Reform of the United Nations Security Council: Equity and Efficiency

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Abstract

Twenty years of negotiations over reform of the United Nations Security Council (UNSC) are yet to bear fruit. We use recent advances in the theory of a-priori voting power to present a formal quantitative appraisal of the "structural reforms" contained within eleven current reform proposals, and the separate effect of expansion of the UNSC membership. Only two reform proposals – the EU acting as a single entity, or a weakening of the veto power for permanent members – robustly dominate the status quo against our measures of equity and efficiency. Several proposals may actually worsen the issues they ostensibly claim to resolve.

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"No reform of the UN will be complete without the reform of the Security Council"

- Former Secretary-General of the United Nations Kofi Annan

1. Introduction

The United Nations (UN) is the foremost international body responsible for the maintenance of international peace and security. The UN Security Council (UNSC) is its most powerful organ, with the authority to make legally binding resolutions to fulfil its mandate of maintaining international peace and security. To that end, it can suspend economic and diplomatic relations between countries, impose blockades, and authorise the use of armed force.

Our study appraises possible reforms to the UNSC. Since its beginnings in 1946, the UNSC has undergone reforms only once: in 1963, the UN General Assembly (UNGA) – which includes delegates from all UN member countries – voted to expand the UNSC from 11 to 15 members (UNGA, 1963).[1] Momentum for a second round of reforms can be traced back to 1993, when an Open-ended Working Group (OEWG) was established to explore proposals for UNSC reform.[2] This Working Group, now often dubbed the "Never-ending Working Group", has entered its 20th consecutive year of deliberations.

Many proposals for UNSC reform have been put forward. This paper presents, to our knowledge, the first formal quantitative study of the equity and efficiency properties of these proposals. We apply new formal equity measures developed by us in Gould and Rablen (2013) to understand the effects of eight "structural reforms" contained within eleven reform proposals currently under consideration by world leaders. A key aspect of the implementation is a computer simulation of the UNSC under each structural reform over a period of 100,000 years.

Under the present arrangements, the 15 UNSC members comprise five Permanent Members (PMs) – China, France, Russia, the United Kingdom, and the United States – that are ever-present and wield a veto on all non-procedural matters. The remaining ten members are elected Non-Permanent Members (NPMs), who serve time-limited two-year terms. The ten NPM seats are divided between five regional caucusing groups: one country from Eastern Europe (EE); two countries from each of the Western European and Others Group (WEOG), the Latin America and Caribbean Group (GRULAC – *el Grupo Latinoamericano y Caribeño*) and Asia;

[1]The reforms did not come into effect until 1965, however, due to opposition among two of the Permanent Members.

[2]In full, the Open-ended Working Group on the Question of Equitable Representation and Increase in the Membership of the Security Council (OEWG, 1994). The call for the creation of the OEWG, UNGA (1993), followed an overwhelming response to an earlier UNGA Resolution, UNGA (1992), which invited members to submit written comments on a possible review of the Security Council.

and three countries from Africa.[3]

Two distinct sets of criticism are widely levelled against these arrangements: one relating to the *efficiency* with which they allow the UNSC to respond to its member's preferences, and another relating to the degree to which they achieve *equity* in the allocation of political power.

On efficiency, critics argue that the UNSC is too often impotent, not least because a preference against a resolution by a single PM can override a preference for the resolution by all remaining members. For instance, the UNSC is presently under criticism for its inability to respond decisively to the Syrian crisis. The UNSC has also appeared slow to react to earlier conflicts, notably the 1994 genocide in Rwanda (Barnett, 2002). This lack of efficiency has sometimes led powerful countries to bypass the UNSC in favour of multilateral action. For instance, in 1999 NATO undertook military action in Kosovo, and in 2003 the US and its allies invaded Iraq, both lacking a UNSC mandate.[4]

On equity, our earlier study, Gould and Rablen (2013), finds, first, that the voting power of a NPM is far too low for a populous country such as India, but far too high when awarded to smaller countries. Second, although, in isolation, the voting power of a PM is not excessive, we find that the *conjunction* of preferential voting power when a member of the UNSC *and* the right to be an ever-present member gives the PMs substantially too much representation. Third, although we do not find compelling support for the abolition of the veto, we find that if the right does remain, it should be re-allocated to different countries. From a regional perspective we find that Asia and Africa are each substantially under-represented, as is the GRULAC (but to a lesser degree), which implies a broader representational imbalance between North (EE and the WEOG) and South (Africa, Asia and the GRULAC).

We find that only two of the eight structural reforms considered, and only one of the eleven reform proposals considered, improve upon the status quo in both the equity and efficiency dimensions. One structural reform strictly worsens both equity and efficiency relative to the status quo, and another three worsen equity, leaving efficiency unchanged. These findings are relatively robust to variations in methodology. Part of the problem is, first, that expansion, although good for equity, is harmful to efficiency. Second, many of the structural reforms concentrate the distribution of expected voting power, when they should ideally do the opposite. The most promising structural reform we consider is to require two PMs to vote

[3] See Appendix 3 for the full membership of each of the regional groups (excluding PMs). Of the PMs, China is a member in Asia, Russia in EE, and France and the UK in the WEOG. Technically, the United States is not a member of any regional group, but it attends meetings of the WEOG as an observer and is considered to be a member of that group for electoral purposes (UN, 2012a). For the purposes of this paper, therefore, we give the United States membership in the WEOG.

[4] Perhaps owing to this disenfranchisement with the organisation, many countries fail to pay their assessed contributions: as of the end of 2011, the UN was owed $454 million by member states (UN, 2012b).

against a resolution for a veto to be constituted. This improves both equity and efficiency, but the gains are still relatively modest. For instance, if this reform is accompanied with UNSC expansion by five or more members, then the efficiency gain is entirely eliminated. Accordingly, we fail to see that any of the reform proposals presently under consideration will (or should) break the reform impasse.

Earlier quantitative studies of UNSC reform include Hosli *et al*. (2011), O'Neill (1996), and Strand and Rapkin (2011). These studies, however, lack a formal theoretical framework for measuring equity in such bodies, or for addressing issues relating to region- and country-specific notions of equity. Instead, they use the voting power of a PM relative to a NPM as an informal indicator of equitability. The theoretical framework of developed by us in Gould and Rablen (2013) permits, for the first time, a formal quantitative assessment of the equitability of UNSC reforms for both individual countries and regions, and of how equity interacts with efficiency.

As in Gould and Rablen (2013), we allow for the UNSC decision rule to be ternary in nature. In contrast, the studies cited above, and many precursors in the literature (e.g., Shapley and Shubik, 1954; Straffin, 1983, 1993), model the UNSC decision rule as a binary rule in which members can vote only for or against a resolution. As discussed in Felsenthal and Machover (1997c) and Freixas and Zwicker (2003), however, the UNSC decision rule cannot be faithfully represented in this way. The difficulty is that the UN Charter states that decisions over non-procedural matters are made by an affirmative vote of nine or more UNSC members, including the *concurring* votes of the PMs. A "concurring" vote has come to be understood, in practice, as either an affirmative vote or an abstention (see, e.g., Blum, 2005: 636), so a negative vote by a PM is distinct from an abstention.

Last, in analysing reform of the UNSC, this paper contributes to the wider literature that uses measures of a-priori voting power to appraise reform options for international voting bodies. Examples include Felsenthal and Machover (1997b, 2001, 2004) and Leech (2002a), who analyse reform of the Council of the European Union; Manno (1966), Newcombe, Wert and Newcombe (1971), and Dixon (1983), who analyse reform of the UNGA; and Leech (2002b), Leech and Leech (2013), and Rapkin and Strand (2006), who analyse reform of the IMF Executive Board.

The plan of the paper is as follows: Section 2 sets out the theoretical framework; Section 3 outlines the structural reforms contained in the reform proposals of UN members; Section 4 details the simulation analysis; Section 5 presents the results; Section 6 considers whether the findings are robust to some alternative methodological assumptions; and Section 7 concludes.

2. Equity and Efficiency in the UNSC

The UNSC in its current form (and under the structural reforms we consider) may be represented as a Council Voting Game (CVG), in the sense proposed by us in Gould and Rablen (2013). In a CVG, a fully representative "assembly" allocates (by election or otherwise) members to a "council". For the purposes of this paper the assembly should be interpreted as the United Nations General Assembly (UNGA), the main deliberative body of the UN containing all 193 of its members, and the council should be interpreted as the UNSC.

In the context of the CVG describing the present arrangements, let *UNGA* denote the set of UNGA members, and $UNSC_t \subset UNGA$ denote the UNSC members (in year t). We partition *UNGA* into regional groups R_j, and we denote by a_{ij} the i^{th} member of region j. We also allow for the UNSC to have different membership categories, indexed by k. To encompass the various reform proposals, we allow membership categories to vary according to, for instance, the mode of granting UNSC membership (e.g., by right or by election), the length of term, the provision for immediate re-election, and voting rights. The present UNSC, for instance, has two membership categories: permanent and non-permanent. PMs are UNSC members in every year by Charter (NPMs by election to two-year terms) and have preferential voting rights in the form of an individual veto.

2.2 Equity Principles

In order to appraise alternative UNSC reform proposals we employ concepts of democratic equity that prescribe rules for the appropriate representation of countries and regions. These concepts can also be understood as egalitarian rules on the expected utilities of world citizens (see, e.g., Laruelle and Valenciano, 2010). Here we outline three such equity concepts based upon those we developed in Gould and Rablen (2013). We refer the interested reader to that paper for a more detailed discussion of the formal development and interpretation of these concepts.

We base our concepts of democratic equity upon an idealised three-stage decision-making process. In Stage 1, a national ballot is held in each country $a_{ij} \in UNGA$ under a simple majority decision rule. In Stage 2 a proper subset of countries are elected to the UNSC. In Stage 3, countries elected to the UNSC cast their vote according to the outcome of their national ballot in Stage 1.

Our first notion of equity we term expected ex-ante equity (EAE). According to EAE, it is desirable that, over time, the expected voting power of every world citizen is equal before the allocation of countries to the UNSC is made in Stage 2, i.e., one person, one expected vote

(OPOEV).[5] The ex-ante perspective acknowledges that the power of a world citizen in the UNSC depends not only on the voting power of his or her country when it is a member of the UNSC, but also on how frequently his or her country is a member.

We use two alternative concepts of ex-post equity. The first, which we term country ex-post equity (CPE), is that it is desirable that the democratic principle of one person one vote (OPOV) hold among the citizens of UNSC member countries, once these are known.[6] This concept is of particular relevance if UNSC members are viewed as representing their own populations, rather than their region at large.

Our second ex-post concept of equity, regional ex-post equity (RPE), is that it is desirable that the combined voting power of the UNSC members from each region be consistent with the level of representation that each region would obtain in a fully representative voting body satisfying OPOV.[7] This concept is of particular relevance if UNSC members are viewed as representing their region, rather than only themselves, for it entails that voting power be commensurate with the population of the region a country belongs to (rather than with its own country-specific population).[8]

The distinction between our ex-ante and ex-post notions of equity is analogous to the distinction made by scholars of law between "procedural" and "distributive" justice (e.g., Konovsky, 2000); and by scholars of psychology between "procedural" and "outcome" fairness (e.g., De Cremer *et al*., 2010). The EAE concept requires procedural equitability hold over time, but not outcome equitability, whereas CPE and RPE require outcome equitability, but not procedural equitability.

