Equitable Representation in Councils: Theory and an Application to the United Nations Security Council

Matthew Gould[†]
matthew.gould@brunel.ac.uk

Matthew D. Rablen[†]
matthew.rablen@brunel.ac.uk

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Abstract

We develop a theoretical framework for equity in *council voting games* (CVGs). In a CVG, a fully representative voting body delegates decision-making to a subset of the members, as describes, e.g., the United Nations Security Council (UNSC). A general framework for analysing country- and region-level equitability in councils is developed under alternate assumptions regarding preference correlation and differing ex-ante and ex-post notions of equity. Allowing for a ternary set of voting possibilities in the council, we use our framework to evaluate the equitability of the UNSC, and the claims of those who seek to reform it.

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[†] Department of Economics and Finance, Brunel University London, Uxbridge, UB8 3PH, UK.

1. Introduction

Decision-making within international organisations is sometimes made by voting bodies that comprise a proper subset of the membership (a "council"). The pre-eminent such council, and the primary motivator of this paper, is the United Nations Security Council (UNSC), the only international body with the power to authorise the use of armed force. At any one time, the UNSC contains only 15 members from a total United Nations (UN) membership of 193. Two further councils operating within the UN are the United Nations Economic and Social Council (ECOSOC) and the United Nations Human Rights Council (UNHRC). ECOSOC contains 54 elected member countries at any one time and is responsible for coordinating the economic, social and related work of 14 UN specialised agencies including the World Bank and International Monetary Fund, while the UNHRC consists of 47 elected member states and is responsible for promoting and protecting human rights around the world.[1]

In this paper we develop a theoretical framework for analysing democratic equitability in such Councils. We then apply the theory to the UNSC. Existing studies of equity in international voting bodies are predicated on a two-stage democratic decision-making process – first a national vote, second an international vote – which anticipates that all members vote in the second stage. Applications include Felsenthal and Machover (1997a, 1997b, 2001, 2004, 2007), Laruelle and Widgrén (1998) and Leech (2002a) to the Council of the European Union; Napel and Widgrén (2006) to the European Parliament; Manno (1966), Newcombe et al. (1971), and Dixon (1983) to the UN General Assembly (UNGA); Leech (2002b), Leech and Leech (2013), and Rapkin and Strand (2006) to the IMF Executive Board; and Leech and Leech (2005) to the World Bank Executive Boards.[2] The UNSC stands out as the only major international body not to have been addressed by this literature.

What lies behind this lacuna? When international decision-making is by a council, the conventional democratic decision-making process cannot be applied directly for at least two reasons. First, only a subset of members votes in the second stage. Second, this subset is not

[1] Why do councils exist? In the case of military or emergency action, the lengthy deliberations of a fully representative body are thought to prevent such a body from being able to react with sufficient speed to developing security threats. Alternatively, councils may function in domains deemed to require detailed or specialised analysis (ECOSOC being an example). Councils can also arise at the national level. For instance, some countries have "Privy" or "Executive" Councils with the right to enact legislation during states of emergency, and/or committees that perform detailed tasks such as voting over proposed new legislation on a clause-by-clause basis prior to final approval by parliament.

[2] Applications to national legislatures include Miller (2009) and Banzhaf (1968) to the U.S. Electoral College; and McLean et al. (2005) and Dunleavy (2010) to the UK Parliament. Again, these bodies are fully representative.

usually constant over time.

The paper contributes to both the theory and application of democratic equitability in voting bodies.[3] In respect of theory, our first contribution is to formally define a council voting game (CVG), to describe the Councils empirically observed in the UN. In particular, we consider a setting in which a fully representative "assembly" allocates (by election or otherwise) members to a "council". Whereas a simple voting game (Shapley 1962) is fully described by a set of members and a decision rule that maps voting possibilities to an outcome, in a CVG the set of council members of the council is not a primitive, but rather derives as a function of four primitive elements, (A, N, R, P), where A is the set of members of the fully representative assembly; R is a regional partition on A (the UN membership is divided into five regions, for instance); N determines the number of council seats for members of each region, and P is a stochastic process that determines the probability with which each country is allocated to the council.

Like the existing literature, to analyse equitable representation we embed a CVG within a democratic decision-making process. In the conventional two-step process a national vote is held in the first stage under a simple majority rule, with a binary set of voting possibilities (for, against), and a dichotomous outcome space (pass, fail). We generalise this process to allow for, first, a three-stage process in which a national vote occurs in the first stage, countries are randomly allocated to the council in the second stage, and the council votes in the final stage. Second, we allow for the first stage to be a regional (rather than national) vote to study country and region notions of equity. Last, as abstention is distinct from a vote either for or against under the UNSC decision rule, we must allow for an outcome of the first stage vote that results in a country wishing to abstain from voting if allocated to the council.

Accordingly, we require only that the decision rule in the first stage be anonymous. In particular, when considering the UNSC we consider a democratic decision-making in which the national (or regional) vote in the first stage is under a trichotomous variant of the well-known majority threshold rule. Under this decision rule, for a motion to pass (fail), a fixed proportion of the eligible voters must vote in favour (against). Abstention in the council is identified with instances where a motion neither passes nor fails in the first stage vote. We prove an extension of Penrose's (1946) square-root law for the case in which the majority

[3] In particular, we contribute to the growing literature on the theory and application of ternary voting games (see, e.g., Birkmeier et al. 2011; Braham and Steffen 2002; Côrte-Real and Pereira 2004; Felsenthal and Machover 1997c; Freixas 2012; Freixas and Zwicker 2003, 2009; Herrera and Mattozzi 2010; Lindner 2008; Uleri 2002).

threshold is one-third of eligible voters.

Our basic normative notion of democratic equity – the equal probability criterion – is that, from behind a veil of ignorance as to what a citizen's preference is, and to which country they belong, a citizen should be equally likely to observe an outcome in the council that matches their personal preference. We define "ex-ante" and "ex-post" notions of this criterion. Ex-ante equity requires that the equal probability criterion hold among all world citizens before the allocation of countries to the council is known. This concept, therefore, depends upon both a country's voting power when a council member, and *how often* they are a council member. Ex-post equity requires that the equal probability criterion holds among the citizens of member countries of the council once allocation to the council is known.

We distinguish between equity at the country and region levels: the country-level equity concepts presuppose that, when a council member, countries represent only their own populations, whereas the region-level concepts presuppose that, when a council member, countries act as representatives of their region as a whole. We also develop further flavours of the equal probability criterion under different a-priori assumptions over intra-region preference correlation.

We characterise the implications for voting power and allocation probability under each equity concept. The country ex-post equity concept is satisfied under the assumption of random voting when a citizen's absolute voting power in the council is inversely proportional to their absolute voting power in the Stage 1 ballot. Country ex-ante equity requires the same condition to hold, but on the expected voting powers before the allocation of countries to the council is known. Regional equity under random voting requires that a citizen's absolute voting power in the council (when each region votes as a bloc) is inversely proportional to their absolute voting power in a regional ballot. When, however, preferences within regions are fully correlated, regional equity requires that each regional bloc attain the same voting power on the council (regardless of its population).

Our different equity concepts are not, in general, mutually compatible. We find that, barring some empirically unlikely cases, our notions of equitable representation for countries are incompatible with our notions of equitable representation for regions. As such, a CVG that is equitable if council members only represent themselves (as opposed to their region) will necessarily fail to achieve equitable regional representation, and the reverse also holds.

With respect to application, our paper is the first we are aware of to present a quantitative

assessment against formal equity concepts of the equitability of the UNSC for both individual countries and regions. As we discuss in more detail in Section 3, the UNSC is witnessing a protracted reform debate that centres on national and regional representation (see, e.g., Franck 2003). At the regional level, reformers argue that Africa and Asia have too little power, and there is a claimed north-south divide. At the national level, countries such as Germany and Japan – who are only eligible for Non-Permanent Member (NPM) status on the UNSC – claim to be severely under-represented, and the Permanent Members (PMs) – who wield an individual veto – are argued to have too much representation.

Our findings suggest more nuanced conclusions for the UNSC reform debate. For instance, we do not find that the PMs receive too much voting power, at least according to our country ex-post equity concept – indeed these countries are in some cases substantially under-represented. We do, however, find that the right to be ever-present on the UNSC makes PMs substantially over-represented in the metric of *expected* voting power. Accordingly, reform proposals should offer PMs *more* voting power when council members in return for losing the right to be ever-present. Our regional equity concept shows that Africa and Latin America (but not necessarily Asia) are under-represented, and that north/south inequity exists. Within this picture, however, some countries in these regions actually receive too much voting power when a council member.

Our equity concepts provide little support for the notion that the power of veto should be abolished; indeed some entail countries receiving substantially higher voting power than do PMs under the present arrangements. We find, however, that no country is a veto player when a member of the UNSC *and* ever-present on the UNSC under our concepts. The analysis also suggests a case for allocating the right of veto to a different set of countries, and for a re-allocation of the number of seats allocated to each region.

The plan of the paper is as follows: Section 2 develops a theoretical framework for the analysis of democratic equity in councils; Section 3 presents an application of the theory to the UNSC; and Section 4 concludes. All proofs are located in Appendix 1.

