

Standing alongside your friends. Network centrality and providing troops to UN peacekeeping operations

Hugh Ward & Han Dorussen, Department of Government, University of Essex

Abstract

Why do countries contribute troops to UN peacekeeping? Recognizing the incentives to free ride on the contributions of other countries, existing explanations have tended to focus on the private benefits of providing troops. There has been particular emphasis on some major contributing countries that gain financially from providing peacekeepers. An alternative explanation could be that countries prefer to deploy troops to peacekeeping alongside countries with similar foreign policy preferences in order to maximize jointly-produced private benefits. Accordingly, the willingness to provide peacekeepers should depend on which other countries are providing troops to peacekeeping operations. The implications are explored within the context of games on networks, and it is demonstrated that in equilibrium countries that are more Bonacich central in the network of foreign policy preference contribute disproportionately to UN peacekeeping. Based on actual contributions to UN peacekeeping from 1990 until 2011, we find that policy complementarities explain why countries provide a larger proportion of peacekeepers to a particular mission. Importantly, centrality in the network of policy complementarities matters and not simply that countries have moderate policy preferences. There is robust evidence for the prevalence of peacekeeping alongside your 'friends'; in effect, countries with a lot of 'friends' contribute more peacekeepers.

Keywords: peacekeeping, network analysis, games on networks, liberal peace, policy complementarities

Corresponding author: hdorus@essex.ac.uk

Introduction

When raising money for charitable purposes, churches and rotary clubs regularly organize events where members are encouraged to give because they observe their friends doing the same. Besides peer pressure, the success of such events derives from the enjoyment to be had from doing things together; for example, when neighborhood organizations pick litter or look after community gardens. Peer pressure via social networks also contributes to turnout in elections (Abrams, Iversen & Soskice, 2011). In this case, an additional element is that people with similar political views are particularly relevant. We argue that benefits from peacekeeping alongside countries with similar foreign policy preferences can similarly explain why countries contribute troops to United Nations peacekeeping operations (UN PKOs).

There is a renewed scholarly interest in peacekeeping, where recent research has emphasized their importance in stabilizing post-conflict situations (Doyle & Sambanis, 2006; Fortna, 2008; Ruggeri, Gizelis & Dorussen, 2013) as well as their relevance for protecting civilians (Hultman, Kathman & Shannon, 2013). Over the last 30 years, peacekeeping has evolved from ‘traditional’ to ‘new’ peacekeeping (Ratner, 1995): peacekeepers are now more likely to be deployed to civil wars rather than interstate conflict, more often authorized to use force, and tend to operate under broader and more demanding mandates (Heldt & Wallenstein, 2006). These developments have not only led to the deployment of a larger number of peacekeepers—from about 10,000 in 1985 to more than 100,000 in 2014—but also to their deployment into more risky environments. Fortna (2008) and Sambanis & Doyle (2007) note that peacekeepers are regularly deployed to so-called ‘hard cases’, while Ruggeri, Dorussen & Gizelis (2012) detail their deployment to local conflict hot spots. Ruggeri, Gizelis & Dorussen (2013) and Dorussen & Gizelis (2014) examine the interaction between

peacekeepers and the local population and find evidence of cooperation *but also* conflict. The UN Secretary General faces with an increasingly daunting task, namely to find adequate numbers of sufficiently competent peacekeeping troops to be deployed into risky situations, making it germane to examine why countries contribute troops to peacekeeping operations.¹

Contributing to peacekeeping operations may yield a combination of public and private benefits (Khanna, Sandler & Shimizu 1999; Bobrow & Boyer, 1997; Bove & Elia, 2014). Peacekeeping provides public goods for the international community if it enhances international security through monitoring peace agreements and stabilizing post-conflict societies. It also contributes to upholding international norms in (post-)conflict situations, such as the responsibility to protect, human rights and transitional justice, and gender equality. Well-known collective action problems affect the provision of such public goods (Olson, 1965). Countries have incentives to free ride on the contributions of other countries leading to an underprovision of peacekeepers and inequitable burden-sharing (Olson & Zeckhauser, 1966; Khanna, Sandler & Shimizu, 1998; 1999). Apart from obvious concerns about potential lack of peacekeepers, peacekeeping is more valuable to the international community if it is seen as a global responsibility with a fair sharing of the burden rather than a hegemonic imposition of values. Observing an increased tendency of a small number of countries to shoulder the financial burden of peacekeeping, Shimizu & Sandler (2002: 666) conclude: “The reliance on a few hegemons to keep the peace comes at a price as these ‘larger shareholders’ in peacekeeping operations pursue an agenda in keeping with their preferences.”