All three equity concepts not need apply to every council, or in equal degrees. In the case of the UNSC, however, we appear to observe evidence of a concern for each notion of equity. As discussed in the Introduction, both country- and regional-level equity concepts are frequently cited by reformers. In respect of ex-ante equity, it is notable that several of the reform proposals we consider leave the country voting powers unchanged, but modify the probabilities of membership, suggesting that world leaders understand (at least intuitively) the importance of membership probability as well as voting rights.

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[5] EAE is a mathematically weaker equity concept than the "ex-ante equity" (AE) concept we develop in Gould and Rablen (2013). AE requires that OPOEV hold at every point in time, whereas EAE requires OPOEV to hold over time on average. As we discuss further in footnote 22, the reason for using a weaker concept is that we are able to compute proximity measures for EAE, but not for AE.

[6] CPE is identical to the "ex-post equity" (PE) concept we define in Gould and Rablen (2013). The renaming here is purely for emphasis and clarity (see also footnote 7).

[7] RPE is identical to the "regional equity" (RE) concept we define in Gould and Rablen (2013).

[8] The logical ex-ante counterpart to RPE is that the combined expected voting power of the regional members be proportional to the level of representation that each region would obtain in a fully representative voting body satisfying OPOV. We do not consider this equity concept separately, however, for if a CVG satisfies EAE at time *t*, then the ex-ante counterpart to RPE is necessarily satisfied too. See Gould and Rablen (2013) for further details.

2.3 Equity Rules

To derive formal rules for each equity concept we make the following assumption:

Assumption 1 *Voting in Stage 1 is assumed, a-priori, to be independent within and across countries.*

As argued by, e.g., Felsenthal and Machover (1997c, 2003), Assumption 1 should be understood as reflecting Bernoulli's Principle of Insufficient Reason: a-priori we do not know how countries will actually vote. Empirically, countries on the UNSC do seem to act as distinct entities. Each member has full sovereignty over how it votes and countries pour large sums of money into campaigns for election (see, e.g., Malone, 2000), suggesting that they do not perceive membership by other countries to be a perfect substitute for their own membership. Also, the voting behaviour in the UNGA of serving members of the UNSC is no more similar to that of their regional members than to the votes of the remaining UNGA members (Lai and Lefler, 2009).

Let p_{ijt} be country a_{ij}'s ex-ante probability of gaining UNSC membership in year t (across all categories of membership). Denote the population (as of a fixed time) of country a_{ij} as q_{ij}, and let its relative voting power (according to a given notion of this concept) if a member of the UNSC be β_{ij}, where $\sum_{a_{ij} \in UNSC_t} \beta_{ij} = 1$.[9] As, when not a member of the UNSC, a country has a voting power of zero, the *expected voting power* of country a_{ij} is given by $\alpha_{ijt} = \beta_{ij} p_{ijt}$. The expectation of α_{ijt} over time we denote by $\bar{\alpha}_{ij} = \mathbf{E}_{t \in T}(\alpha_{ijt}) = \beta_{ij} \bar{p}_{ij}$, where $\bar{p}_{ij} = \mathbf{E}_{t \in T}(p_{ijt})$.

With this notation, and under Assumption 1, the EAE, CPE and RPE concepts are equivalent to the following conditions:

$$\text{EAE: } \bar{\alpha}_{ij} \propto \sqrt{q_{ij}}; \quad \text{CPE: } \beta_{ij} \propto \sqrt{q_{ij}}; \quad \text{RPE: } \sum_{a_{ij} \in UNSC_t \cap R_j} \beta_{ij} \propto \sum_{a_{ij} \in R_j} \sqrt{q_{ij}}. \qquad (1)$$

It was the inspiration of Penrose (1946) that, under Assumption 1, the condition for CPE in (1), which must hold for all countries, achieves the OPOV principle among the citizens of member countries of a voting body. The condition for EAE in (1) may then be understood as simply requiring the same square-root rule to hold, but this time for *expected* voting power. The condition for RPE in (1), which must hold across all regions, states that the combined voting powers of UNSC members from each region must be proportional to the sum of the square-root populations of the region members. This follows as, under Assumption 1, it holds that the

[9] The existing UNSC and all reforms we consider may be analysed without requiring country voting powers to be time-variant. See Gould and Rablen (2013) for a consideration of the more general case, however.

voting power of a region is the sum of the voting powers of the individual members. Hence, via Penrose's square-root rule, a region's voting power in a fully representative body satisfying OPOV is proportional to $\sum_{a_{ij} \in R_j} \sqrt{q_{ij}}$.[10]

In Gould and Rablen (2013) we show that no CVG can simultaneously achieve CPE and RPE, but that it is possible for a CVG to satisfy either both EAE and CPE, or both EAE and RPE.

2.4 Measuring Deviations from Equitability

It is desirable to be able to measure, in an objective sense, the proximity of a given CVG to each of our equity notions. Accordingly, we adopt the metric $d(\mathbf{X},\mathbf{Y}) = \frac{1}{2}\sum|X_i - Y_i|$, where $\mathbf{X}$ and $\mathbf{Y}$ are unit-vectors, which corresponds to the *index of distortion* used in Felsenthal and Machover (2004, 2007), and commonly attributed to Loosemore and Hanby (1971). We then define proximity measures on the unit interval (where unity indicates maximal proximity) for each of our equity concepts as

$$EAE = 1 - d(\boldsymbol{\alpha},\boldsymbol{\alpha}^{\text{EAE}}); \quad CPE = 1 - d(\boldsymbol{\beta},\boldsymbol{\beta}^{\text{CPE}});$$

where $\boldsymbol{\alpha}$ is the scaled $|A| \times 1$ unit vector of the $\bar{\alpha}_{ij}$; $\boldsymbol{\alpha}^{\text{EAE}} = \boldsymbol{\beta}^{\text{CPE}}$ is the scaled $|A| \times 1$ unit vector of the $\sqrt{q_{ij}}$; and $\boldsymbol{\beta}$ is the scaled $|A| \times 1$ unit vector of the β_{ij}. To define an analogous proximity measure with respect to RE we note that we may write

$$\sum_{a_{ij} \in UNSC_t \cap R_j} \beta_{ij} = n_{j,\text{PM}}\beta_{\text{PM}} + (n_j - n_{j,\text{PM}})\beta_{\text{NPM}}, \tag{2}$$

where $n_{j,\text{PM}}$ is the number of PM seats for members of region j and n_j is the total number of UNSC seats for members of region j. Hence, from equation (1), we define

$$RE = 1 - d(\textstyle\sum\boldsymbol{\beta},\boldsymbol{\beta}^{\text{RPE}}),$$

where $\sum\boldsymbol{\beta}$ is the scaled $|J| \times 1$ unit vector of the right-side of (2), and $\boldsymbol{\beta}^{\text{RPE}}$ is the scaled $|J| \times 1$ unit vector of the $\sum_{a_{ij} \in R_j} \sqrt{q_{ij}}$.

2.4.1 A summary measure

It is helpful for the purposes of comparison between reforms to have a single encompassing measure of equity. To present our main results we utilise a weighted average, or "utilitarian", measure of the form

[10] If Assumption 1 were replaced with the assumption that voting is correlated across countries within a region, but independent across regions, then a different concept would be required as regions would vote as blocs on the UNSC and, in general, the voting power of a bloc does not equal the sum of the individual voting powers of the members when voting independently.

$$E = \phi_{EAE}EAE + \phi_{CPE}CPE + \phi_{RPE}RPE,$$

where ϕ_i is the preference weight assigned to equity concept i, with $\sum_i \phi_i = 1$. If the preference weights of world-leaders were known, we would clearly utilise these. As, however, these are not known, we weight the concepts of ex-post and ex-ante equity equally to reflect this Bernoullian uncertainty. As we have two ex-post measures to one ex-ante, we halve the weight on ex-post measures, giving $\phi_{EAE} = ½$ and $\phi_{CPE} = \phi_{RPE} = ¼$. The findings arising under this choice of preference weights will not hold for all such choices, however. Accordingly, in Section 6 we discuss the main qualitative changes that arise as the weights are varied, and also show our results under an alternative "Rawlsian" measure for *E*.

2.5 Efficiency

Our notion of efficiency relates to the decision rule that governs whether UNSC resolutions pass or fail. As discussed in the Introduction, we assume a ternary decision rule: a map from the set of all possible votes by UNSC members (each member may vote either no, yes, or abstain) to an outcome (which is either "pass" or "fail"), that satisfies the monotonicity conditions set out in Felsenthal and Machover (1997c: Definition 2.2). The efficiency of a decision rule refers to the efficiency with which it responds to the preferences of the members. The more difficult, a-priori, it is for a resolution to pass, the lower the efficiency of the decision rule.

Our formal measure of efficiency is based on the ternary extension of the "power of a collectivity to act" (*PTA*) of Coleman (1971), which is the a-priori probability of a resolution being approved rather than blocked. For ternary decision rules this is given in Freixas (2012) as $PTA = \omega(3^N)^{-1}$, where ω is the is the number of divisions of the N UNSC members for which a resolution is passed.[11] As our remaining measures are scaled to the unit interval, but *PTA* lies on the interval (0, ½), we report 2*PTA* as our measure of efficiency.[12]

3. Proposed UNSC Reforms

[11] For a good introduction to *PTA*, and its relationship to the Banzhaf index, see Leech (2002c).

[12] The minimum and maximum possible values of *PTA* when there are N voters are $PTA_{min} = 3^{-N}$ and $PTA_{max} = ½\{1 - 3^{-N}\sum_{i=0}^{\lfloor 2^{-1}N \rfloor} N!(i!)^{-1}((N-i)!)^{-1}\}$. PTA_{min}, which converges to zero with N, is attained under the unanimity decision rule in which, for a resolution to pass, all members must vote in favour. PTA_{max}, which converges to ½ with N, is attained under the simple majority decision rule in which the simple majority is taken over all members that do not abstain.

Since the 1990s many different proposals for a second reform of the UNSC have been made.[13] A difficulty, however, with taking these reform proposals themselves as the unit of analysis is that most bundle several distinct reforms. Most reform proposals advocate expansion of the category of NPM alongside one-or-more "structural" reforms (for instance, the introduction of a new membership category).[14] Analysis of reform proposals is, therefore, unable to isolate the effects due to the structural reform from those due to expansion.

A more informative approach, which we adopt here, is to take individual structural reforms as the unit of analysis. We analyse eight structural reforms that encompass eleven reform proposals put forward by actors within the UN (Table 1).[15] A detailed description of each of the structural reforms in Table 1 is contained in Appendix 1, and of each of the reform proposals in Appendix 2. As we discuss further in Section 4, we initially impose each structural reform holding the size of the UNSC constant, so as to capture the pure effect of the structural reform. We then expand the resulting council along an "expansion path" to separately observe the effects of expansion.

The earliest proposed structural reform we consider is the creation of a new membership category that gives permanent membership of the UNSC, but not the right of veto (Permanent Non-Veto Member – PNVM). The "*2+3*" reform proposal, which, according to Davis (2010: 23), was put forward in 1995 by the Non-Aligned Movement (NAM), was one of the first to embrace the *PNVM* structural reform.[16] The creation of a PNVM category is also the only structural reform in the reform proposal of the "Group of Four" (G4), comprised of Brazil, Germany, India and Japan (G4, 2006); and the 1997 reform proposal of Ismail Razali (*Razali*), then Chair of the OEWG (OEWG, 1997).