2. Theory

In this section we consider a setting in which a fully representative "assembly" allocates members to a "council". As with other aspects of the model, this setting is intended to mirror

the structure observed within the UN, in which context the assembly should be interpreted as the UNGA, the main deliberative body of the UN containing all 193 of its members, and the council could refer to, e.g., the UNSC, ECOSOC, or UNHRC. As in the UNGA, we partition the assembly membership into regional groups. Countries are then allocated to the council in fixed proportions from each of the regions.

2.1 Council Voting Games

In this section we formally develop a class of voting game we term a *council voting game* (CVG). We begin by describing the elements of a CVG.

Let the (fully-representative) assembly be denoted as the finite set A. We write $A = \cup_j R_j$, where R_j is the j^{th} region, $j \in J$. The set $\{R_j\}_{j \in J}$ we denote R. Each region is a set of countries and we define a_{ij} as the i^{th} country within R_j.

The number of council seats for the members of each region j is given by n_j, where it is assumed that the number of seats for each region is always smaller than the size of the region, $|R_j| > n_j$. The set $\{n_j\}_{j \in J}$ we denote N.

Rather than specify a procedure by which countries are allocated to the council, we adopt a reduced form representation that allows for any such procedure. An *allocation process* P is a stochastic process that induces, for every motion k on which the council must vote, a probability p_{ijk} that country a_{ij} is allocated to the council for that vote. Under P, the average allocation probability of country a_{ij} on an infinite set of motions $k \in K$ is given by $\bar{p}_{ij} = \mathbf{E}_K(p_{ijk})$.

The above elements together constitute a function that determines the set of council members (M) that vote on a given motion: $M(A, N, R, P)$. The set of council members that vote on motion k is denoted M_k, and we denote by M_{jk} the intersection $M_k \cap R_j$.

Votes in the council are decided according to a *decision rule* U which is a mapping from the space of voting possibilities to an outcome space satisfying appropriate monotonicity conditions (see, e.g., Freixas and Zwicker 2003). We may now define a CVG in two parts:

Definition 1 *A council voting game is the pair* $C = (M, U)$.

2.2 Equity in CVGs

In order to understand the equity properties of a CVG it must be embedded into a democratic decision-making process which maps the preferences of each citizen to an outcome. We now develop alternative models of the democratic decision-making process.

2.2.1 The democratic decision-making process

The first bifurcation distinguishes between "country" processes (CDP) and "region" processes (RDP) Under CDP countries on the council represent only their national population, allowing us to investigate equity at the country level. Under the region process (RDP) countries act on the council as regional representatives, permitting us to investigate equity at the level of regions.

For a given motion k, the CDP comprises three stages. In Stage 1, a national ballot is held in each *country*. In Stage 2 a subset $M_{jk} \subset R_j$ of countries are allocated to the council from each region. In Stage 3, countries $a_{ij} \in M_k$ cast their vote in the council according to the outcome of their national ballot in Stage 1. In contrast, in the RDP, a single *regional* ballot is held in each region in Stage 1. In Stage 2 a subset $M_{jk} \subset R_j$ of countries are allocated to the council from each region. In Stage 3, countries $a_{ij} \in M_{jk}$ vote as a bloc, each bloc member voting according to the outcome of the regional ballot in Stage 1.

We denote the population of country a_{ij} as $q_{ij} \in \mathbb{N}$, and the population of region j as $q_j \equiv \sum_{a_{ij} \in R_j} q_{ij}$. We assume that the decision rule in Stage 1 is anonymous, such that every citizen of a country obtains the same voting power. Under this assumption, each citizen of country a_{ij} receives an absolute voting power of $\varphi_{ij} \equiv \varphi(q_{ij})$ under the CDP, and each citizen of region j receives an absolute voting power $\varphi_j \equiv \varphi(q_j)$ under the RDP.[4]

2.2.2 Preferences

We consider two possible configurations of citizen preferences: uncorrelated preferences (UP) and perfectly correlated preferences (FP). Under UP every world citizen votes independently, and is equally likely to vote for each of the given voting possibilities. In contrast, under FP all citizens of region j have an identical preference, such that (i) voting is perfectly correlated across citizens within a country; and (ii) country voting outcomes are perfectly correlated across countries within a region. On a given motion, however, each voting possibility is equally likely to be the one chosen unanimously by all regional citizens. In this way, voting outcomes between regions remain independent. Accordingly, under FP,

[4] The absolute voting power of a citizen is here defined as the probability that the citizen changes the voting outcome when moving from voting "for" to voting "against".

countries act as regional blocs on the council, with each bloc voting independently of the others.

Neither UP nor FP are, in themselves, satisfactory assumptions: if voting is uncorrelated within regions, then the very notion of a region is arbitrary, while if the countries in each region have identical preferences then the distinction between country and region equity is nugatory. Nonetheless, these two cases bound the more realistic cases involving some intermediate level of correlated preferences within regions.[5]

2.2.3 Equity concepts

Our basic normative notion of democratic equity is that, from behind a veil of ignorance as to what the citizen's preference is, and to which country they belong, a citizen should be equally likely to observe an outcome in the council that matches their personal preference. For brevity, we term this the *equal probability* criterion.[6,7] We posit two alternative perspectives on this criterion. The first, ex-ante equity (AE), is that the equal probability criterion should hold *before* the allocation of countries to the council occurs. The AE perspective acknowledges that the democratic power of a world citizen in the council depends not only on the voting rights of his or her country when it is a member of the council, but also on how frequently his or her country is a member of the council.[8] In its strong form, AE requires that the equal probability criterion hold (in an ex-ante sense) for each and every motion. Its weak form, however, allows for deviations from the equal probability criterion in any one ballot, so long as deviations offset across an infinite sequence of ballets.

The second, ex-post equity (PE), is that the equal probability criterion should hold among the citizens of countries $a_{ij} \in M$ *after* the allocation of countries to the council has occurred. As the PE perspective upholds the equal probability criterion only for citizens whose countries gain representation in Stage 3 it does not require that the criterion hold ex-ante. The distinction between the AE and PE perspectives is analogous to the distinction made by scholars of law between "procedural" and "distributive" justice (e.g. Konovsky 2000); and by

[5] In particular, as argued by, e.g., Felsenthal and Machover (1997c, 2003), UP can be understood as reflecting Bernoulli's Principle of Insufficient Reason: a-priori we do not know how countries will actually vote.

[6] We rule out the existence of citizens who are perfectly indifferent. As discussed in Côrte-Real and Pereira (2004), if such citizens exist, their preferences can, in any case, be safely ignored.

[7] Under the assumption of random voting the equal probability criterion yields identical insights to the more familiar equalisation of voting power criterion. However, the former criterion proves to have applicability to the case in which voting is fully correlated within regions, in which the equalisation of voting power criterion breaks down.

[8] It is notable that several of the proposals for reform of the UNSC detailed in Cox (2009) leave the country voting powers unchanged, but modify the allocation probabilities, suggesting that world leaders understand (at least intuitively) the importance of allocation probability as well as voting rights.

scholars of psychology between "procedural" and "outcome" fairness (e.g. De Cremer et al. 2010). The AE perspective is one of procedural equitability, whereas the PE perspective is one of outcome equitability.

In this framework there are, in principle, twelve different flavours of our core equity concept depending the perspective (strong ex-ante, weak ex-ante or ex-post); the decision-making process (country or regional), and the correlation of preferences (uncorrelated or fully correlated). In spite of this apparent complexity, it transpires that the analysis may be reduced to just five cases. First, as each is region is always represented on the council, the distinction between an ex-ante and an ex-post notion of equity does not arise when considering regional equity. In this case one may therefore restrict attention to the PE perspective. This gives two flavours of region equity, one under UP (RUP) and one under FP (RFP). Second, under FP, countries have identical preferences to those of their region, so the same equity rules emerge under either the CDP or RDP. Thus, when considering country equity, we may restrict attention to the case of UP. This gives three country flavours: one under strong AE (CUA_s), one under weak AE (CUA_w), and one under PE (CUP).

2.2.4 Equity concepts – a formalisation

We now define indices of absolute voting power on *C*. Under the CDP voting power must be defined at the level of countries. In this circumstance, let the absolute voting power of country a_{ij} under the decision rule *U* if allocated to the council be denoted ω_{ij}.[9] Under RDP and/or FP, however, council members vote as regional blocs. In this circumstance, let the absolute voting power of the bloc representing region *j* under *U* be denoted ω_j.