In joint-production models contributions to the public good simultaneously yield private benefits (Cornes & Sandler, 1984). Because operations are located in a specific geographic

region, the stability provided by peacekeeping can be treated as an impure public good, more beneficial for countries in the same region or with region-specific interests (Bobrow & Boyer, 1997: 727). Peacekeepers thus deliver public goods for the whole international community while also securing private, country-specific, benefits. A large number of participating countries however may crowd out any advantage for a particular country. In joint-production models, positive contributions can occur in equilibrium even though public-good elements still incentivize countries to contribute less the more others contribute. Empirical evidence suggests that jointly-produced benefits matter for the provision of peacekeepers (Khanna, Sandler & Shimizu, 1999; Gaibulloev, Sandler & Shimizu, 2009; Bove & Elia, 2014).

Others simply consider private, in particular financial, benefits as the primary motivation for providing peacekeepers. UN funding for peacekeepers exceeds the cost of providing troops for most poorer member countries, making it profitable for them to deploy peacekeepers. Financial incentives have often been suggested as the primary motivation behind the large number of peacekeepers from countries like India, Bangladesh, and Nepal. Furthermore, the deployment of peacekeepers may provide troops with valuable operational experience.

Peacekeeping alongside countries with similar foreign policy preferences provides benefits so far unacknowledged in the literature on the economics of peacekeeping. Moreover, once this is brought into focus an alternative explanation of why some states make disproportionate contributions can be construed. By definition public-goods benefits are independent of what particular countries are contributing. The same holds for some private benefits such as financial gains. However, many benefits are in fact conditional on the participation of specific other countries. For instance, leaders find it easier to garner domestic support for a peacekeeping mission if allies join in. A smaller country may expect to secure foreign policy

advantages from contributing to an operation, but only if a major power favors it and supports it with troops. Peacekeeping only pushes up standards if peacekeepers operate alongside well trained, disciplined troops. Finally, the specific norms that peacekeepers promote are likely to depend on what other countries are sending troops. The main contribution of our article is to examine the role of political affinity in the decision of countries to provide peacekeepers.

We adapt a model developed by Ballester, Calvó-Armengol & Zenou (2006) to deal with provision of public goods where there are also jointly-produced private benefits. The model is extremely flexible. It can include jointly-produced private benefits that are either independent of or dependent on the actions of other states. Dependent benefits can take the form of either positive or negative complementarities. In our application of the model, benefit complementarities follow from the (dis)similarity of foreign policy preferences within the group of countries that provide peacekeepers. Further, the model formulates the relative strength of complementarities in terms of network ties between country dyads. A country i is more strongly linked with country j in this network to the extent that i 's private benefits go up with j 's level of participation. In equilibrium, contributions to peacekeeping are best responses given the direct and indirect network ties between countries. The analysis is therefore an example of so-called network games (Jackson, 2008; Gallop, 2016; Larson, 2016). We show that in equilibrium, contributions are proportional to a country's Bonacich centrality in the complementarities network, where a country has a greater Bonacich centrality score (Bonacich 1987) if it has more direct and indirect connections with other countries. As we elaborate below, such countries are more subject to positive feedback effects encouraging them to increase their contributions in response to others (Ballester, Calvó-Armengol & Zenou, 2006: 104).

The next section reviews the literature on peacekeeping contributions and elaborates why it matters for countries to be part of the ‘right’ alliance in providing peacekeepers. Next, we present and analyze peacekeeping contribution as a network game. We apply the main result that, in equilibrium, contributions are proportional to actor centrality and argue that similarity of foreign policy preferences generates a network of complementarities. The fourth section reports on the test of the hypothesis that identifies a relationship between proportionate contributions to peacekeeping and centrality in this network. There is indeed evidence for the prevalence of peacekeeping alongside your ‘friends’. In effect, we find that countries with a lot of ‘friends’ contribute more peacekeepers.

Providing blue helmets

Why would countries care about the contributions made by specific other countries, and how does this alter existing explanations for peacekeeping contributions? Research so far is not only inconclusive on whether contributions from other countries provide incentives to provide peacekeepers (so-called spill-ins), but also on the reasons behind possible spill-ins. In our opinion, insufficient attention has been given to the political motives behind peacekeeping.