Nearly all governments wish to abolish or limit the right of veto, which is viewed as an unfair and anachronistic legacy of the Second World War (Fassbender, 2004; Schwartzberg, 2003). It is widely believed, however, that the five PMs would resist any such change (Weiss and Young, 2005). The position of the African Union (AU) is, therefore, that although it opposes the right of veto, if some countries are to have the right of veto, then this right must be extended.

[13] See, e.g., Hassler (2013), Cox (2009) and von Freiesleben (2008) for recent qualitative reviews of these reform proposals.

[14] The UNSC has not increased in size in line with the growth in UN membership: the ratio of UNSC members to UN members has gone from 13.5 per cent in 1966, to only 7.8 per cent in 2012. Accordingly, there is widespread agreement on the need to expand the membership of the UNSC (although by what degree is hotly disputed).

[15] We focus on the structural reforms associated with reform proposals that are sufficiently concrete to be simulated. This rules out some recent, but vague, reform proposals such as those found in OEWG (2008) and in UfC (2010), and the two NAM reform proposals discussed in Weiss (2005: 18). We also ignore a number of structural reforms associated with UNSC reform proposals made by academics, notably Model C (Hoffmann and Ariyoruk, 2005), Model X (Hoffmann, 2006), the REP proposal of Hartwig (2008), and the reform proposals found in Russett, O'Neill and Sutterlin (1996), Schwartzberg (2003) and Strand and Rapkin (2010). We do this as, so far as we know, none of these reform proposals is under detailed consideration by UN members.

[16] For more on the origins of this reform proposal, see Fassbender (2004: 346) and Bourantonis (2005: 49).

Accordingly, the *AU* reform proposal (AU, 2005) has as its structural reform the extension of the right of veto to eleven UNSC members (*Veto+*). As a fall-back position, the AU has joined with several other states (Italy, Mongolia, Singapore and Tunisia), to advocate particular structural reforms aimed at weakening the right of veto. In particular, we analyse the Weak Veto reform proposal, (*WV*), which contains as its structural reform that at least two PMs must vote against a resolution for it to necessarily fail (*Veto–*).[17]

A further structural reform we consider is the redefining of the existing regional groups (*RR*). In 2003, the then UN Secretary-General set up the High-level Panel on Threats, Challenges and Change (HLP). The Panel's report (HLP, 2004) contains two different reform proposals – HLP_A and HLP_B – each incorporating a modified set of regions. While HLP_A additionally allows for PNVMs, HLP_B instead features two new structural reforms. First, it calls for a new category of long-term NPM seat (*Term+*) with a four-year term. Second, it proposes that the long-term NPM membership category allow immediate re-election (*Renew*) – at present, NPMs must allow one year before seeking re-election. Allowing renewable membership is also the principal structural reform in the reform proposal of the Uniting for Consensus (UfC) group (UfC, 2005) headed by Italy. In 2007 Panama put forward a reform proposal (*Panama*) that also allows for renewable membership, but with the twist that members elected to the UNSC for four consecutive terms would acquire PNVM status (Panama, 2007).

We consider two further structural reforms, each associated with Italy (which plays an especially active role in the UNSC reform debate). In Italy (2005) it published a reform proposal (*Italy*) that, as its structural reform, creates a new category of seat that rotates among the members of each regional group (*Rotate*). A more radical structural reform – regional members (*RM*) – is to create a category of seat held by a region, rather than by any individual country. In this vein, Italy has advocated the creation of a permanent European Union (EU) seat on the UNSC, endowed with the right of veto (the *EU* reform proposal).[18] In April 2011 this idea received the backing of the European Parliament, which passed a resolution stating that "...a seat in an enlarged UNSC remains a central, long-term goal of the European Union" (European Parliament, 2011).[19]

[17] Fassbender (2004: 351) and Wouters and Ruys (2005: 22) discuss further the origins of this reform proposal.
[18] See, e.g., Kirkup (2009).
[19] The EU already enjoys observer status in the UNGA under Resolution A/65/L.64/Rev.1 (UNGA, 2011). As an observer the EU has the right to speak at UNGA meetings and to present proposals agreed by EU members, but not the right to vote on resolutions and other substantive matters. Note that our *EU* reform proposal assumes that the veto for the EU replaces the separate vetoes presently wielded by France and the UK. It is unclear whether this is also envisaged by the European Parliament, or whether it seeks an EU seat in addition to the France and the UK retaining their existing PM status.

4. Simulation

In this section we detail our approach to simulating the UNSC under each reform process. The reader not interested in these details may skip this section.

4.1 Election to the UNSC

We begin by determining, for each region, the number of seats of each membership category that are vacant in a given year: as only a subset of UNSC members complete their terms in a given year, this is not unique. For instance, in the present UNSC the GRULAC and the WEOG both receive two NPM seats: the GRULAC elect one of their seats each year – the sequence {1,1} – whereas the WEOG elect both their seats in odd years, and hold no elections in even years – the sequence {2,0}. As, the WEOG aside, the remaining regions display a preference for temporal smoothing of vacancies we look (under each structural reform) for the set of sequences that makes maximally smooth the number of vacant seats per year within each region, and which also makes maximally smooth the total number of vacancies per year across regions.[20]

With the number of vacant seats decided, we specify an election procedure for membership categories that require members to be elected. At present, the UNGA simultaneously elects new NPMs to the UNSC in an annual ballot. In order to obtain a tractable model for purposes of simulation, however, we suppose that elections are conducted sequentially, with countries elected one-by-one to each membership category in turn. As countries that win UNSC membership in the category elected first become ineligible for election to the membership category elected second, and so on, we assume that the elections for each membership category are held in order of desirability, with seats belonging to the most desirable membership category elected first. This assumption rules out the possibility a country might not participate in the elections for the first membership category, so as to ensure eligibility for a later membership category. PNVM membership is deemed the most desirable, with further membership categories ranked by term length, followed by renewable status. The least desirable membership category – two years non-renewable – is therefore elected last.[21]

[20] Specifically, we employ a lexicographic procedure in which, first, we identify the sets of sequences that makes maximally smooth the number of vacant seats per year within each region. Second, among these sets of sequences, we identify those that maximally smooth the total number of vacant seats across regions. Last, if a unique set of sequences is not yet determined, a final choice is made according to a random draw from the remaining sequence sets.

[21] The *Rotate* structural reform is the introduction of ten regional rotating seats to replace the ten existing NPM seats. To analyse this structural reform, for each region, we draw the countries one-by-one without replacement under a uniform distribution to determine the order of rotation. In some instances a country may be elected to a more desirable membership category when its "turn" for a rotating seat comes, in which case its turn as a rotating

As in Gould and Rablen (2013), we model the $\bar{p}_{ij}$ as deriving from a (time-invariant) probability ρ_{ijk}, where $\sum_k \sum_{a_{ij} \in R_j} \rho_{ijk} = 1$, with which country a_{ij} will be elected to the UNSC in membership category k when in competition with all members of its region and if only a single seat is being elected. If, in year t, there are n_{jkt} seats of membership category k to be filled by new members from region j, then, in each of n_{jkt} rounds, there is a new realisation of a random variable that elects country a_{ij} with probability ρ_{ijkt}. The only complication is that countries cannot have dual membership of the UNSC, so, if the same country is elected in more than one round, the process is repeated again in full until distinct countries are elected. The probability, therefore, of country a_{ij} being elected to one of n_{jkt} seats in membership category k from a set of eligible countries E_{jkt} is given by

$$\frac{n_{jkt} \sum_{\substack{h_1 < \cdots < h_{n_{jkt}-1} \\ h_1, \cdots, h_{n_{jkt}-1} \neq i}} \rho_{ijkt} \rho_{h_1 jkt} \cdots \rho_{h_{n_{jkt}-1} jkt}}{\sum_{h_1 < \cdots < h_{n_{jkt}}} \rho_{h_1 jkt} \cdots \rho_{h_{n_{jkt}} jkt}}, \tag{3}$$

the sum in the numerator being over all n_{jkt}-subsets of E_{jkt} containing country a_{ij} and in the denominator being over all n_{jkt}-subsets of E_{jkt}. The numerator of equation (3) is the probability of observing a distinct country sequence of length n_{jkt} containing country a_{ij}, and the denominator is the probability of observing any distinct country sequence of length n_{jkt}. When a country is eligible for only one elected membership category then equation (3) corresponds to p_{ijt}. If, however, a country is eligible for more than one elected membership category, its p_{ijt} will reflect the probabilities with which it is elected to each of the membership categories for which it is eligible.[22]

How should the ρ_{ijk} be chosen? One perspective is that, for countries without a specified UNSC election probability in the either structural reform or the UN Charter, Bernoulli's Principle of Insufficient Reason applies. According to this Principle, the ρ_{ijk} for such countries should be set equal within each region. An alternative perspective is that past behaviour offers the best guide to future behaviour, in which case it is necessary to understand empirically the implied ρ_{ijk} arising from the current system of election to the UNSC. In Dreher *et al*. (2014) we detail the systematic determinants of election to the UNSC, accounting for the two-stage process by

member is delayed until its UNSC term has ended. Similarly, a country may be ineligible to serve on the UNSC when its "turn" for a regional seat comes, in which case its turn is delayed until it next becomes eligible.

[22] In this case the precise form of p_{ijt} is complex, as it must reflect all possible orderings in which a country could be elected to the UNSC. Moreover, the denominator of (3) will frequently contain a (prohibitively) large number of terms as the size of the UNSC is increased. With the individual p_{ijt} unobservable, we are unable to compute proximity measures for the AE concept we use in Gould and Rablen (2013). We are, nonetheless, able to compute proximity measures for the weaker EAE concept we employ here.

which members are presently elected.[23] The analysis finds that UNSC election is non-random, depending instead on three country characteristics: population, gross national income, and waiting time since last serving on the UNSC.[24] The estimated co-efficients for these three variables can be used in a straightforward way to compute estimates of the ρ_{ijk}.[25] These are presented in Appendix 3. Our main results are based upon this latter approach, but – as a robustness check – in Section 6 we re-run the analysis under the assumption that, within each region, the ρ_{ijk} for countries without a specified membership probability in either the structural reform or the UN Charter are equal.

4.2 Structural reforms and expansion path

We would like to distinguish the effects of each structural reform, *s*, separately from those of expansion. Therefore, we write the structural reforms in Appendix 1 such that each leaves the size of the UNSC unchanged at $N = 15$. We then create the CVG C_s associated with each structural reform *s*. For example, C_{PNVM}, is created from $C_{Present}$ by reducing by one the number of NPM seats for Africa, Asia, GRULAC and the WEOG in the present UNSC, and adding one new PNVM seat for each of these regions. Under each structural reform we denote the total number of UNSC seats (of all categories) belonging to region *j* with a vector $\mathbf{n}^0 = (n_1^0, n_2^0, \ldots, n_{|J|}^0)^T$.