Proposition 1 *With respect to a given democratic decision-making process,*

(i) *C is CUP if and only if* $\varphi_{ij}\omega_{ij} = \overline{\varphi\omega}$ *for all* a_{ij}*;*

(ii) *C is* CUA_s *if and only if* $p_{ijk}\varphi_{ij}\omega_{ij} = \overline{p\varphi\omega}_k$ *for all* a_{ij} *and all* $k \in K$*;*

(iii) *C is* CUA_w *if and only if* $\overline{p}_{ij}\varphi_{ij}\omega_{ij} = \overline{p\varphi\omega}$ *for all* a_{ij}*;*

(iv) *C is RUP if and only if* C^{t_0} *satisfies* $\varphi_j\omega_j = \overline{\varphi\omega}$ *for all j;*

(v) *C is RFP if and only if* C^{t_0} *satisfies* $\omega_j = \overline{\omega}$ *for all j*;

[9] Note that a country's absolute voting power on the council, ω_{ij}, is motion-invariant, yet its relative voting power, $\omega_{ij}/\sum_{a_{ij}\in M_k}\omega_{ij}$, varies from motion to motion.

where

$$\overline{\varphi\omega} = \mathbf{E}_A(\varphi_{ij}\omega_{ij});\ \overline{p\varphi\omega}_k = \mathbf{E}_A(p_{ijk}\varphi_{ij}\omega_{ij});\ \overline{p\varphi\omega} = \mathbf{E}_A(\overline{p}_{ij}\varphi_{ij}\omega_{ij});\ \overline{\varphi\omega} = \mathbf{E}_J(\varphi_j\omega_j);\ \textit{and}\ \overline{\omega} = \mathbf{E}_J(\omega_j).$$

Part (*i*) of Proposition 1 asserts that, under CUP, the equal probability criterion requires that voting power on the council be allocated in inverse proportion to voting power in Stage 1, such that the product $\varphi_{ij}\omega_{ij}$ is equal across countries.

Unlike the remaining equity concepts, CUA does not relate exclusively to the properties of the decision rule *U*, but is rather a property of the interaction between *U* and the (stochastic) allocation process *P*. To meet CUA in its strong form it must hold that, for any and every motion, expected voting power on the council is allocated in inverse proportion to a citizen's voting power in Stage 1. In its weak form, CUA requires an understanding of the long-run average properties of the allocation process, as summarised by $\overline{p}_{ij}$ – the average allocation probability of country a_{ij}. CUA is met in its weak form if, on average, expected voting power on the council is allocated in inverse proportion to a citizen's voting power in Stage 1.

There are many divisions of voting power and allocation probability that achieve strong CUA: if the p_{ijk} are equal across countries (a flat rule) then it holds if voting power in the council is proportional to $1/\varphi_{ij}$. An alternative possibility is that voting power in the council obeys a flat rule, and the allocation probabilities are proportional to $1/\varphi_{ij}$.[10] Weak CUA additionally permits inter-temporal shifting of allocation probability, such that a country might, for instance, have guaranteed representation on the council in a given period in return for a reduced allocation probability in later periods.

It is straightforward to observe that under a flat rule for allocation probability the condition for CUA_s coincides with that for CUP. The CUA and CUP concepts are compatible, therefore, but only in this special case. When, however, some countries desire to be council members on a more regular basis than are others, then unequal allocation probabilities are required. With unequal allocation probabilities, strong CUA implies that a country with a lower allocation probability in a given period must, by way of compensation, receive a higher voting power on the council if it is allocated. In this case, CUA is in conflict with CUP. A similar argument applies to weak CUA: a country with a lower *average* allocation probability

[10] Both these examples are monotonic in the sense that more populous countries receive a weakly higher absolute voting power and allocation probability. We note, however, that CUA_s is also satisfied by a range of less empirically plausible rules in which, e.g., allocation probability is decreasing in population and voting power is a function of population that increases faster than $1/\varphi_{ij}$.

must be compensated for longer expected spells outside the council by the exercise of greater voting power when a member of the council.

Part (*iii*) establishes that, under RUP, the voting power of regional blocs on the council must be in inverse proportion to the voting power of a citizen of the bloc in Stage 1. The intuition is that, when voting in Stage 1 is on a regional basis, the likelihood that a citizen is on the winning side is a function of the region population, not the relevant national population. Last, part (*iv*) establishes that RFP implies that each regional bloc should have equal voting power, regardless of the population they represent. To see this, note that the probability that a citizen's preferences are matched by the outcome of Stage 1 is exactly one. To attain the equal probability criterion, therefore, each regional bloc must have the same probability of swinging the vote in Stage 3, which implies a flat rule for voting power.

Is RUP compatible with CUP? There is a complex relationship between the voting power of a bloc and the sum of the voting powers of its individual members when voting independently (see, e.g., Leech and Leech 2006). In general, this relationship is non-linear (and so also non-additive), yet compatibility of CUPE and RUPE requires a proportional relationship to hold between the two. While artefactual examples can be constructed with this property, the probability of such a relationship holding in an empirical example seems remote. Accordingly, under UP, country and region equity are, for practical purposes, incompatible.

3. Application

In this section we apply the theory of Section 2 to the case of the UNSC, the most powerful organ within the United Nations, 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. Under the present arrangements – which have been in place since 1965 – the UNSC is comprised of 15 members, of which five – China, France, Russia, the United Kingdom, and the United States – are ever-present and wield a veto on all non-procedural matters. The remaining ten members are elected NPMs who serve time-limited two-year terms.

The UNSC is experiencing a protracted reform debate, in which both country and regional perspectives on equity are frequently cited (e.g., Russett et al. 1996; Hammer 2002;

Schwartzberg 2003; Annan 2005; Blum 2005). From the country perspective, it is commonly argued that the right of veto of the five PMs gives these countries too great an influence; and that other countries are more deserving of PM status than are France and the UK.[11] 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).

From the regional perspective it is argued that Africa and Asia are under-represented as together they account for around 75 % of the UN population, but are allocated only 20 % of the PM seats, and 50 % of the NPM seats; and that there exists a broader representational imbalance between the north – defined in Zifcak (2006: footnote 9) as comprising EE, and the WEOG – and south (Africa, Asia and the GRULAC).

In the absence of a formal theoretical framework for measuring the equitability of CVGs, or for addressing issues relating to region- and country-specific notions of equity, existing quantitative analyses are unable to directly assess these claims. Instead, extant studies use the voting power of a PM relative to a NPM as an informal indicator of equitability (see e.g. Hosli et al. 2011; O'Neill 1996; Strand and Rapkin 2011; Straffin 1993: 180). The theoretical framework of Section 2 permits, for the first time, a formal quantitative assessment of the equitability of the UNSC for both individual countries and regions.

We analyse the UNSC under each of our five equity concept flavours. In particular, we allow a-priori for both UP and FP, for which is the "right" a-priori assumption regarding preference correlation for the UNSC is unclear. We note, however, that actual voting on the UNSC suggests preference correlation is closer to UP than to FP. For instance, countries on the UNSC do seem to act as distinct entities within regions. Each council member has full sovereignty over how it votes and countries pour large sums of money into campaigns for election to the UNSC (e.g. Malone 2000), suggesting that they do not perceive membership by another of their regional group 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).

3.1 Modelling the UNSC

[11] Germany and Japan are widely cited in this regard. As of 2012, Japan contributes 12.5 % of the UN regular budget, Germany 8.0 %, the UK only 6.6 %, and France only 6.1 % (UN Secretariat 2011).

We consider the UNSC as of 2012, the corresponding CVG we denote by C^{2012}_{UNSC}. We now describe each of the elements (*A*, *N*, *R*, *P*, *U*) for this game. The assembly *A* is the UNGA, which is partitioned into five regions: Africa, Asia, Eastern Europe (EE), Latin America and Caribbean Group (GRULAC – *el Grupo Latinoamericano y Caribeño*), and the Western European and Others Group (WEOG).[12] The ten NPM seats are divided between the five regions: one for EE; two for each of Asia, the GRULAC and the WEOG; and three for Africa. Election patterns are as follows: the term of the single EE NPM begins in even years; the two NPMs of the WEOG begin their terms in odd years; and the terms for the two NPMs of the GRULAC are staggered; one is elected each year. Asia's two NPM seats are similarly staggered. The three Africa NPM seats are also staggered with two terms beginning in even years and one term beginning in odd years.

3.1.2 The UNSC allocation process

Let *PM* be the set of PMs and *OM* be the set of the remaining 188 "ordinary" members. For simplicity, we imagine that the UNSC votes once per year, such that motions are indexed in the same way as years. As a PM is guaranteed allocation to the UNSC, we have $p_{ijk} = 1$ for $a_{ij} \in PM$. We model the UNSC allocation process for ordinary members by assigning each $a_{ij} \in OM$ with a probability, $\rho_{ij} \in [0,1]$ (where $\sum_{a_{ij} \in R_j} \rho_{ij} = 1$), with which it will be allocated to the UNSC if it (i) is in competition with all members of its region; and (ii) if only a single seat is being allocated.

We use empirical estimates of the ρ_{ij} for the UNSC. These are taken from our earlier analysis, Dreher et al. (2014), in which we empirically estimate the systematic determinants of the election of OMs to the UNSC, accounting for the two-stage process by which such members are presently elected.[13] There we show that three country characteristics systematically predict UNSC election: population, gross national income per capita, and waiting time since last serving on the UNSC. The estimated co-efficients for these three variables can be used in a straightforward way to compute estimates of the ρ_{ij}.[14] The resulting estimates are listed in

[12] See Appendix 2 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 2012). For the purposes of this paper, therefore, we give the United States membership in the WEOG.

[13] In the first stage, the regions make nominations to the UNGA and, in the second stage, the UNGA votes. See Dreher et al. (2014) for a detailed account.