Countries contribute to peacekeeping by providing troops, financial support, or some mixture of both. Further, there have been notable changes in the extent and nature of peacekeeping since the end of the Cold War. Khanna, Sandler & Shimizu (1999) and Gaibulloev, Sandler & Shimizu (2009) observe positive spill-ins for financial contributions made to both UN and non-UN missions: in other words, countries provide more financial support if other countries also provide financial support. At the same time, Shimizu & Sandler (2002) note that financial burden-sharing for peacekeeping has become more uneven in the post-Cold War

period, possibly because the benefits from peacekeeping have become more public. They argue that the specific financial assessment rules of the UN explain spill-ins for UN PKOs. For non-UN PKOs, the spill-ins for financial contributions provide evidence for a willingness of countries to take shared responsibility for missions that generate region-specific benefits (Gaibulloev, Sandler & Shimizu, 2009: 849).

Troop contributions to peacekeeping operations do not follow a similar pattern. Bove & Elia (2013: 712) find that country-specific benefits primarily explain contributions with no difference between UN and non-UN peacekeeping operations: “developing countries readily contribute persons to UN operations for the financial and training benefits that participation provides” (2013: 713). Gaibulloev et al. (2015) argue, however, that the decision to contribute to UN and non-UN operations differs. They observe spill-ins from contributing to non-UN operations, but not for UN PKOs. They claim that UN PKOs provide limited opportunity for training, because of the generally poor quality of peacekeeping forces. Further, the financial benefits from providing troops, i.e., the difference between the costs of deploying peacekeepers and UN reimbursements, are private benefits unrelated to the contributions of other countries.

The actual financial gains of providing peacekeepers are however easily overstated (Findlay, 1996: 9; Bellamy & Williams, 2013: 10). Tellingly, many small developing countries only provide small (‘token’) contributions to peacekeeping operations (Coleman, 2013), and financial benefits cannot explain the willingness of Austria, Canada, or the Scandinavian countries to provide substantial number of peacekeepers. The motivations behind peacekeeping often encompass broader policy objectives: Bobrow & Boyer (1997) argue that countries get involved in peacekeeping to advance their foreign policy and economic goals.

For non-UN missions, Rost & Greig (2011) show that trade ties but also ethnic and colonial links, are important in determining whether countries send peacekeepers. Focusing on economic interests, Stojek & Tir (2014) show that trade of the five permanent members of the UN Security Council with the (post-)conflict country affects whether a peacekeeping mission is sent. Beardsley & Schmidt (2012), however, contend that the narrow interests of permanent members are less important than the UN's broader aims.

The motives of democratic countries to provide peacekeepers have received most attention (Perkins & Neumayer, 2008). Lebovic (2004) finds that democratic countries contribute more troops to UN missions. He explains their greater involvement because of shared liberal principles, such as democratic and humanitarian objectives, and a preference for intervening multilaterally rather than unilaterally. Lebovic (2004: 914) argues that multilateral operations allow democracies to manage risks and costs, to provide scale efficiencies and legitimacy, and to realize shared interests. Sotomayor (2014: 29–30) focuses on the contributions of democratizing states and argues that their contributions signal a commitment to upholding international agreements and (human rights) norms as well as to their new political identity. Arguably, the specific content of such signals depends on what other countries also provide peacekeepers. The same applies to any effect of participation in peacekeeping on reforming the military organizations of newly democratized countries. In fact, Sotomayor finds that peacekeeping has only limited impact on transforming civil-military relations when political institutions are weak. However, it remains significant that political leaders expect positive spillovers from the participation of their military in multilateral peacekeeping operations with other democracies.

Foreign policy goals supporting the deployment of peacekeepers are not necessarily limited to exporting democratic values. For instance, until 1980 China viewed UN peacekeeping as an aspect of western imperialism. As its foreign policy and economic goals shifted towards multilateralism and integration in the global economy, it has come to support some UN peacekeeping operations and has begun to provide troops. Yet it remains wary of US involvement and sensitive to what other countries are involved in operations (Choedon, 2005).