To then observe separately the effects of expansion, we increase the size of the UNSC under each structural reform by adding new NPM seats one-by-one until $N = 30$.[26] Expansion of the UNSC is performed according to a probabilistic "expansion path". Specifically, for a given *s*, to allocate *x* new NPM seats we give each region $\gamma_{jx} = \lfloor \psi_j x \rfloor$ extra seats for sure, and consider all possible divisions of the remaining $h_x = x - \sum_j \gamma_{jx}$ seats.[27] Let an outcome of this procedure

[23] In the first stage, the regions make nominations to the UNGA and, in the second stage, the UNGA votes. See, e.g., Dreher *et al*. (2014) for further details.

[24] As noted by Lucas (1976), however, the parameter estimates of Dreher *et al*. may be conditional on the existing institutional arrangements. If so, they may no longer apply if these arrangements were to change.

[25] We obtain estimates of country population and gross national income per capita (current US$) for 2012 from the CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook/index.html#). We update Dreher *et al*.'s variable measuring waiting time since last serving on the UNSC (which ends in 2006 in their data) to 2012 using membership records from the UNSC Web site (http://www.un.org/Docs/sc). To produce the estimates in Appendix 3, these data, along with the co-efficient values for population, gross national income per capita, and waiting time since last serving on the UNSC reported in their Table 3a, are fed into their equation (5), where we assume that the sum in the denominator is over all countries in the region ($E_{jt} = R_{jt}$). We assume, a-priori, that election to new membership categories different from the existing NPM category, also follows the probabilities in Appendix 3, i.e., $\rho_{ijk} = \rho_{ij,\mathrm{NPM}}$ for all *k*.

[26] We do not analyse the cases $N > 30$ as there is broad agreement among UN members that, in order to be able to perform its role effectively, the UNSC must contain a limited number of members (e.g., Zifcak, 2006). The largest UNSC expansion advocated in the reform proposals we consider is 11 new members (*AU*), bringing total membership to $N = 26$ countries.

[27] Hence, we do not consider extreme divisions of seats to regions in which the number of new NPM seats given to one or more region deviates significantly from its expected value $\psi_j x$.

for a given x be represented by the vector $\mathbf{x}_x = (x_1, x_2, \ldots, x_{|J|})^{\mathrm{T}}$, where $\mathbf{1} \cdot \mathbf{x}_x = x$; and let $\Psi_{\mathbf{x}_x}$ be the set of all feasible $\mathbf{x}_x$ for a given x, i.e., $\mathbf{x}_x \in \Psi_{\mathbf{x}_x}$ if and only if $x_j \geq \gamma_{jx}$ for all $j \in J$. We assume a multinomial probability distribution over $\mathbf{x}_x \in \Psi_{\mathbf{x}_x}$ such that a given $\mathbf{x}_x$ is realised with probability

$$(h_x)! \prod_{j \in J} \frac{(\psi_j)^{x_j - \gamma_{jx}}}{(x_j - \gamma_{jx})!}. \tag{4}$$

Last, for each structural reform, we denote as $\mathcal{C}_x = \{C_{\mathbf{x}_x}\}_{\mathbf{x}_x \in \Psi_{\mathbf{x}_x}}$ the set of CVGs that enter into the computation of the expansion path at expansion x.

How to choose the ψ_j? According to the UN Charter, NPM seats on the UNSC should be given to regions according to the principle of "equitable geographical distribution" (Article 23(1)), but there is no agreed upon interpretation of this principle, however. Instead, we note that one of our equity concepts – RPE – makes a clear prediction regarding the division of council seats to regions. From equations (1) and (2), RPE requires that

$$n_{j,\mathrm{PM}} \beta_{\mathrm{PM}} + (n_j - n_{j,\mathrm{PM}}) \beta_{\mathrm{NPM}} \propto \textstyle\sum_{a_{ij} \in R_j} \sqrt{q_{ij}}. \tag{5}$$

As the left-side sums to unity across regions, (5) can be used to re-arrange for n_j^{RPE} as

$$n_j^{\mathrm{RPE}} = n_{j,\mathrm{PM}} + \frac{\sum_{a_{ij} \in R_j} \sqrt{q_{ij}} - n_{j,\mathrm{PM}} \beta_{\mathrm{PM}} \sum_{a_{ij} \in A} \sqrt{q_{ij}}}{\beta_{\mathrm{NPM}} \sum_{a_{ij} \in A} \sqrt{q_{ij}}} \tag{6}$$

We choose the ψ_j such that, for each s, the UNSC would attain the RPE concept at the maximal expansion $x = 193 - 15 = 178$. To do this, for each s, we (*i*) add 178 new NPM seats to $\mathbf{n}^0$ to give $\mathbf{n}^{178}$; (*ii*) compute β_{PM} and β_{NPM} for $\mathbf{n}^{178}$; (*iii*) use (6) to determine the n_j^{RPE} that implement RPE for $\mathbf{n}^{178}$, (*iv*) compute the vector of implied x_j: $\mathbf{x} = \mathbf{n}^{178} - \mathbf{n}^0$; and (*v*) set $\psi_j = (178)^{-1} x_j$.

4.3 Voting power and decision rule

As is by now conventional in the literature, we adopt the normalised Banzhaf index as our measure of relative a-priori voting power. Note, however, that we adopt the ternary interpretation of the normalised Banzhaf index, as set out by Felsenthal and Machover (1997c), rather than the more conventional binary interpretation. We compute the ternary normalised Banzhaf index using the method of generating functions (see, e.g., Freixas, 2012).

At present, the UNSC decision rule requires, as a necessary condition, that nine of 15 members vote in favour of a resolution for it to pass. It is only possible to retain the ratio 0.6 when N is divisible by five, however. One option, when N is not divisible by five, is to set the threshold

number of members required for a decision to pass, Q_N, such that the fraction $Q_N N^{-1}$ is made as close as possible to 0.6. This, however, introduces marked jaggedness into the results. Instead we adopt a probabilistic approach with mean $0.6N$. We assume $Q_N \geq \lfloor 0.6N \rfloor$ and $N - Q_N \geq \lfloor 0.4N \rfloor$ for sure, and allocate the remaining quantity $N - \lfloor 0.6N \rfloor - \lfloor 0.4N \rfloor$ to Q_N with probability 0.6, and to $N - Q_N$ with probability 0.4. Under this procedure, if $0.6N$ is an integer then $Q_N = 0.6N$; otherwise $Q_N = \lfloor 0.6N \rfloor$ with probability $\lceil 0.6N \rceil - 0.6N$, and $Q_N = \lceil 0.6N \rceil$ with probability $0.6N - \lfloor 0.6N \rfloor$. This is sufficient to remove much of the jaggedness associated with a deterministic Q_N.

4.4 Computation of Measures

For a given *s*, at every point on the expansion path ($x = 1,2,...,15$) we, first, realise the set of CVGs $\mathcal{C}_x$. We choose the number of years over which each CVG is realised in the following way. For every *x*, we perform a total of 100,000 realisations across the CVGs belonging to $\mathcal{C}_x$. We divide these 100,000 realisations equally between each CVG in $\mathcal{C}_x$ such that each CVG is realised over $100{,}000/|\mathcal{C}_x|$ periods.[28] Second, we compute an estimate of $\bar{p}_{ij}$ for each country from the realisations of each CVG. If a CVG is realised over *T* years, the estimated $\bar{p}_{ij}$ is computed as $\bar{p}_{ij}^T = T^{-1}\#_{a_{ij} \in \text{UNSC}}$, where $\#_{a_{ij} \in \text{UNSC}}$ is the number of realisations in which country a_{ij} is a member of the UNSC. We take the mean of the $\bar{p}_{ij}^T$ across realised CVGs according to the probabilities in (4) as our final estimate of $\bar{p}_{ij}$. Last, we then able, for each *x*, to compute $\boldsymbol{\beta}^{\text{CPE}}$, $\boldsymbol{\beta}^{\text{RPE}}$ and $\boldsymbol{\alpha}^{\text{EAE}}$ for each CVG in $\mathcal{C}_x$. Our final estimates of these measures are, again, the mean across realisations under the probabilities in (4). We are then able to compute *EAE*, *CPE* and *RPE* for each structural reform at each point on the expansion path.

5. Results

Our main results are shown in Figure 1. On the horizontal axis is our summary equity measure

[28] When $100{,}000/|\mathcal{C}_x|$ is not an integer we realise $\lceil 100{,}000/|\mathcal{C}_x| \rceil$ years. Precisely, for each CVG we realise marginally more than $\lceil 100{,}000/|\mathcal{C}_x| \rceil$ periods, but discard the very earliest periods. This is necessary as we begin each CVG with a UNSC containing just the PMs (with the remaining seats vacant). Hence, it requires a number of years before the elected UNSC becomes filled with members. The number of initial years we discard corresponds to twice the maximum term length.

E, and on the vertical axis is our efficiency measure *2PTA*. As, however, *2PTA* becomes very close to zero as the UNSC is expanded, we show the logarithm of *2PTA* for visual ease.

The left-most point of each expansion line in Figure 1 records the equity and efficiency of the unexpanded UNSC under each structural reform. Each expansion line is then is formed as the locus of equity and efficiency results we obtain as the membership of the UNSC is expanded according to the relevant expansion path. Accordingly, the right-most point of each expansion line records the equity and efficiency of the expanded council at the maximum expansion $x = 15$ under each structural reform. Comparison of the left-most points of each expansion line therefore reveals the pure effect of the structural reform separate from the effects of expansion. Comparison of the expansion lines away from the left-most point reveals the separate effect of expansion of the UNSC under each structural reform.

The equity and efficiency measures for each UNSC reform proposal appear in Figure 1 as a point estimate, marked "×". To help interpret the findings in Figure 1 we show, in Figure 2, the three components to our summary equity measure (EAE, CPE and RPE) on an expansion-by-expansion basis under each structural reform.

5.1 Structural reforms

We begin with an appraisal of the structural reforms (separate from the effects of expansion). We say that structural reform *i* "0-dominates" *j* if, at expansion $x = 0$, it holds that $2PTA_i > 2PTA_j$ and $E_i > E_j$, and that structural reform *i* "weakly 0-dominates" *j* if one or both of these inequalities is weak. We see in Figure 1 that the structural reforms fall into two categories: three alter both efficiency and equity (*RM*, *Veto+* and *Veto–*), but the remaining five alter equity only. Structural reforms in the latter category can, at best, weakly 0-dominate *Present*, but we find that three of the five are actually weakly 0-dominated by *Present*. Of the structural reforms in the former category, two strictly 0-dominate *Present*, and one is strictly 0-dominated by *Present*.

The only structural reform to be strictly 0-dominated by *Present* is *Veto+*, under which six existing NPM seats are replaced by six new PM seats. The effect of this structural reform upon efficiency is deleterious: it reduces the a-priori probability of a resolution being approved from one per cent at present to just 0.2 per cent, leaving the UNSC barely able to pass a resolution. *Veto+* also leads to a fall in overall equity: Figure 2 shows this to be the result of an improvement against CPE and RPE, but a worsening against EAE. The improvement against CPE arises as the veto right is awarded to countries such as India and Brazil who are presently heavily under-represented by this concept. The improvement in RPE arises as *Veto+* gives four

of the six new vetoes to countries from the under-represented regions of Africa and Asia. The worsening against EAE, which transpires to be the dominant effect, arises as *Veto+* concentrates (rather than dilutes) expected voting power in the hands of the countries selected to be new PMs.