[14] Because the Dreher et al. dataset ends in 2006, we obtain estimates of country population and gross national income per capita (current US$) for 2012 from the CIA World Factbook (see https://www.cia.gov/library/publications/the-world-factbook/index.html#.). We update Dreher et al.'s variable

Appendix 2.

In practice, the UNGA simultaneously allocates OMs to the UNSC. For the purposes of developing a tractable simulation model, however, we suppose that when the UNGA must elect more than one NPM from the same region in a given year, countries are elected sequentially, one-by-one. Hence, if there are two seats to be allocated to members of region *j*, then, in each of two rounds, there is a new realisation of a random variable that, if all countries in the region are competing for the seat, elects country a_{ij} with probability ρ_{ij}. Because, however, UNSC rules prohibit countries from having dual membership, if the same country is elected in both rounds the result is annulled and the process repeated again in full. This continues until distinct countries are elected.

What does this procedure imply for the relationship between the ρ_{ij} and the p_{ijk}? In a given year, a first set of countries, those half-way through their two-year term, gain automatic renewal of their NPM status in the following year (Y_k); a second set of countries, I_k, are those ineligible for election to the UNSC in the following year (UNSC rules prohibit NPMs from seeking immediate re-election); and a final set of countries is eligible for election to the UNSC (E_k). Hence we can write

$$p_{ijk}\begin{cases} =0 & \text{if } a_{ij}\in I_k; \\ \in(0,1) & \text{if } a_{ij}\in E_k; \\ =1 & \text{if } a_{ij}\in Y_k. \end{cases}$$

For $a_{ij} \in E_k$, let p^z_{ijk} denote p_{ijk} when z NPM seats are being elected in region j, in which case

$$p^0_{ijk}=0; \quad p^1_{ijk}=\frac{\rho_{ij}}{\sum_{a_{ij}\in E_{jk}}\rho_{ij}}; \quad p^2_{ijk}=\frac{2p^1_{ijk}\left(1-p^1_{ijk}\right)}{1-\sum_{a_{ij}\in E_{jk}}\left(p^1_{ijk}\right)^2}.$$

Note that the numerator of p^2_{ijk} is the binomial probability of observing a distinct country pair containing a_{ij}, and that the denominator corrects for the impossibility of a country obtaining dual UNSC membership. Using these expressions for the p_{ijk}, we can compute a finite-sample

measuring waiting time since last serving on the UNSC to 2012 using historical UNSC membership data from the UNSC Web site (http://www.un.org/Docs/sc). To produce the estimates in Appendix 2, 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 (i.e., their "E_{jt}" – the set of countries competing for the seat – is assumed to be R_{jt}).

estimate of the $\bar{p}_{ij}$ from the realisation (via computer simulation) of C^{2012}_{UNSC} over the finite set of motions $K' = \{k_1,\ldots,k_{100,000}\}$.[15]

3.1.3 The UNSC decision rule

The set of voting possibilities in the UNSC is given by {for, abstain, against} and the outcome space by {pass, fail}. The UN Charter states that decisions over non-procedural matters are made by an affirmative vote of nine or more 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 (e.g. Blum 2005), so a negative vote by a PM is distinct from an abstention. As commented by Felsenthal and Machover (1997c: 348), this feature of the UNSC decision rule implies that it "cannot be faithfully represented" as a binary decision rule.[16] This observation notwithstanding, the existing studies of equity in the UNSC cited previously, as well as other precursors in the literature (e.g. Shapley and Shubik 1954; Straffin 1983), model the UNSC decision rule as a binary rule.

In the context of our approach the right a-priori assumption regarding abstention is informed by the choice of decision rule in Stage 1. In the existing literature, the Stage 1 vote is modelled as a binary dichotomous simple majority game, i.e., two voting possibilities, two outcomes, a mandate to vote "for" in Stage 3 arises if more than half the votes are cast in favour of the motion, and a mandate to vote "against" in Stage 3 arises otherwise. Under this implementation, a country always enters the council with a mandate to vote in a particular way, and would therefore never abstain. Accordingly, in this case, the much criticised binary interpretation of the UNSC decision rule *is* warranted. We concur with Felsenthal and Machover, however, that the distinct effects of abstention in the UNSC warrant a decision rule in Stage 1 that is consistent with a non-zero level of abstention. This we develop in the next section.

3.2 Stage 1 decision rule

[15] Precisely, we realise marginally more than 100,000 periods, but discard the very earliest periods. This is necessary as we begin with a UNSC containing the five PMs and ten vacant seats. In each period we elect five new NPMs, hence, it is not until the completion of the election in period two that there remain no vacant seats on the elected UNSC. We discard the first four periods, which corresponds to twice the term length of a NPM, as, in all periods beyond the fourth, the elected UNSC contains no vacant seats, and eligibility for election to the UNSC does not depend upon whether a country was elected to the UNSC in either of periods one or two (when, abnormally, $I_k = \emptyset$).

[16] The same point is also made in Freixas and Zwicker (2003).

To allow for abstention in the UNSC, we consider a ternary trichotomous voting game for Stage 1 in which citizens may vote either {for, abstain, against} and the outcome space is {mandate to vote "for" on the council (mandate for), no mandate, mandate to vote "against" on the council (mandate against)}. In the event that "no mandate" obtains, the country (or regional bloc under the RDP) is assumed to abstain in the council. We suppose that voting is costly such that citizens with sufficiently weak preferences over a motion will not vote (abstain) in Stage 1. In this way, as in Côrte-Real and Pereira (2004), we allow citizens who abstain to nonetheless hold a preference. In particular, an abstainer is assumed to support the motion with probability one-half, and oppose it with probability one-half.

We consider a trichotomous variant of the majority threshold rule (TMT), for indeed the actual rules for referenda in countries such as Belarus, Denmark, Germany and Hungary contain a majority threshold provision (Côrte-Real and Pereira 2004).[17] Under the TMT rule, for "mandate for" to obtain, (i) more citizens must vote in favour than vote against; and (ii) at least a proportion $\tau > 0$ of all eligible voters must vote in favour. For "mandate against" to obtain, (i) more citizens must vote against than vote in favour; and (ii) at least a proportion τ of all eligible voters must vote against. In all other eventualities, "no mandate" obtains.

There are constraints on the choice of τ, however. It is possible to show that, in general, $\varphi(q_{ij};\tau)$ is composed of the sum of five terms (reducing to two for $\tau > ½$), each of which is a Gauss hypergeometric function. For countries such as China (for which q_{ij} exceeds one billion) it is computationally infeasible to compute explicitly the Gauss hypergeometric function. Some special cases of τ do permit simplification, however; Lindner (2008), for instance, gives the result $\varphi(q;0) \to (\sqrt{3/\pi})(1/\sqrt{q})$ as $q \to \infty$. In this case, however, the "no mandate" outcome arises with measure zero.[18] To observe the "no mandate" outcome, we prove a related result for $\varphi(q;⅓)$.[19]

Proposition 3 *Under UP and $\tau = ⅓$, the probability that a citizen swings the outcome of Stage 1 is given, for an electorate of size q, by*

[17] Other countries, notably Italy, require a similar rule that instead requires a quorum for the number of people that vote (rather than abstaining), not a condition on the number of citizens voting in favour. We do not consider this rule, however, for it is well-known that it violates monotonicity under natural interpretations of the preferences of voters who abstain (see, e.g., Côrte-Real and Pereira 2004; Freixas and Zwicker 2003, 2009; Herrera and Mattozzi 2010; Uleri 2002). Freixas and Zwicker (2009) give a "soft quorum" rule that avoids this difficulty, but there are no known examples in which it is used in practice.

[18] Lindner's result is seen by setting $t = ⅓$, $w_k = 1$ for all k and $w_a = 1$ in her equation (31), then taking the limit $N \to \infty$.

[19] Our result (and that of Lindner) is a natural extension of Penrose's (1946) original square-root law, which addresses only the case in which both the set of voting possibilities and the set of voting outcomes are binary.

$$\varphi(q;\tfrac{1}{3}) \to \frac{3\sqrt{3}+6}{8\sqrt{q\pi}} \ \ as\ q \to \infty.$$

Under CUP and CUA, $\tau = \frac{1}{3}$ implies that countries vote "for" and "against" with an equal probability, given by $(\frac{1}{2} - \tau^2) = 7/18 \approx 0.39$. The probability that a country wishes to abstain is therefore $2\tau^2 = 2/9 \approx 0.22$. Thus, as seems realistic, abstention is chosen less often than either of the remaining voting possibilities. Under RUP regional blocs vote according to these same probabilities. Under RFP, however, each of the three possible outcomes of Stage 1 are equi-probable.[20] In this case, therefore, each region votes independently on the council, and is equally likely to vote "for", to vote "against", or to abstain.

3.3 Measuring Deviations from Equitability

We now wish to measure, in an objective sense, the proximity of C^{2012}_{UNSC} to each equity concept. To this end, 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 write $\omega_{ij} = \omega_{\text{PM}}$ for $a_{ij} \in PM$ and $\omega_{ij} = \omega_{\text{OM}}$ for $a_{ij} \in OM$. We compute $\{\omega_{\text{OM}},\omega_{\text{PM}}\}$ using the method of generating functions (see, e.g., Freixas 2012) to obtain $\omega_{\text{PM}} \approx 0.0387$ and $\omega_{\text{OM}} \approx 0.014$, implying that a PM receives some 2.7 times as much voting power as a NPM.[21] We compute $\varphi(q;\frac{1}{3})$ using Proposition 2.

