
Total			848	848	466

It therefore turns out that under the (binary) SVG model:

1. The ability of the UNSC to pass resolutions is $848 / 2^{15} = 0.025878906$.
2. The number of times each permanent member is decisive is 848.
3. The number of times each rotating member is decisive is $(2 \cdot 466) – 848 = 84$.
4. The Penrose measure of each permanent member is $848 / 2^{14} = 0.051757812$.
5. The Penrose measure of each rotating member is $84 / 2^{14} = 0.005126953125$.
6. The Banzhaf index of each permanent member is $848 / (848 \cdot 5) + (84 \cdot 10) = 0.166929133$
7. The Banzhaf index of each rotating member is $84 / (848 \cdot 5) + (84 \cdot 10) = 0.016535433$.
8. The ability of a permanent member to block resolutions is 848 / 848 = 1.
9. The ability of a rotating member to block resolutions is 84 / 848 = 0.099056603.

So if Article 27(3) of the UN Charter would have reflected how decisions in the UNSC are actually made, then this decision rule could be represented as a weighted simple voting game (WVG) where each of the five permanent members has weight 7, each of the ten rotating members has weight 1, and the quota is 39. These weights and quota are derived as follows:

As it is clear that the weight of a veto-wielding permanent member must be larger than that of a rotating member, let us assign weight $x > 1$ to each permanent member and weight 1 to each rotating member. If we denote the required quota by Q, then we obtain the following inequalities according to Article 27(3) of the UN Charter:

$$4x + 10 < Q$$
$$5x + 4 \geq Q$$

Solving for x we get that:

$$4x + 10 < 5x + 4$$
$$6 < x$$

If all assigned weights are to be integers, then the smallest integer larger than 6 is 7. So if we assign to a permanent member weight 7 we get (from the second inequality) that $Q \geq 39$.

References

Bolger, E.M. (1993), 'A value for games with *n* players and *r* alternatives', *International Journal of Game Theory*, 22, 319–334.

Coleman, J.S. (1971), 'Control of collectivities and the power of a collectivity to act', in: B. Lieberman (ed.), *Social Choice*, New York: Gordon and Breach Science Publishers, 269–300.

Felsenthal, D.S. and M. Machover (1997), 'Ternary voting games', *International Journal of Game Theory* 26, 335–351.

Felsenthal, D.S. and M. Machover (1998), *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar Publishing Ltd.

Felsenthal, D.S. and M. Machover (2001a), 'Misreporting rules', *Homo Oeconomicus* 17, 371–390.

Felsenthal, D.S. and M. Machover (2001b), 'Models and reality: The curious case of the absent abstention', in: M.J. Holler and G. Owen (eds.), *Power Indices and Coalition Formation*, Boston/Dordrecht/London: Kluwer Academic Publishers, 87–103. Reprinted in *Homo Oeconomicus* 19 (2002), 297–310.

Simma, B. (ed.) (1982), *The Charter of the United Nations – A Commentary*. New York: Oxford University Press.