Of the three structural reforms that are weakly 0-dominated by *Present*, the one that is weakly dominated by the remaining two such reforms is seen to be *PNVM*, under which four NPM seats are converted into PNVM seats. As this proposal affects only the membership probabilities, and not the voting powers, *PNVM* leaves proximity to the CPE and RPE concepts unchanged, but results in a worsening against EAE. The reason is, again, that the proposal concentrates (when it would ideally dilute) the distribution across countries of expected voting power.

The second worst of these three structural reforms is *Rotate*, under which NPM seats are replaced with seats that rotate within region. Like *PNVM*, *Rotate* alters only proximity to the EAE concept. The worsening against this concept arises as *Rotate* does not shift expected voting power away from the PMs to the remainder of the UN membership (as would be desirable), but instead re-allocates (equalises) expected voting power within those remaining members. This equalisation of expected voting power is counter-productive, for, under EAE, more populous countries warrant greater expected voting power than less populous countries.

The final structural reform in this group of three – which weakly 0-dominates *Rotate* and *PNVM*, but remains weakly 0-dominated by *Present* – is *Renew*, under which NPM seats allow re-election. Once again, *Renew* alters only proximity to the EAE concept. The worsening against this concept arises as permitting re-election benefits disproportionately those countries that gain election more often, but such countries already receive at least their share of expected voting power under *Status quo*.

Only two structural reforms weakly 0-dominate *Present*: *Term+* and *RR*. *Term+* allows for a new category of membership with a four-year term. As may be seen in Figure 1, however, the equity gain vis-à-vis *Present* at expansion 0 is so small as to be nugatory. To a first, approximation, therefore, the *Term+* structural reform at expansion 0 simply replicates *Status quo*. Under *RR* the five existing regional groupings would collapse to four. Voting rights are left unchanged, so the proposal does not alter *CPE*. *RR* does lead to a very slight improvement in proximity to the EAE concept, but the principal improvement is in proximity to the RPE concept. This improvement arises as *RR* disperses some of the excess representation of the WEOG by moving the United States and Canada into the Americas group, and countries such as Australia and New Zealand into the Asia and Pacific group.

RM, under which all EU members act as a single PM, is one of only two structural reforms that

0-dominate *Present*. By reducing the number of players that wield the right of veto from five at present to four (for the UK and France would no longer exercise separate vetoes) *RM* improves efficiency: it increases the a-priori probability of a resolution being approved from 1.02 per cent at present to 1.68 per cent. Although it worsens proximity to both CPE and RPE, *RM* leads to an overall improvement in equity, for it dilutes the distribution of expected voting power by reducing the number of PMs – which improves proximity to EAE in Figure 2a. Why does *RM* worsen CPE? The reason is that the voting power of a PM substantially under-represents these countries, giving them just 35 per cent of their voting power under CPE. *RM* additionally worsens proximity to the RPE concept, for the remainder (less EU members) of both the EE group and the WEOG become substantially over-represented.

The only other structural reform to 0-dominate *Present* is *Veto–*. Under *Veto–* two PMs would need to vote against a resolution for this to constitute an automatic veto. By reducing the blocking power of each PM, *Veto–* increases the a-priori probability of a resolution being approved to 2.21 per cent. As may be seen in Figure 2(a) the improvement in overall equity is due to a substantial improvement in ex-ante equity (EAE). This arises as *Veto–* succeeds in diluting the share of expected voting power held by the PMs by reducing their voting power. Note, however, that *Veto–* worsens proximity to the CPE concept (Figure 2b), which offsets some of the improvement against EAE in the summary measure of equity. The worsening against CPE may be explained as follows: in Gould and Rablen (2013) we find that the PMs exercise too *little* voting power, but exercise too *much* expected voting power. The implication of these joint findings is that UNSC reform should seek to erode the right of the existing PMs to be ever-present on the UNSC, rather seeking to reduce their voting power when UNSC members. Thus, *Veto–* reduces the expected voting power of the PMs in the "wrong" manner: by reducing their voting power rather than by reducing their time as a UNSC member.

5.2 Expansion

We now consider the effects of expansion. Strengthening the definition of 0-dominance, we say that structural reform i "expansion-dominates" j if it holds that $2PTA_i > 2PTA_j$ and $E_i > E_j$ for all expansions $x = 0,1,\ldots,15$. Recall that, in Figure 1, the UNSC under each structural reform is expanded so as to attain (in expectation) the RPE concept at expansion 178. Although there is some modest variation across structural reforms, the typical proportion of new NPM seats given to each region by this procedure is: Africa 27 per cent, Asia 38 per cent, EE nine per cent; the GRULAC 13 per cent and the WEOG 13 per cent. Under these proportions the first ten additional NPM seats would be allocated three to Africa, four to Asia, and one to each of EE, the GRULAC and the WEOG.

The effects of UNSC expansion are seen in Figure 1 to be similar under each of the different structural reforms:[29] it improves equity, but worsens efficiency. Our simulations show that equity is increasing, but concave, in the size of the UNSC, which indicates diminishing equity returns to expansion. Efficiency, however, is decreasing and convex in the size of the council, indicating that the marginal loss of efficiency from adding one additional NPM falls with the size of the UNSC. Thus, the largest marginal gains in equity from expansion are associated with the largest losses of efficiency.

One structural reform expansion-dominates all the remaining seven: *Veto–*. In this sense, this structural reform wins out among those we consider. The only other structural reform to expansion-dominate *Present* is *RM*. At the other end of the scale, *Veto+* is expansion-dominated by all the remaining seven structural reforms, making it, in this sense, the worst of the structural reforms we consider. Two further structural reforms are weakly expansion-dominated by *Present*: *PNVM* and *Renew*.

5.3 Reform proposals

Last, we consider our results for the reform proposals. We say that a reform proposal *i* "dominates" *j* if $2PTA_i > 2PTA_j$ and $E_i > E_j$. In Figure 1 we shade the space that is dominated by *Status quo* (the "south-west" corner), and the space that dominates *Status quo* (the "north-east" corner). Note that, in Figure 1, not all reform proposals lie on the expansion line of a particular structural reform. There are two reasons for this. Most straightforwardly, some reform proposals combine more than one structural reform, and therefore appear somewhere between the relevant expansion lines. Alternatively, a second reason is that some reform proposals imply expansion proportions (in terms of the proportion of new NPM seats that are allocated to each region) that are different from the "optimal" proportions we employ in the simulation.[30] Indeed, we find that none of the reform proposals considered fully exploits the potential equity improvements from expansion, typically because the proportion allocated to

[29] One exception is *Rotate*, which is 0-dominated (but not expansion-dominated) by *Renew*, *Term+* and *Present*. The reason *Rotate* generates stronger equity effects from expansion than, e.g., *Present*, is that it promotes a clean division of duties between membership categories: the more populous countries utilise the additional NPM seats, while the rotating seats substantially increase the membership probability (and therefore expected voting power) of the least populous countries (that, in Gould and Rablen (2013), we find to be substantially under-represented in an ex-ante sense).

[30] Two clarifications: first, the *EU* reform proposal in Appendix 2 reduces the size of the UNSC to $N = 14$ as France and the UK are no longer separate members. The *RM* structural reform in Appendix 1 adds back this lost member to retain the size of the UNSC at $N = 15$. The *EU* reform proposal therefore appears to the left of the left-most point of the *RM* expansion line in Figure 1. Second, as detailed in Appendix 2, *2+3*, *G4* and *Razali* each specify different numbers of new PNVM seats. Technically, we should treat the replacement of one NPM seat by a PNVM seat as a distinct structural reform from the replacement of two NPM seats by two PNVM seats, and so on. To reduce the number of lines in Figure 1, however, in Appendix 1 we simply define a single *PNVM* structural reform that replaces four NPM seats with four PNVM seats.

Asia is too low (relative to the optimal proportion of 40 per cent), and too high a proportion is given to either the GRULAC or the WEOG.

Only one reform proposal dominates *Status quo*: *WV*. Indeed, Figure 1 shows that it is possible to augment *WV* with expansion of the UNSC by up to four members and still dominate *Status quo*. It is not possible, however, to augment *WV* with expansion of the UNSC such that all the remaining reform proposals would be dominated. On its own *EU* does not dominate *Status quo*. Figure 1 indicates, however, that if it is augmented with expansion of the UNSC by one member (which moves us to the left-most point of the *RM* expansion line), then it too dominates *Status quo*, but not if expansion is by more than a single member.

Of the remaining nine reform proposals, each improves upon equity relative to *Status quo*, but worsens efficiency. Of these, only four – *2+3*, *HLP*$_B$, *Italy*, and *Panama* – are undominated proposals. Of the five reform proposals that are at least weakly dominated by at least one other proposal, the most heavily dominated is *AU*, which is dominated by four reform proposals. If world leaders were willing to reduce $Q_N N^{-1}$ – the proportion of the total votes required to be affirmative for a resolution to pass – as part of any reform proposal, then the point estimates in Figure 1 would all shift upwards. For a sufficient reduction in $Q_N N^{-1}$, some or all of these nine reform proposals would dominate *Status quo*. There appears, however, little appetite among world leaders to relax $Q_N N^{-1}$, which is why, in our simulation, we set it to be consistent with the current requirement that, as a necessary condition, three-fifths of members must vote in favour of a resolution for it to pass.

6. Robustness

The results of the previous section are predicated upon a number of assumptions. In this section we explore how our findings change under variants of these assumptions.

6.1 Equity Measure

The results of Section 5 are for a summary equity measure that employs a weighted average of *EAE*, *CPE* and *RPE*, with the weights chosen to reflect the a-priori uncertainty over their true values. We first discuss the implications of different weights, which may be assessed using Figure 2. According to panel (a) *Veto–* and *RM* would be the chief winners from a rule that placed a higher weight on the EAE concept, which would benefit the associated *WV* and *EU* reform proposals. The principal loser would be *Veto+*, and the associated *AU* reform proposal.

Conversely, *Veto+* would be the principal winner if more weight were placed on either the CPE or RPE concepts; and *RM* and the associated *EU* reform proposal, would be the principal loser.

A second perspective is to construct *E* in a different way. A prominent alternative is the "Rawlsian" measure *E* = min(*EAE*, *CPE*, *RPE*), the results under which are shown in Figure 3. The majority of the findings of the previous section remain. In particular, that *Veto–* 0-dominates *Present* is robust to the Rawlsian interpretation, and now *RM* also 0-dominates *Present* (and the associated *EU* reform proposal now dominates *Status quo*). *Present* continues to 0-dominate *Veto+*, and weakly 0-dominate *PNVM*, *Renew*, and *Rotate*. Turning to the reform proposals, *WV* continues to dominate *Status quo*, and the *2+3*, HLP_B, *Italy* and *WV* reforms continue to be undominated. The principal difference between results is that *Veto–* no longer expansion-dominates all other structural reforms, for it is held back by its weak performance against the CPE equity concept beyond a given degree of expansion.

6.2 Decision rule, voting power index, and membership probability

We now investigate the sensitivity of our qualitative findings to (*i*) the measurement of voting power; (*ii*) the representation of the UNSC decision rule; and (*iii*) the estimated membership probabilitiies. To address part (*i*) above we repeat the analysis of Section 4 using the principal alternative to the Banzhaf index of voting power – the (ternary) Shapley-Shubik index – as defined in Felsenthal and Machover (1997c). To address part (*ii*) we repeat the analysis with the (normalised) binary Banzhaf index.[31] To address part (*iii*) we repeat the analysis under the a-priori assumption that the ρ_{ijk} are equal within region for all countries without a specified membership probability within the UN Charter, or within the rules of the structural reform. We reason that if our qualitative results are robust to this (significant) perturbation of the estimated ρ_{ijk} in Section 4 then we may conclude that our results are not sensitive to the precise estimates employed.