From Proposition 1 we define proximity measures on C^{2012}_{UNSC} with respect to the three country equity concepts as

$$CUP = 1 - d(\boldsymbol{\varphi\omega_C}, \boldsymbol{\lambda_C}); \quad CUA_s = 1 - \mathbf{E}_{K'}(d(\boldsymbol{p\varphi\omega_C}, \boldsymbol{\lambda_C})); \quad CUA_w = 1 - d(\bar{\boldsymbol{p}}\boldsymbol{\varphi\omega_C}, \boldsymbol{\lambda_C});$$

where $\boldsymbol{\varphi\omega_C}$ is the scaled $|A| \times 1$ unit vector of the $\varphi(q_{ij};\frac{1}{3})\omega_{ij}$; $\boldsymbol{p\varphi\omega_C}$ is the scaled $|A| \times 1$ unit vector of the $p_{ijk}\omega_{ij}\varphi(q_{ij};\frac{1}{3})$; $\bar{\boldsymbol{p}}\boldsymbol{\varphi\omega_C}$ is the scaled $|A| \times 1$ unit vector of the $\bar{p}_{ij}\varphi(q_{ij};\frac{1}{3})\omega_{ij}$; and $\boldsymbol{\lambda_C}$ is the $|A| \times 1$ unit vector of the constant $1/|A|$. Note that these two measures lie on the unit

[20] Either the citizens of a region vote unanimously for, vote unanimously against, or unanimously abstain, each outcome being equi-probable.

[21] In contrast, if all voting possibilities are assumed equi-probable we obtain $\omega_{\text{PM}} \approx 0.10$ and $\omega_{\text{OM}} \approx 0.05$, implying that a PM receives almost exactly twice the voting power of a NPM. When the UNSC decision rule is modelled as binary then $\omega_{\text{PM}} \approx 0.167$ and $\omega_{\text{OM}} \approx 0.017$, which implies that a PM has around ten times as much voting power as a NPM.

interval, with unity indicating maximal proximity, and zero indicating the minimum possible proximity.

Analogous proximity measures for the two region equity concepts, we write as

$$RUP = 1 - d(\boldsymbol{\varphi\omega_R}, \boldsymbol{\lambda_R}); \quad RFP = 1 - d(\boldsymbol{\omega_R}, \boldsymbol{\lambda_R})$$

where $\boldsymbol{\varphi\omega_R}$ is the scaled $|J| \times 1$ unit vector of the $\omega_j\varphi(q_j;⅓)$; $\boldsymbol{\omega_R}$ is the scaled $|J| \times 1$ unit vector of the ω_j; and $\boldsymbol{\lambda_R}$ is the $|J| \times 1$ unit vector of the constant $1/|J|$.

To gain further insight, we decompose each proximity measure by country (Appendix 3). Specifically, abbreviating $\varphi(q_{ij};⅓)$ to just φ_{ij}, we report individual *relative* deviations, $\mathcal{R}$, from each equity concept as:

$$\mathcal{R}_{ij}^{\text{CUP}} = \frac{\varphi_{ij}\omega_{ij} - \overline{\varphi\omega}}{\overline{\varphi\omega}}; \quad \mathcal{R}_{ij}^{\text{CUA}_s} = \mathbf{E}_{K'}\left(\frac{\left|p_{ijk}\varphi_{ij}\omega_{ij} - \overline{p\varphi\omega}_k\right|}{\overline{p\varphi\omega}_k}\right); \quad \mathcal{R}_{ij}^{\text{CUA}_w} = \mathbf{E}_{K'}\left(\frac{p_{ijt}\varphi_{ij}\omega_{ij} - \overline{p\varphi\omega}_k}{\overline{p\varphi\omega}_k}\right);$$

$$\mathcal{R}_{j}^{\text{RUP}} = \frac{\varphi_j\omega_j - \overline{\varphi\omega}}{\overline{\varphi\omega}}; \quad \mathcal{R}_{j}^{\text{RFP}} = \frac{\omega_j - \overline{\omega}}{\overline{\omega}}.$$

Note that, as the sign of $p_{ijk}\varphi_{ij}\omega_{ij} - \overline{p\varphi\omega}_k$ can vary with k, we consider the absolute value of this term when computing deviations from strong CUA. By contrast, under weak CUA, we allow positive and negative relative deviations to offset over time (so $\mathcal{R}_{ij}^{\text{CUA}_s} \geq \mathcal{R}_{ij}^{\text{CUA}_w}$).

3.4 Results

Simulating the UNSC according to the approach described above, our proximity measures are found as

$$CUP = 0.52; \quad CUA_s = 0.39; \quad CUA_w = 0.53; \quad RUP = 0.67; \quad RFP = 0.79.$$

The maximum deviation is observed to be from strong CUA. Part of this inequity owes to the two-year term length of a NPM, which implies that countries half-way through their term are allocated to the UNSC with probability one (and thereby wield too much expected voting power in that year). A second explanatory factor is the rule that prevents OMs from running for immediate re-election, which implies that countries at the end of their term as a NPM receive an allocation probability of zero (and thereby wield too little expected voting power in that year). As the two factors above go in different directions, we observe that around 23 % of the deviations from strong CUA cancel out over time, making the performance of the UNSC against weak CUA similar to its performance against CUP.

The two regional measures suggest that the UNSC is more equitable from a region perspective than from a country perspective, and that the UNSC is more equitable the more closely correlated are intra-region preferences. The latter finding arises largely as, under RFP, each country receives the same voting power on the council, which is, with the exception of the PMs, what the actual UNSC decision rule implies.

To delve deeper, we now use the country statistics in Appendix 3, beginning with an analysis of country-level equity in the UNSC. Taking the ex-post perspective first (CUP), the relatively middling *CUP* achieved by the UNSC largely reflects the observation that, within *PM* and *OM*, each country receives the same voting power regardless of its population. As may be seen in the first column of the table in Appendix 3, a consequence is that, within each set, the most populous countries receive a voting power that is much too low. The most extreme example is India, which receives only 3.2 % of its equitable voting power under CUP. Within *PM*, China receives only 8.5 % of its equitable voting power under CUP, and Russia (25.8 %) and the United States (17.5 %) are also substantially under-represented. In the remaining regions, countries such as Brazil (8.1 %), Nigeria (9.0 %), Germany (12.5 %) and Ukraine (16.8 %) also find themselves substantially under-represented according to CUP.

A related consequence, which principally manifests itself within *OM*, is that the least populous countries receive far too much voting power. The most extreme example is Tuvalu, which receives around 11.5 times its equitable voting power. In the remaining regions, countries such as San Marino (6.4 times), St. Kitts and Nevis (5 times), The Seychelles (3.9 times), and Montenegro (1.43 times) also find themselves substantially over-represented under CUP.[22]

When we repeat the analysis from an ex-ante perspective, however, we observe some important differences. For instance, the balance of power between *PM* and *OM* remains a problem, but now because far too much expected voting power is given to citizens of PM countries. On average (i.e., under weak CUA) the UK wields some 16.8 times its equitable level of expected voting power, and even China wields around 3.6 times too much expected voting power. How can the PMs be simultaneously under-represented according to CUP, and over-represented according to CUA? The answer lies in the observation that PMs are always able to cast their vote in Stage 3, whereas OMs can do so only periodically. It is this right that

[22] Interestingly, although the PMs are under-represented individually under CUP, they are not under-represented collectively according to the RUP concept. That is, were the members of *PM* and *OM* to vote as blocs on the UNSC, the ratio of the voting power of the PM bloc to the OM bloc would be 0.64, which is almost exactly the equitable level under RUP.

gives the PMs a disproportionately large share of the *expected* voting power.

Ordinary members suffer a collective deficit of expected voting power. Only a small proportion of such members exceed their equitable expected voting power under CUA, and the major individual deviations are for members that receive too little expected voting power. For instance, under the estimated membership distribution in Appendix 2, Dominica receives just 1.1 % of its equitable expected voting power. In other regions, countries such as Chad (11.6 %), Samoa (3.0 %), Montenegro (5.7 %) and Liechtenstein (2.5 %) also receive much too little expected voting power.

In summary, the current UNSC deviates significantly from both the CUA and CUP concepts. The largest individual deviations are from CUA, for PMs enjoy the highest voting power *and* the highest allocation probability, whereas, under CUA, these margins should be traded-off. Moreover, deviations from CUA in any single ballot tend to be significantly more pronounced than the average deviation over time. Whether the PMs are favoured hinges, however, on whether an ex-ante or ex-post perspective is adopted: PMs obtain decisively too much expected voting power ex-ante, but too little realised voting power ex-post. Accordingly, to simultaneously reduce deviations from CUP and CUA, proposals for reform of the UNSC should not seek to erode the voting power of the existing PMs when members of the UNSC, but should instead focus upon eroding the right of these countries to be ever-present on the UNSC. That is, PMs should be given extra voting power when a UNSC member in return for losing their right to be ever-present.

We now analyse the UNSC from a regional perspective using the RUP and RFP concepts (the fourth and fifth columns of the table in Appendix 3). Both concepts identify Africa and the GRULAC as under-represented. Under RUP, Africa is the most under-represented region, with only around one-third of its equitable voting power, while Latin America has 44 %. Under RFP, however, both regions are under-represented equally: each receives 52 % of its equitable level. At the other end of the spectrum, EE and the WEOG are over-represented under both RUP and RFP. EE receives just over double its equitable voting power under RUP, making it the most over-represented region. This distinction instead falls to the WEOG under RFP, however, for it is over-represented by some 61 %, compared to 20 % for EE. Depending upon the a-priori assumptions regarding preference correlation, Asia may be either under- or over-represented on the council, a finding which contrasts with the claim in the literature that Asia is surely under-represented. Under RUP Asia receives only 60 % of its equitable voting power, but under RFP it is 20 % over-represented.

These results imply the existence of north/south inequity: if UNSC members were to form north and south voting blocs, the ratio of bloc voting powers in the council would be exactly one. As, however, the south is more populous, RUP requires that it receive more voting power on the council than the north. Accordingly, under RUP, the south achieves just 64 % of its equitable voting power. The equality of bloc voting powers implies, however, that the RFP concept is met exactly. As RUP and RFP represent extreme ends of the correlation spectrum we may therefore conclude that the south is under-represented by between 0 % and 36 %. Therefore, barring the empirically unlikely case of full preference correlation, the region equity concepts advocate that voting power should be shifted away from EE and the WEOG, and towards Africa, Asia and the GRULAC.

Last, we use our theoretical framework to address some of the remaining issues raised by reformers. Should some countries be ever-present on the UNSC? If so, which ones? The CUP concept disregards allocation probabilities, and is therefore permissive of ever-present members. The CUA concept permits ever-present members, but only if the country is sufficiently populous. Given distribution of voting power in the UNSC, is any country sufficiently populous to warrant ever-present membership under CUA? The condition for a country to answer this question in the affirmative is

$$\frac{15\sqrt{q_{ij}}/\omega_{ij}}{\sum_{A_{ij} \in A} \sqrt{q_{ij}}/\omega_{ij}} \geq 1.$$

We find, however, that no country meets this condition. At its current level of voting power, CUA would obtain for China if it were represented on the UNSC in around 29 of every 100 years. On the other hand, in return for receiving only the voting power of an OM, CUA would obtain for India if it were represented in around 76 of every 100 years. The United States would qualify for membership under CUA in only around 14 years in every 100, while the UK and France would qualify for membership in only around six.

Our equity concepts can also shed some light on whether the right of veto should be abolished and, if not, which countries should exercise a veto. Under the CUP concept each of the P5 warrant their existing voting power (and should have more), making clear that CUP is consistent with sufficiently populous countries exercising a veto. Under CUA any country, no matter how small could exercise a veto when on the council if it is willing to possess a sufficiently small allocation probability. In summary, therefore, we do not find support for the abolition of the veto from our country level equity concepts. Two points are of note,

however: first, CUA implies, in general, a trade-off between voting rights on the council, and time on council. Accordingly, we establish above that no country (not even China) should have a veto *and* be ever-present on the UNSC. Second, under CUP, if a veto right is to be allocated to five countries it should be the five most populous: China, India, the United States, Indonesia, and Brazil. Thus our analysis agrees that, if the right of veto is to remain, attention should be focused upon its allocation. As, however, we consider democratic ideals alone (rather than economic might, or peacekeeping contributions), our analysis does not suggest that either Germany or Japan should be the recipients of a veto.[23]

The final issue we address is how the 15 UNSC seats should be divided between regions. CUP does not speak to this issue, while the region equity concepts imply that only the voting power of the regional bloc matters, such that, for a given bloc voting power, the number of countries that form the bloc is irrelevant. The CUA concept is prescriptive in this regard, however.

Proposition 4 *If* C^{2012}_{UNSC} *satisfies strong CUA then* $n_j \propto \sum_{a_{ij} \in R_j} \frac{\sqrt{q_{ij}}}{\omega_{ij}}$ *for all* j.

The proof of Proposition 4 first establishes that, under the assumptions of this application, strong CUA implies $p_{ijk} \propto \sqrt{q_{ij}}/\omega_{ij}$. Then as it must, by construction, hold that $\sum_{a_{ij} \in R_j} p_{ijk} = n_j$ the Proposition follows. According to Proposition 4, the (approximate) optimal n_j would be: 5.5 members to Asia, four members to Africa, two members to each of the GRULAC and the WEOG, and 1.5 members to EE.[24] Thus the WEOG, with four seats in the present UNSC, has twice its entitlement under CUA, while Asia and Africa – which both receive three seats – are under-represented, in Asia's case by close to one-half.

4. Conclusion

The Councils of the United Nations – ECOSOC, the UNHCR, and the UNSC – play an important role in upholding global wealth, law, and security. Yet, to our knowledge, no previous analysis has developed formal equity principles for the analysis of such bodies, in

[23] As seen in Appendix 3, Japan and Germany are heavily under-represented according to CUP. Both countries have historically achieved election to the UNSC on a regular basis, however, hence their representation under CUA tells a different story. Japan's expected voting power is only 20 % below meeting CUA_{w}, while Germany actually receives 2.8 times its equitable expected voting power.

[24] Here the fractional Asia and EE membership would be achieved by alternating between (i) Asia having six seats, and EE one; and (ii) Asia having five seats and EE two.

which only a subset of member countries may vote at a point in time.

In this paper we develop a new class of voting game we term a council voting game. We then develop democratic equity concepts for this new class of game, which differ according to whether equity is in an ex-ante (or procedural) sense, or in an ex-post (or outcome) sense; whether equity is conceived at the regional or country level; and whether preferences are fully correlated or uncorrelated.

We demonstrate the utility of our theoretical framework with an application to the UNSC. Significant degrees of inequity exist irrespective of the precise equity concept used, but we find that the UNSC is more inequitable in a strong ex-ante sense than in an ex-post sense, and more inequitable if countries are viewed as representing themselves, than if they are viewed as representing their region. Different from the perspective of much of the reform literature, we find that the permanent members actually have too little voting power on the UNSC, although they have too much expected voting power. We also find that Latin America, not Asia, is one of the most heavily under-represented regions.

What do our findings imply for the ongoing debate on UNSC reform? First, we believe our framework clarifies the nature of the underlying trade-offs. Simultaneous achievement of country and region equity is unfeasible and, if realpolitik makes giving every country an equal probability of council allocation unfeasible, then some trade-off between the ex-ante and ex-post equity perspectives is also unavoidable. Second, our analysis highlights that a successful reform of the UNSC must address not only the distribution of voting power, but also the distribution of allocation probability. In particular, our country equity concepts suggest giving PMs *more* voting power when a member of the council in return for the loss of the right to be ever-present.

The apparent tension between realpolitik and the equity concepts we develop suggests that the latter should be understood purely as normative benchmarks against which to assess the equitability of alternative reform possibilities. An avenue for future research might, therefore, be to investigate "second-best" designs that minimise deviations from our equity concepts under an additional realpolitik constraint. While this idea must await a proper treatment, we hope the present contribution marks a first step in the normative analysis of democratic equitability in councils.

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Appendix 1: Proofs

Proof of Proposition 1: (*i*) Under the CDP, and assuming UP, consider a citizen of a country that will achieve council membership with certainty in Stage 3. Then a citizen who belongs to a country with zero voting power in Stage 3 and/or who has zero voting power in the Stage 1 vote has their preference matched purely by chance with probability ½. In contrast, a dictator citizen always has their preferences matched. It follows that, in general, the a-priori probability that a citizen's preferences are matched by the outcome in Stage 3 is $\frac{1}{2}(1 + \varphi_{ij}\omega_{ij})$. To equalise this probability across world citizens, $\varphi_{ij}\omega_{ij}$ must be equal for all countries, which implies the condition in part (*i*).

(*ii*) Under the CDP, and assuming UP, the a-priori probability that a citizen's preference is matched by the outcome in Stage 3, before allocation to the council is decided, is $\frac{1}{2}(1 + \varphi_{ij}p_{ijk}\omega_{ij})$, as a citizen can only influence the outcome of Stage 3 when his/her country is allocated to the council. Equalisation of this probability across world citizens implies the condition in part (*ii*).

(*iii*) Under the CDP, and assuming UP, the expectation over *K* of the a-priori probability that a citizen's preference is matched by the outcome in Stage 3, before allocation to the council is decided, is $\frac{1}{2}(1 + \varphi_{ij}\bar{p}_{ij}\omega_{ij})$. Equalisation of this probability across world citizens implies the condition in part (*iii*).

(*iv*) Under the RDP, and assuming UP, the a-priori probability that a citizen's preference is matched by the outcome in Stage 3 is $\frac{1}{2}(1 + \varphi_j\omega_j)$. Equalisation of this probability across world citizens implies the condition in part (*iv*).