The results of these three analyses are presented in Table 2, which summarises our findings for the structural reforms in respect of 0-dominance (part a) and expansion dominance (part b); and for dominance with respect to the reform proposals (part c). In Table 2a, for instance, a ">" in the i^{th} row and j^{th} column would imply that structural reform *i* 0-dominates *j* in the analysis of Section 4 and all three analyses (*i*)-(*iii*) above. Conversely, ">TB,SS,EP" would indicate that structural reform *i* 0-dominates *j* in the ternary Banzhaf (TB) analysis of Section

[31] The normalised binary Banzhaf index is computed using the method of generating functions applied to binary games (see, e.g., Bilbao *et al*., 2000). A good introductory account of these methods may be found in Leech (2002d).

4, in the Shapley-Shubik (SS) analysis of part (*i*), and in the "equal ρ_{ijk}" (ER) analysis of part (*iii*), but not in the binary Banzhaf (BB) analysis of part (*ii*).

Our key qualitative conclusions are robust to these additional analyses. We see in Table 2a that the finding that *RM* and *Veto*– 0-dominate *Present* is robust across all four analyses considered, as are the findings that *Present* 0-dominates *Veto+*, and weakly 0-dominates *PNVM* and *Rotate*. In Table 2b we see that *Veto*– expansion-dominates all other proposals across all four analyses, confirming this structural reform as the best among those we consider. *RM* also expansion-dominates *Present* in all four analyses. Under ER the *Present*, *Renew*, *Rotate* and *Term+* structural reforms become equivalent, so some weak-dominance relationships hold in both Tables 2a and 2b under ER that do not hold in the remaining analyses. In Table 2c, which considers the reform proposals, we see that *WV* always dominates both *Status quo* and *EU*, and is the only reform proposal that is undominated in each analysis, confirming its position as the most promising of the reform proposals we consider. *AU* is always dominated by four reform proposals *G4*, HLP_B, *Italy* and *UfC*; and HLP_B always dominates *AU*, *G4*, HLP_A, and *Razali*.

The analysis under SS is seen, however, to produce several dominance relations in Table 2c that do not hold in any of the three remaining analyses. This arises as, under SS, the voting power of a PM is much higher than under TB. Under, *Status quo*, for instance, a PM has almost exactly twice as much voting power as a NPM according to TB, but almost exactly 9.5 times as much voting power under SS. Accordingly, under SS, voting power shifts from the PMs to the remaining UNSC members much more slowly with expansion of the UNSC, making the analysis more pessimistic concerning the equity benefits of expansion. The point estimates of those reform proposals that expand the UNSC therefore shift to the left in Figure 1. The two reform proposals that do not expand the UNSC – *EU* and *WV* – therefore dominate additional reform proposals (and *WV* dominates all other proposals).

7. Conclusion

The UNSC plays an important role in ensuring global peace – the bedrock of macroeconomic stability. Although reform of the UNSC is one of the most pressing issues facing the international community, as yet no previous analysis has appraised the options for UNSC reform against formal equity and efficiency desiderata.

In this paper we present such an appraisal. Nearly all countries support expansion of the UNSC membership, but, so far, no expansion has taken place, as some countries worry that an expansion-only reform would be merely a "sticking plaster" that ultimately delayed the implementation of the deeper "structural" reforms needed for a lasting solution to the Council's

difficulties. On the basis of our analysis we agree that expansion at the levels currently under consideration will provide only modest improvements in equity, and will also come at the expense of efficiency, unless world leaders are also willing to relax the threshold for the proportion of members that must vote in favour of a resolution for it to pass. On the other hand, we find that at least two of the structural reforms under consideration – *PNVM* and *Renew* – seem sure to make the Council's woes worse rather than better, for in Table 1a both these proposals are weakly dominated by the present UNSC under all analyses. Also, the *Veto+* structural reform is (strictly) dominated by the present arrangements in our main results. As such, an expansion-only reform would be preferable to expansion with structural reform in these cases.

The most promising reform proposal among those we consider is one in which two PMs would have to cast a vote against a resolution for this to constitute a veto (*WV*). Its success owes to the fact that, by reducing the voting power of the PMs, it dilutes the distribution of expected voting power away from these countries. By contrast, many of the other reform proposals advocate structural reforms that fail to dilute the distribution of expected voting power, or even further concentrate it in the hands of the PMs (e.g., the African Union's proposal). But *WV* is still far from being "optimal" in respect of our equity concepts, for it reduces the expected voting power of the PMs by reducing their voting power, rather than by requiring them to lose their right to permanent representation. As such, *WV* conflicts with the CPE equity notion, under which the PMs (individually and collectively) warrant more voting power when a UNSC member.

Realpolitik would appear to impose heavily upon the set of feasible reforms. In the case of *WV*, the PMs would be reluctant to relinquish their veto right, and enjoy an apparently impregnable right of double-veto – they exercise a veto on all non-procedural matters and over whether matters should be treated as procedural or non-procedural (see, e.g., Köchler, 1995).

More generally, it has is recognised by political scientists that when the interests and responsibilities of the members of an organisation are not shared equally, the functioning of such organisations may be impaired if these inequalities are not reflected in the voting system.[32] This observation might stimulate future research into "second-best" reforms that are as proximate as possible to the equity concepts adopted in this paper, but which satisfy a "functionality" or realpolitik constraint. While this idea must await a proper treatment, we believe that the present contribution has at least clarified what (little) can be achieved with the

[32] The League of Nations and the International Trade Organization are two now deceased international organisations whose demise has been attributed to a failure to accommodate the interests of the United States and other Western powers in voting procedures (see, e.g., Zamora, 1980; Malone, 2004).

reform proposals presently on the table.

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Appendix 1: Structural Reforms

Reform	Details
PNVM	Four new PNVM seats (replacing one NPM seat for each of Africa, Asia, the GRULAC and the WEOG).[1]
Present	Implement no structural reform.
Renew	All NPM seats made renewable.
RM	All EU members act jointly as a single PM with the right of veto within the WEOG. One new NPM seat (to restore the UNSC to 15 members) allocated to regions according to the relevant expansion path (see Section 4.2).
Rotate	Ten seats that rotate among the region members (replacing existing NPM seats).
RR	New regional groupings: Africa, Asia and Pacific, Europe, and the Americas (three NPMs for Africa; 2.5 for each of the Asia and Pacific and the Americas; two for Europe).[2]
Term+	Eight seats with a four-year term (replacing two NPM seats for each of Africa, Asia and the GRULAC; one NPM seat for each of EE and the WEOG).
Veto+	Six new PM seats with the right of veto (replacing two NPM seats for each of Africa and Asia; one NPM seat for each of the GRULAC and the WEOG).[3]
Veto–	Two PM votes against a resolution required to form a veto.

[1] We assume that the PNVM seats are given to Nigeria in Africa, India in Asia, Brazil in the GRULAC, and Germany in the WEOG.

[2] These proportions are chosen to maintain, insofar as possible, the regional allocation of NPM seats between the existing five regional groups. The two NPM seats currently allocated to the WEOG are split one to Europe, and the other shared (rotated) between the Americas and Asia and Pacific (hence the fractional number of NPMs for these two regions). The new regional groupings are based on the report of the UN's High-level Panel on Threats, Challenges and Change (HLP, 2004). The report does not detail the precise membership of each group, but does indicate the number of countries belonging in each (allowing some inference to be made over the intended membership). We assume the Africa group to correspond to the existing Africa group; the Europe group to correspond to the existing EE group and the European countries in the WEOG; Asia and the Pacific to correspond to the existing Asia group with the addition of New Zealand and Australia; and the Americas group to correspond to the existing GRULAC plus Canada and the United States.

[3] As this structural reform is associated with the *AU* reform proposal we follow Appendix 2 (note 2) in assuming that the new PM seats are given to Nigeria and Egypt in Africa, India and Japan in Asia, Brazil in the GRULAC and Germany in the WEOG.

Appendix 2: Reform Proposals

Proposal	Details
2+3	Two new PNVM seats and three new NPM seats (one each for Africa, Asia and the GRULAC).[1]
AU	Six new PM seats with the right of veto (two each for Africa and Asia; one each for the GRULAC and the WEOG) and five new NPM seats (two for Africa; one each for Asia, EE and the GRULAC).[2]
EU	All EU members act jointly as a single PM with the right of veto.
G4	Six new PNVM seats (two each for Africa and Asia; one each for the GRULAC and the WEOG) and four NPM seats (one each for Africa, Asia, EE and the GRULAC).[3]
HLP$_A$	New regional groupings: Africa, Asia and Pacific, Europe, and the Americas. Six new PNVM seats (two each for Africa and Asia and Pacific; one each for Europe and the Americas). A total of 13 NPM seats (four for Africa and Americas; three for Asia and Pacific; two for Europe).[4]
HLP$_B$	New regional groupings: Africa, Asia and Pacific, Europe, and the Americas. Eight new renewable four-year seats (two for each region). A total of 11 NPM seats (four for Africa; three each for Asia and Pacific and the Americas; one for Europe).
Italy	Ten new regional rotating seats (three each for Africa and Asia; two for the GRULAC; one each for EE and the WEOG).[5]
Panama	Six new renewable five-year seats (two each for Africa and Asia; one each for the GRULAC and the WEOG). Any country elected for four consecutive terms to these new seats to become a PNVM.
Status quo	Do nothing.
Razali	Five new PNVM seats (two for Asia; one each for Africa, the GRULAC and the WEOG). Four new NPM seats (one each for Africa, Asia, EE, the GRULAC).[6]
UfC	All NPM seats to be renewable. Ten new renewable NPM seats (three each to Africa and Asia; two for the GRULAC; one each for EE and the WEOG).[7]
WV	Two PM votes against a resolution required to form a veto.

[1] According to Davis (2010), Germany and Japan were widely seen as deserving the two NPVM seats. We therefore allocate these seats on this basis.

[2] As the identities of the new PMs is not specified, we assume that the new PM seats are allocated to Nigeria and Egypt in Africa, India and Japan in Asia, Brazil in the GRULAC and Germany in the WEOG.

[3] We assume the six new PNVMs to be the same six countries assumed to be PMs in the *AU* reform proposal.

[4] We assume that the six new PNVMs are identical those in the *G4* reform proposal.

[5] Italy (2005) terms the ten new seats as "Regional" seats. Rotation is not proposed explicitly, but, according to Martini (2009: 7), is implicit in the Italian position.