(*v*) Under the RDP, and assuming FP, all citizens have their preference matched by the outcome of Stage 1. The a-priori probability that a citizen's preference is matched by the outcome in Stage 3 is therefore just $\frac{1}{2}(1 + \omega_j)$. Equalisation of this probability across world citizens implies the condition in part (*v*). ■

Proof of Proposition 2: Define i.i.d. random variables X_i, $i = 1,2\ldots,q$ by:

$$X_i(x) = \begin{cases} 1 & \text{if } x = \text{For}; \\ 0 & \text{if } x = \text{Abstain}; \\ -1 & \text{if } x = \text{Against}; \end{cases}$$

where $\Pr(x = \text{For}) = \Pr(x = \text{Abstain}) = \Pr(x = \text{Against}) = \frac{1}{3}$. Then we have $\mathbf{E}(X_i) = 0$ and $\text{Var}(X_i) = 2/3$, where X_i represents the vote of citizen i in Stage 1. Construct another random variable $X^q = \sum_{k=1}^{q} X_k - X_i$, which represents the possible votes from an electorate of size q, excluding the vote of citizen i. X^q takes integer values corresponding to the difference between the number of For and Against votes, (excluding i's vote). Then $\mu_q = \mathbf{E}(X^q) = 0$ and $(\sigma_q)^2 = \text{Var}(X^q) = 2(q - 1)/3$. Citizen i swings the Stage 1 vote under the TMT rule when any of the following holds:

$$
\begin{aligned}
&|\text{For}| = |\text{Against}| \text{ and } |\text{Abstain}| < \tfrac{q}{3};\\
&|\text{For}| = |\text{Against}| + 1 \text{ and } |\text{Abstain}| < \tfrac{q}{3};\\
&|\text{For}| = |\text{Against}| - 1 \text{ and } |\text{Abstain}| < \tfrac{q}{3};\\
&|\text{For}| = \lfloor \tfrac{q}{3} \rfloor \text{ and } |\text{Against}| < \tfrac{q}{3};\\
&|\text{For}| < \tfrac{q}{3} \text{ and } |\text{Against}| = \lfloor \tfrac{q}{3} \rfloor.
\end{aligned}
\tag{A.1}
$$

Let ϕ denote the density function of the standard normal distribution. By application of the local central limit theorem (see, e.g., Petrov 1975: Theorem 1, p 187) we obtain:

$$
\Pr\big(|\text{For}| = |\text{Against}|\big) = \Pr\big(X^q = 0\big) = \frac{1}{\sigma_q}\phi\left(\frac{0-\mu_q}{\sigma_q}\right) \sim \frac{1}{\sqrt{4(q-1)\pi/3}};
$$

$$
\Pr\big(|\text{For}| = |\text{Against}| + 1\big) = \Pr\big(X^q = 1\big) = \frac{1}{\sigma_q}\phi\left(\frac{1-\mu_q}{\sigma_q}\right) \sim \frac{1}{\sqrt{4(q-1)\pi/3}};
$$

$$
\Pr\big(|\text{For}| = |\text{Against}| - 1\big) = \Pr\big(X^q = -1\big) = \frac{1}{\sigma_q}\phi\left(\frac{-1-\mu_q}{\sigma_q}\right) \sim \frac{1}{\sqrt{4(q-1)\pi/3}};
$$

where $\sim$ denotes asymptotic equivalence. Note that we have ignored the minimum threshold at this point; we will re-introduce this later. The last two conditions in (A.1) do not arise from X^q as specified. For these we consider the random variables Y_i and Z_i:

$$
Y_i(x) = \begin{cases} \frac{2}{3} & \text{if } x = \text{For}; \\ -\frac{1}{3} & \text{if } x = \text{Abstain or Against}; \end{cases}
\qquad
Z_i(x) = \begin{cases} \frac{2}{3} & \text{if } x = \text{Against}; \\ -\frac{1}{3} & \text{if } x = \text{For or Abstain}; \end{cases}
$$

and construct Y^q and Z^q in the same manner as X^q. We compute the mean and variance of these random variables to be $\tilde{\mu}_q = \mathbf{E}(Y^q) = \mathbf{E}(Z^q) = 0$ and $(\tilde{\sigma}_q)^2 = \text{Var}(Y^q) = \text{Var}(Z^q) = 2(q-1)/9$. Applying the local central limit theorem in a similar manner to above we find that

$$
\Pr\left(|\text{Yes}| = \left\lfloor \frac{q}{3} \right\rfloor\right) \sim \Pr\big(Y^q = 0\big) = \frac{1}{\tilde{\sigma}_q}\phi\left(\frac{0-\tilde{\mu}_q}{\tilde{\sigma}_q}\right) \sim \frac{3}{\sqrt{4(q-1)\pi}};
$$

$$
\Pr\left(|\text{No}| = \left\lfloor \frac{q}{3} \right\rfloor\right) \sim \Pr\big(Z^q = 0\big) = \frac{1}{\tilde{\sigma}_q}\phi\left(\frac{0-\tilde{\mu}_q}{\tilde{\sigma}_q}\right) \sim \frac{3}{\sqrt{4(q-1)\pi}}.
$$

Notice that Pr(|For| = |Against| and |Abstain| < q/3) = Pr(|For| = |Against| and |Abstain| ≥ q/3), with similar equivalences holding for the remaining conditions in (A.1). Then

$$
\begin{aligned}
\varphi(q;⅓) &= 3\Pr\left(|\text{For}| = |\text{Against}| \text{ and } |\text{Abstain}| < \frac{q}{3}\right) + 2\Pr\left(|\text{For}| = \left\lfloor \frac{q}{3} \right\rfloor \text{ and } |\text{Against}| < \frac{q}{3}\right)\\
&\sim \frac{1}{2}\frac{3}{2}\frac{1}{\sqrt{4(q-1)\pi/3}} + \frac{1}{2}\frac{2}{2}\frac{3}{\sqrt{4(q-1)\pi}} \sim \frac{3\sqrt{3}+6}{8\sqrt{q\pi}}. \quad \blacksquare
\end{aligned}
$$

Proof of Proposition 3: From Propositions 1 and 2, strong CUA (and therefore also weak CUA) holds in our application if and only if $p_{ijk}\omega_{ij} \propto \sqrt{q_{ij}}$, which implies $p_{ijk} \propto \sqrt{q_{ij}}/\omega_{ij}$ for all a_{ij}. Then, as $\sum_{a_{ij} \in R_j} p_{ijk} = n_j$ by construction, it must hold that $n_j \propto \sum_{a_{ij} \in R_j} \sqrt{q_{ij}}/\omega_{ij}$ for all j. ■

Appendix 2: Estimated ρ_{ij} (as of 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.

Appendix 3: Relative deviations

Country	$\mathcal{R}_{ij}^{\text{CUP}}$	$\mathcal{R}_{ij}^{\text{CUA}_s}$	$\mathcal{R}_{ij}^{\text{CUA}_w}$	$\mathcal{R}_{j}^{\text{RUP}}$	$\mathcal{R}_{j}^{\text{RFP}}$
Africa	–	–	–	-0.665	-0.516
Algeria	-0.809	1.069	0.481	–	–
Angola	-0.740	1.060	-0.423	–	–
Benin	-0.618	1.077	-0.408	–	–
Botswana	-0.199	1.108	-0.148	–	–
Burkina Faso	-0.720	1.051	-0.463	–	–
Burundi	-0.608	1.028	-0.739	–	–
Cameroon	-0.744	1.029	-0.693	–	–
Cape Verde	0.612	1.037	-0.269	–	–
Central African Republic	-0.459	1.055	-0.616	–	–
Chad	-0.661	1.018	-0.879	–	–
Comoros	0.324	1.053	-0.570	–	–
Congo	-0.436	1.170	0.325	–	–
Cote d'Ivoire	-0.745	1.059	-0.378	–	–
Democratic Republic of the Congo	-0.860	1.000	-0.868	–	–
Djibouti	0.204	1.101	-0.090	–	–
Egypt	-0.874	1.000	-0.437	–	–
Equatorial Guinea	0.356	1.024	-0.813	–	–
Eritrea	-0.505	1.046	-0.599	–	–
Ethiopia	-0.875	1.003	-0.696	–	–
Gabon	-0.075	1.162	0.438	–	–
Gambia	-0.137	1.080	-0.404	–	–
Ghana	-0.770	1.076	-0.074	–	–
Guinea	-0.641	1.107	-0.134	–	–
Guinea-Bissau	-0.078	1.040	-0.742	–	–
Kenya	-0.822	1.033	-0.386	–	–
Lesotho	-0.230	1.088	-0.265	–	–
Liberia	-0.432	1.016	-0.853	–	–
Libya	-0.550	1.127	-0.056	–	–
Madagascar	-0.751	1.046	-0.520	–	–
Malawi	-0.706	1.061	-0.432	–	–
Mali	-0.711	1.092	-0.213	–	–
Mauritania	-0.390	1.160	0.108	–	–
Mauritius	-0.004	1.119	0.254	–	–
Morocco	-0.799	1.079	0.032	–	–
Mozambique	-0.765	1.075	-0.191	–	–
Namibia	-0.249	1.123	0.014	–	–
Niger	-0.712	1.076	-0.282	–	–
Nigeria	-0.910	0.962	-0.537	–	–
Rwanda	-0.652	1.024	-0.781	–	–
Sao Tome and Principe	1.791	1.013	-0.484	–	–