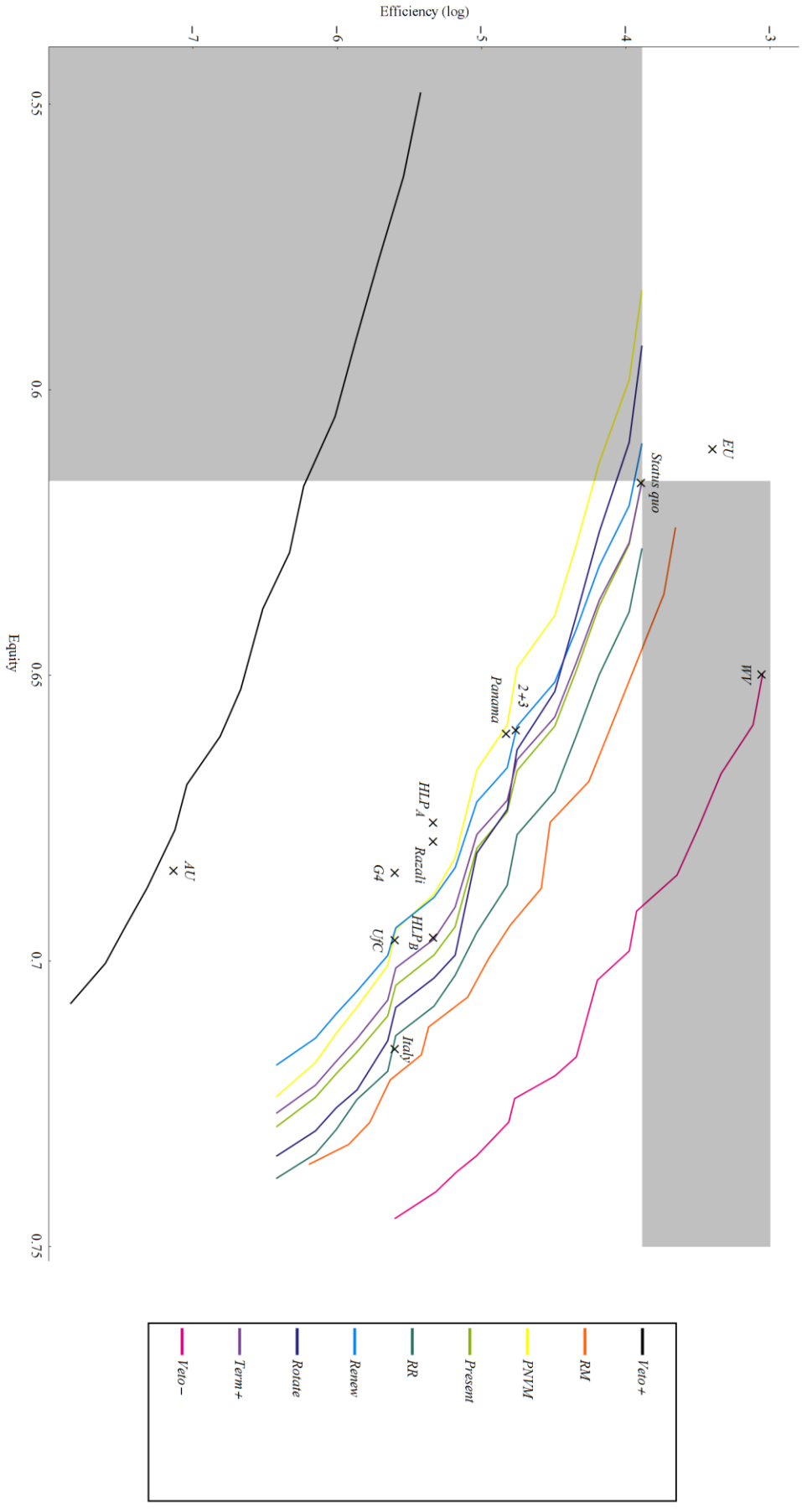
[6] Specifically, the reform proposal allocates two new PNVM seats to the "industrialized states". According to Macqueen (2010), these two seats were intended for Germany and Japan. The reform proposal then allocates one PNVM seat to "developing states" in Africa, Asia and the GRULAC respectively. We allocate these seats to Nigeria, India and Brazil respectively.

[7] The *UfC* reform proposal we examine here superseded two earlier reform proposals made by the UfC (the "Blue" and "Green" Models). For a discussion of these reform proposals see Hoffmann and Ariyoruk (2005).

Appendix 3: Estimated $\rho_{ij,\text{NPM}}$ (t = 2012)

Africa		Asia		EE		GRULAC		WEOG	
Algeria	0.0860	India	0.47728	Poland	0.3681	Brazil	0.34235	Germany	0.28949
Morocco	0.0501	Japan	0.12114	Ukraine	0.2470	Mexico	0.19389	Turkey	0.16346
Nigeria	0.0497	Pakistan	0.09212	Romania	0.1122	Venezuela	0.16637	Italy	0.11347
Egypt	0.0424	Malaysia	0.04707	Hungary	0.0591	Argentina	0.08081	Spain	0.07454
Ghana	0.0384	Republic of Korea	0.04376	Czech Republic	0.0525	Colombia	0.04673	Austria	0.07041
Tunisia	0.0377	Indonesia	0.03583	Belarus	0.0256	Chile	0.04251	Netherlands	0.04505
Tanzania	0.0376	Bangladesh	0.02381	Serbia	0.0227	Peru	0.02556	Canada	0.03614
South Africa	0.0336	Singapore	0.01899	Bulgaria	0.0191	Ecuador	0.01801	Sweden	0.03072
Zimbabwe	0.0329	Thailand	0.01732	Azerbaijan	0.0178	Uruguay	0.01334	Switzerland	0.02616
Zambia	0.0322	Jordan	0.01521	Slovakia	0.0145	Cuba	0.01019	Ireland	0.02483
Mozambique	0.0319	Philippines	0.01487	Croatia	0.0112	Dominican Republic	0.00765	Denmark	0.02285
Kenya	0.0319	United Arab Emirates	0.01314	Republic of Moldova	0.0078	Honduras	0.00712	Belgium	0.02184
Senegal	0.0309	Sri Lanka	0.01113	Georgia	0.0074	Costa Rica	0.00605	Finland	0.01849
Mali	0.0245	Iran	0.00657	Albania	0.0062	Guatemala	0.00538	Portugal	0.01692
Niger	0.0226	Saudi Arabia	0.00630	Lithuania	0.0060	Panama	0.00484	Norway	0.01666
Cote d'Ivoire	0.0220	Kuwait	0.00579	Slovenia	0.0052	Trinidad and Tobago	0.00458	Australia	0.01228
Guinea	0.0218	Myanmar	0.00518	Bosnia & Herzegovina	0.0047	Guyana	0.00415	New Zealand	0.01027
Congo	0.0218	Nepal	0.00516	Latvia	0.0037	Paraguay	0.00409	Greece	0.00497
Ethiopia	0.0213	Qatar	0.00462	TFYR Macedonia	0.0034	Jamaica	0.00381	Israel	0.00054
Angola	0.0198	Yemen	0.00414	Armenia	0.0034	Nicaragua	0.00371	Malta	0.00039
Libya	0.0189	Iraq	0.00332	Estonia	0.0019	Bolivia	0.00340	Luxembourg	0.00025
Uganda	0.0184	Vietnam	0.00324	Montenegro	0.0005	El Salvador	0.00165	Iceland	0.00007
Burkina Faso	0.0173	Oman	0.00323			Bahamas	0.00149	Monaco	0.00007
Malawi	0.0172	Kazakhstan	0.00257			Belize	0.00070	Andorra	0.00005
Madagascar	0.0170	Fiji	0.00203			Suriname	0.00061	San Marino	0.00004
Mauritania	0.0163	Cyprus	0.00200			Barbados	0.00046	Liechtenstein	0.00003
Sudan	0.0159	Papua New Guinea	0.00196			Haiti	0.00020		
Togo	0.0150	Syrian Arab Republic	0.00168			Antigua and Barbuda	0.00015		
Gabon	0.0147	Bahrain	0.00149			Saint Lucia	0.00013		
Benin	0.0136	Uzbekistan	0.00148			Saint Kitts and Nevis	0.00002		
Namibia	0.0124	Brunei	0.00092			St Vincent & Grenadines	0.00002		
Mauritius	0.0121	Lebanon	0.00082			Grenada	0.00001		
Cameroon	0.0104	DPR Korea	0.00076			Dominica	0.00001		
South Sudan	0.0098	Afghanistan	0.00075						
Botswana	0.0097	Cambodia	0.00062						
Sierra Leone	0.0087	Turkmenistan	0.00060						
Lesotho	0.0087	Mongolia	0.00048						
DR Congo	0.0082	Tajikistan	0.00044						
Eritrea	0.0072	Kyrgyzstan	0.00042						
Djibouti	0.0071	Laos	0.00040						
Gambia	0.0062	Bhutan	0.00033						
Central African Republic	0.0061	Maldives	0.00022						
Burundi	0.0059	Solomon Islands	0.00022						
Rwanda	0.0055	Timor Leste	0.00018						
Swaziland	0.0050	Tonga	0.00008						
Somalia	0.0048	Kiribati	0.00007						
Cape Verde	0.0045	Vanuatu	0.00007						
Comoros	0.0030	Samoa	0.00005						
Chad	0.0029	Micronesia	0.00003						
Guinea-Bissau	0.0024	Nauru	0.00002						
Liberia	0.0023	Marshall Islands	0.00002						
Sao Tome and Principe	0.0019	Tuvalu	0.00002						
Equatorial Guinea	0.0012	Palau	0.00002						
Seychelles	0.0005								

Estimates computed from Table 3a of Dreher et al. (2014). Countries are listed in descending order of probability.


Efficiency (log)
−3
−4
−5
−6
−7
Equity
0.55
0.6
0.65
0.7
0.75
EU
Status quo
WV
Panama
2+3
HLP A
Razali
G4
HLP B
UfC
Italy
AU
Veto +
RM
PNM
Present
RR
Renew
Rotate
Term +
Veto −

Figures

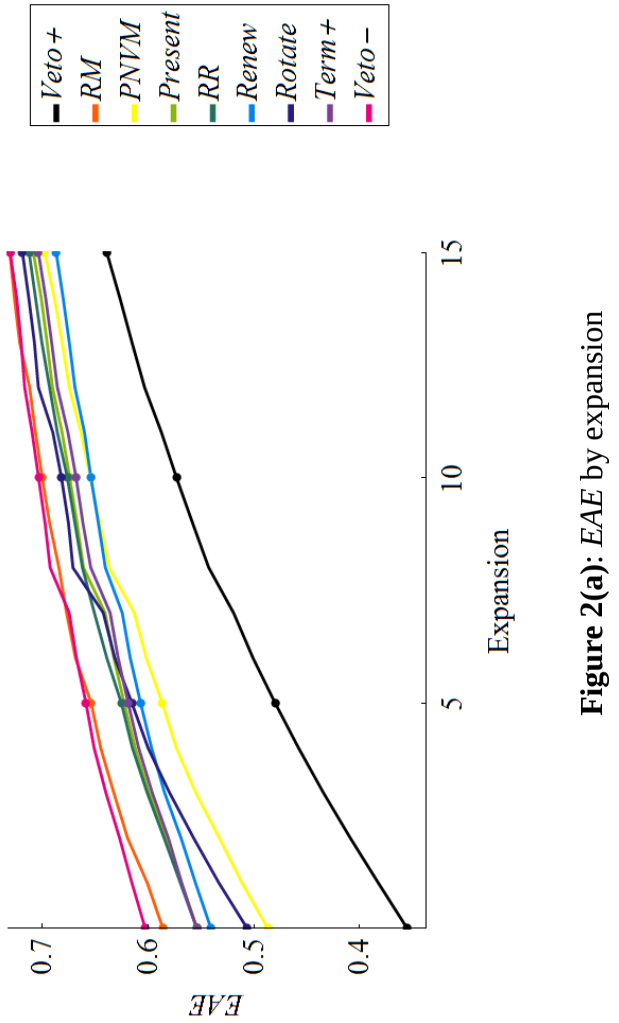


Figure 2(a): *EAE* by expansion

Figure 1: Equity and efficiency (normalised ternary Banzhaf index)