Senegal	-0.678	1.115	0.062	–	–
Seychelles	2.859	0.977	-0.841	–	–
Sierra Leone	-0.531	1.067	-0.527	–	–
Somalia	-0.628	1.025	-0.795	–	–
South Africa	-0.840	1.026	-0.417	–	–
South Sudan	-0.640	1.036	-0.611	–	–
Sudan	-0.804	1.029	-0.641	–	–
Swaziland	0.042	1.049	-0.450	–	–
Togo	-0.538	1.104	-0.225	–	–
Tunisia	-0.649	1.162	0.383	–	–
Uganda	-0.804	1.033	-0.587	–	–
United Republic of Tanzania	-0.828	1.035	-0.313	–	–
Zambia	-0.686	1.119	0.077	–	–
Zimbabwe	-0.680	1.142	0.137	–	–
Asia	–	–	–	-0.402	0.210
Afghanistan	-0.797	0.981	-0.963	–	–
Bahrain	0.010	0.824	-0.642	–	–
Bangladesh	-0.907	0.727	-0.501	–	–
Bhutan	0.332	0.945	-0.898	–	–
Brunei	0.797	0.795	-0.624	–	–
Cambodia	-0.698	0.980	-0.951	–	–
China	-0.915	2.636	2.636	–	–
Cyprus	0.262	0.704	-0.406	–	–
DPR Korea	-0.770	0.978	-0.958	–	–
Fiji	0.223	0.711	-0.416	–	–
India	-0.968	0.405	-0.147	–	–
Indonesia	-0.927	0.674	-0.438	–	–
Iran	-0.868	0.892	-0.790	–	–
Iraq	-0.798	0.920	-0.836	–	–
Japan	-0.899	1.089	0.806	–	–
Jordan	-0.544	0.720	0.603	–	–
Kazakhstan	-0.716	0.917	-0.820	–	–
Kiribati	2.597	0.965	-0.941	–	–
Kuwait	-0.314	0.552	-0.064	–	–
Kyrgyzstan	-0.509	0.974	-0.952	–	–
Laos	-0.544	0.978	-0.957	–	–
Lebanon	-0.448	0.947	-0.892	–	–
Malaysia	-0.787	1.172	1.033	–	–
Maldives	1.019	0.944	-0.898	–	–
Marshall Islands	3.882	0.986	-0.980	–	–
Micronesia (Federated States of)	2.406	0.989	-0.971	–	–
Mongolia	-0.316	0.959	-0.924	–	–
Myanmar	-0.836	0.897	-0.795	–	–
Nauru	10.207	0.959	-0.951	–	–
Nepal	-0.793	0.875	-0.740	–	–

Oman	-0.320	0.753	-0.472	–	–
Pakistan	-0.914	0.618	0.331	–	–
Palau	6.932	0.985	-0.972	–	–
Papua New Guinea	-0.567	0.903	-0.793	–	–
Philippines	-0.882	0.789	-0.589	–	–
Qatar	-0.144	0.553	-0.069	–	–
Republic of Korea	-0.836	0.669	0.477	–	–
Samoa	1.652	0.981	-0.969	–	–
Saudi Arabia	-0.783	0.841	-0.672	–	–
Singapore	-0.497	1.208	1.146	–	–
Solomon Islands	0.547	0.958	-0.921	–	–
Sri Lanka	-0.752	0.693	-0.345	–	–
Syrian Arab Republic	-0.749	0.949	-0.897	–	–
Tajikistan	-0.567	0.980	-0.952	–	–
Thailand	-0.863	0.723	-0.454	–	–
Timor Leste	0.070	0.974	-0.957	–	–
Tonga	2.518	0.963	-0.942	–	–
Turkmenistan	-0.495	0.965	-0.927	–	–
Tuvalu	10.449	0.969	-0.952	–	–
United Arab Emirates	-0.586	0.528	0.253	–	–
Uzbekistan	-0.783	0.959	-0.925	–	–
Vanuatu	1.318	0.977	-0.965	–	–
Vietnam	-0.879	0.949	-0.905	–	–
Yemen	-0.769	0.885	-0.770	–	–
EE	–	–	–	1.050	0.210
Albania	-0.366	0.875	-0.685	–	–
Armenia	-0.355	0.931	-0.827	–	–
Azerbaijan	-0.626	0.796	-0.462	–	–
Belarus	-0.634	0.711	-0.252	–	–
Bosnia and Herzegovina	-0.415	0.913	-0.778	–	–
Bulgaria	-0.585	0.750	-0.375	–	–
Croatia	-0.459	0.812	-0.514	–	–
Czech Republic	-0.650	0.649	0.437	–	–
Estonia	-0.020	0.941	-0.848	–	–
Georgia	-0.456	0.879	-0.672	–	–
Hungary	-0.641	0.749	0.625	–	–
Latvia	-0.244	0.912	-0.780	–	–
Lithuania	-0.377	0.889	-0.696	–	–
Montenegro	0.428	0.981	-0.939	–	–
Poland	-0.817	2.830	2.532	–	–
Republic of Moldova	-0.400	0.850	-0.631	–	–
Romania	-0.755	1.145	1.015	–	–
Russian Federation	-0.742	10.041	10.041	–	–
Serbia	-0.582	0.716	-0.238	–	–
Slovakia	-0.514	0.783	-0.436	–	–

Slovenia	-0.203	0.869	-0.671	–	–
TFYR Macedonia	-0.209	0.913	-0.786	–	–
Ukraine	-0.832	1.839	1.599	–	–
GRULAC	–	–	–	-0.558	-0.516
Antigua and Barbuda	2.811	0.930	-0.878	–	–
Argentina	-0.821	1.724	1.521	–	–
Bahamas	0.938	0.651	-0.362	–	–
Barbados	1.171	0.865	-0.795	–	–
Belize	1.033	0.820	-0.693	–	–
Bolivia	-0.640	0.860	-0.715	–	–
Brazil	-0.919	1.520	1.055	–	–
Chile	-0.726	1.479	1.360	–	–
Colombia	-0.833	0.732	0.564	–	–
Costa Rica	-0.474	0.647	-0.270	–	–
Cuba	-0.662	0.627	-0.208	–	–
Dominica	3.360	0.996	-0.984	–	–
Dominican Republic	-0.640	0.694	-0.367	–	–
Ecuador	-0.702	0.510	0.190	–	–
El Salvador	-0.544	0.914	-0.824	–	–
Grenada	2.511	0.992	-0.990	–	–
Guatemala	-0.701	0.823	-0.620	–	–
Guyana	0.307	0.473	0.205	–	–
Haiti	-0.641	0.993	-0.982	–	–
Honduras	-0.588	0.674	-0.328	–	–
Jamaica	-0.314	0.696	-0.411	–	–
Mexico	-0.893	1.705	1.340	–	–
Nicaragua	-0.528	0.803	-0.594	–	–
Panama	-0.395	0.669	-0.330	–	–
Paraguay	-0.553	0.790	-0.583	–	–
Peru	-0.790	0.507	0.165	–	–
Saint Kitts and Nevis	3.958	0.981	-0.977	–	–
Saint Lucia	1.719	0.958	-0.923	–	–
Saint Vincent and the Grenadines	2.432	0.988	-0.983	–	–
Suriname	0.567	0.876	-0.795	–	–
Trinidad and Tobago	-0.020	0.503	0.016	–	–
Uruguay	-0.382	0.881	0.822	–	–
Venezuela	-0.789	3.694	3.358	–	–
WEOG	–	–	–	0.576	0.613
Andorra	2.896	0.980	-0.969	–	–
Australia	-0.759	0.757	-0.445	–	–
Austria	-0.608	3.347	3.184	–	–
Belgium	-0.653	0.539	0.355	–	–
Canada	-0.805	0.516	0.214	–	–
Denmark	-0.518	1.008	0.946	–	–

Finland	-0.510	0.705	0.630	–	–
France	-0.617	15.407	15.407	–	–
Germany	-0.875	2.242	1.837	–	–
Greece	-0.663	0.863	-0.678	–	–
Iceland	1.006	0.983	-0.976	–	–
Ireland	-0.463	1.390	1.327	–	–
Israel	-0.583	0.982	-0.955	–	–
Italy	-0.854	1.420	1.185	–	–
Liechtenstein	4.979	0.982	-0.977	–	–
Luxembourg	0.593	0.964	-0.928	–	–
Malta	0.759	0.934	-0.880	–	–
Monaco	5.032	0.953	-0.939	–	–
Netherlands	-0.722	1.186	1.077	–	–
New Zealand	-0.457	0.544	0.028	–	–
Norway	-0.486	0.638	0.546	–	–
Portugal	-0.653	0.527	0.063	–	–
San Marino	5.391	0.973	-0.964	–	–
Spain	-0.833	1.049	0.879	–	–
Sweden	-0.629	1.063	0.982	–	–
Switzerland	-0.590	0.947	0.877	–	–
Turkey	-0.867	1.733	1.433	–	–
United Kingdom	-0.609	15.760	15.760	–	–
United States of America	-0.825	6.493	6.493	–	–