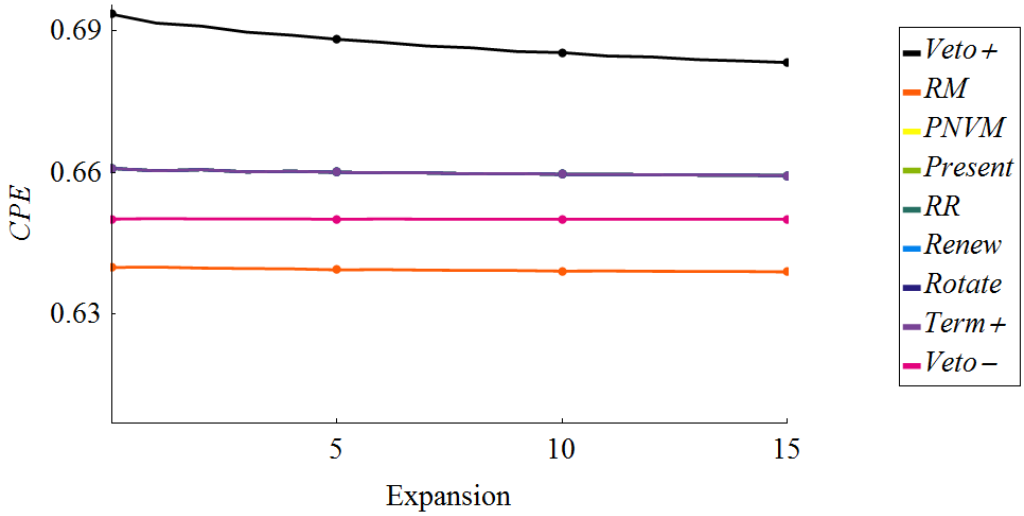


Figure 2(b): *CPE* by expansion

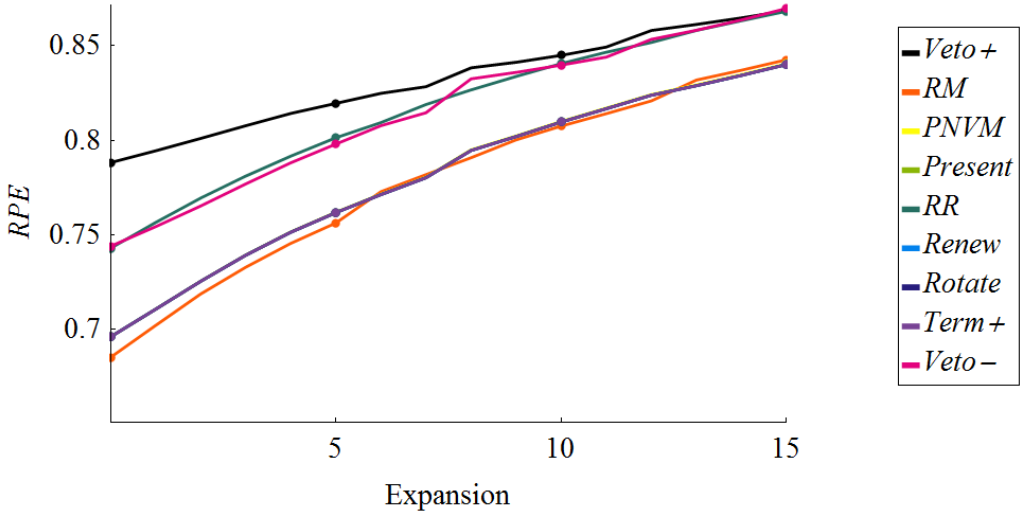


Figure 2(c): *RPE* by expansion

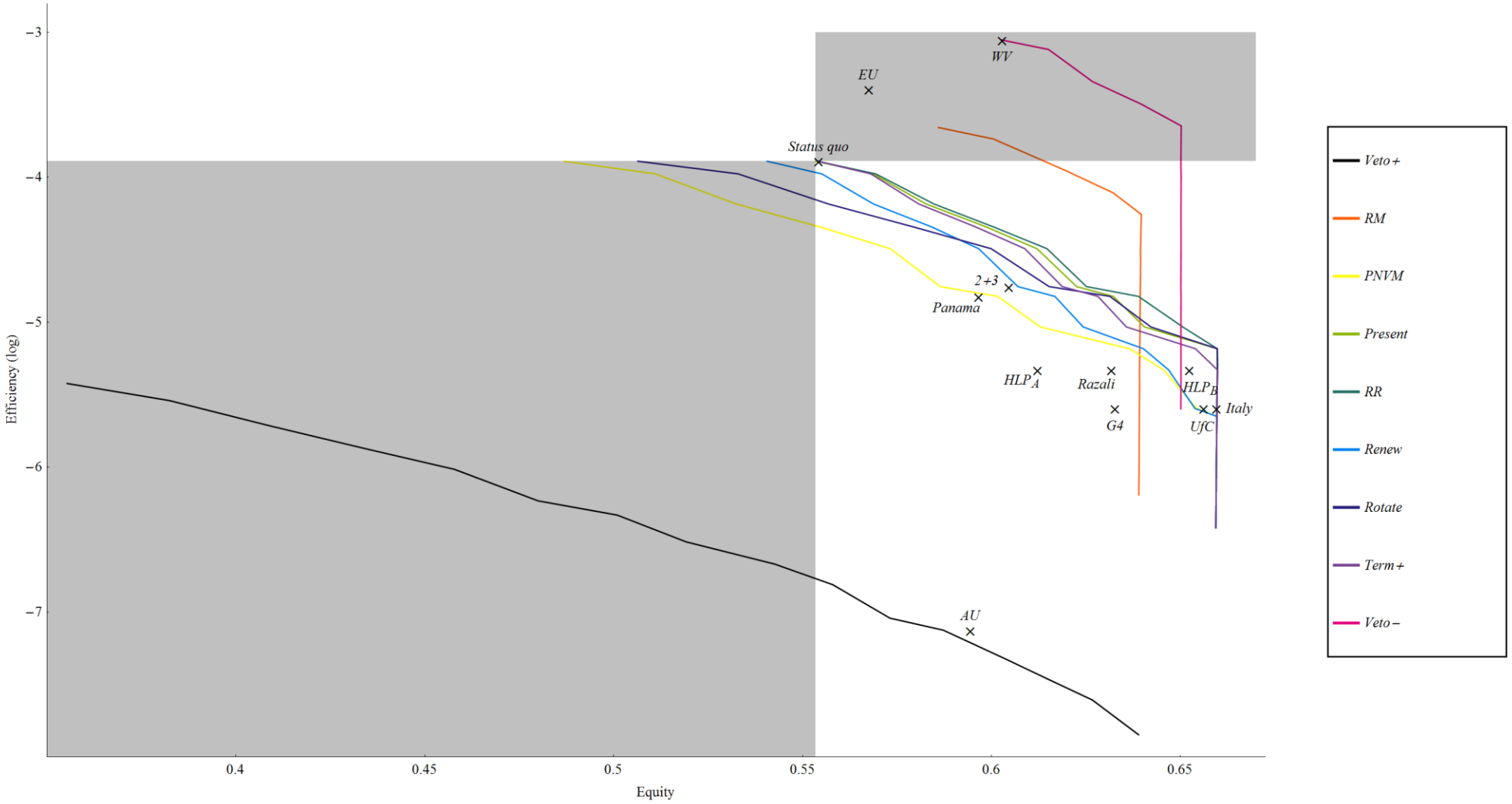


Figure 3: Equity and efficiency under Rawlsian *E* (normalised ternary Banzhaf index)

Tables

Structural Reform	Associated Reform Proposals
PNVM seats (*PNVM*)	*2+3*, *G4*, *HLP$_A$*, *Panama*, *Razali*
Renewable seats (*Renew*)	*HLP$_B$*, *Panama*, *UfC*
Regional members (*RM*)	*EU*
Regional rotating seats (*Rotate*)	*Italy*
Region re-allocation (*RR*)	*HLP$_A$*, *HLP$_B$*
Increase term length (*Term+*)	*HLP$_B$*, *Panama*
Expand right of veto (*Veto+*)	*AU*
Weaken right of veto (*Veto–*)	*WV*

Table 1: Structural reforms and associated reform proposals

	Veto+	*RM*	*PNVM*	*Present*	*RR*	*Renew*	*Rotate*	*Term+*	*Veto–*
Veto+									
RM	>		>	>	>BB,SS	>	>	>	
PNVM	>TB,BB,ER						≥BB,TS		
Present	>TB,BB,ER		≥			≥TB,ER	≥	≥ER	
RR	>		≥	≥		≥	≥	≥	
Renew	>TB,BB,ER		≥	≥ER			≥	≥ER	
Rotate	>TB,BB,ER		≥TB,ER	≥ER		≥ER		≥ER	
Term+	>TB,BB,ER		≥	≥TB,ER		≥TB,ER	≥		
Veto–	>	>	>	>	>	>	>	>	

Table 2a: 0-dominance (structural reforms)

	Veto+	*RM*	*PNVM*	*Present*	*RR*	*Renew*	*Rotate*	*Term+*	*Veto–*
Veto+									
RM	>		>TB,BB,SS	>	>BB,SS	>	>BB,SS,ER	>	
PNVM	>TB,BB,ER						≥BB,TS		
Present	>TB,BB,ER		≥TB,BB,TS			≥TB,BB,ER	≥BB,TS,ER	≥BB,ER	
RR	>		≥	≥		≥	≥	≥	
Renew	>TB,BB,ER		≥TS	≥ER			≥BB,TS,ER		
Rotate	>TB,BB,ER		≥TB	≥ER		≥ER		≥ER	
Term+	>TB,BB,ER		≥TB,BB,TS			≥TB,BB,TS	≥BB,TS,ER		
Veto–	>	>	>	>	>	>	>	>	

Table 2b: Expansion-dominance (structural reforms)

	2+3	*AU*	*EU*	*G4*	*HLP$_A$*	*HLP$_B$*	*Italy*	*Panama*	*Status quo*	*Razali*	*UfC*	*WV*
2+3		>BB,SS										
AU												
EU	>SS	>BB,SS		>SS			>SS	>SS	>BB,SS	>SS	>SS	
G4		>					≥SS				≥SS	
HLP$_A$		>BB,SS		>BB,SS			>SS			≥BB,SS	>SS	
HLP$_B$		>		>	≥		>BB,SS			≥	>BB,SS	
Italy		>		≥TB,BB,ER							≥TB,ER	
Panama		>BB,SS										
Status quo												
Razali		>BB,SS			≥TB,ER		>SS					
UfC		>		≥TB,BB,EP			≥BB,SS,ER					
WV	>BB,SS	>BB,SS	>	>SS	>SS	>SS	>SS	>BB,SS	>	>SS	>SS	

Table 2c: Dominance relations (reform proposals)