Shared objectives among a group of countries thus provide private benefits and incentivize countries to support missions with likeminded countries. Moreover, the incentives are not only direct (in the case country *i* benefits from peacekeeping with country *j*) but also indirect (country *i* benefits from peacekeeping with countries *j* and *k*, because the latter prefer to deploy together). In other words, complementarities between policy preferences of countries participating in peacekeeping constitute a network. Policy complementarities affect the private benefits of countries for a number of reasons. First of all, domestic support may depend on whether peacekeeping is done with countries that are considered allies. Secondly, the peacekeeping outcome will depend on a shared understanding of the countries in the mission regarding its implementation and ultimate objectives. Countries with similar foreign policy preferences find it easier to agree on how to carry out peacekeeping. This has become particularly important since peacekeeping has developed beyond the provision of a ‘thin blue-line’ of troops acting as neutral observers. Peacebuilding and peace-enforcement require a more encompassing engagement with the conflict situation. Peacekeepers increasingly use force against groups threatening to undermine the peace-process or violating human rights. Peace-building and peace-enforcement are not necessarily neutral relative to the interests of the countries that provide the peacekeepers, because they aim for particular post-conflict

institutions and may well favor one side or—more commonly—exclude groups from the ultimate settlement.

Peacekeeping failures are obviously costly. As the Srebrenica genocide clearly illustrates, the failure of a peacekeeping mission not only affects the civilians caught up in the fighting and the UN, but also the country that deployed the peacekeepers—in this case, the Netherlands. Peacekeeping failures endanger the troops involved and damage their international reputation. Furthermore, the Dutch government was held liable for their (lack of) action. In other words, failures have clear domestic and international costs. Disagreement about the terms of engagement, lack of coordination among countries involved and disagreement about ultimate objectives all contribute to peacekeeping failures. Inversely, successful peacekeeping provides reputational and domestic political benefits.

Modeling the provision of peacekeepers as a network game

We present and analyze peacekeeping contributions as a network game based on Ballester, Calvó-Armengol & Zenou's (2006) and Calvó-Armengol, Patacchini & Zenou (2009). For our purposes the most important feature of the model is that it captures the idea that a country i 's private-goods benefits from peacekeeping depend not only on whether it acts, but also on whether it does so alongside some other country j . Positive (negative) complementarities exist if i 's private benefits increase (decrease) the more j contributes. The empirical section links the size of such complementarities to the similarity of foreign policy preferences between two countries. Accordingly, the network game analyzes the role of homophily in determining the discretionary international network defined by joint peacekeeping (Maoz & Joyce, 2016)

Social network analysis is no longer limited to its original sociological interpretation, where it dealt with ties associated with social relations. In fact all relationships can constitute a network (Jackson 2008). Accordingly, networks constituted by preference similarity sit well alongside other networks used in international relations theory in recent years such as alliance, trade, and IGO networks (Hafner-Burton, Kahler & Montgomery, 2009). Indeed, the effects of such networks on conflict and cooperation may depend on them generating convergence in preferences (Dorussen & Ward, 2008; 2010).

THE MODEL Consider that there are n countries, where country i 's contribution to peacekeeping is denoted by $x_i \geq 0$. Country i 's utility is a function of the contributions of each country ($j \neq i$) in the system:

$$u_i(x_1, x_2, \dots, x_i, \dots, x_n) = \alpha(x_i + \sum_{j \neq i} x_j) + \pi x_i + \frac{1}{2} \sigma_{ii} x_i^2 + \sum_{j \neq i} \sigma_{ij} x_j x_i \quad (1)$$

The first term represents country i 's gains from total production of the public good, which are linear in i 's contributions and the sum of contributions of all other states assuming $\alpha \geq 0$. The second term represents private benefits that depend exclusively on i 's contributions; for example, in the case of poorer countries, the difference between the costs of deployment and UN payments. We assume that such private benefits exist, or $\pi > 0$. The third term represents i 's costs of peacekeeping, where for all countries i , $\sigma_{ii} = \sigma < 0$. Taking the first three terms together, i 's payoffs are strictly concave in its effort. Moreover, the assumption is that the three terms are the same for all countries.² The fourth term represents complementarities in the joint production of private goods. If $\sigma_{ij} > 0$, there is a positive complementarity whereby i 's private goods from peacekeeping increase with j 's efforts. If $\sigma_{ij} < 0$, the complementarity is negative and i 's private benefits from peacekeeping decrease with j 's efforts.

It is useful to re-arrange (1) so that the costs of peacekeeping are grouped together with any disincentives to contribute due to negative complementarities from other countries' efforts. For this we need some additional notation. Let $\sigma_{min} = \min\{\sigma_{ij} | i \neq j\}$ and $\sigma_{max} = \max\{\sigma_{ij} | i \neq j\}$. Assume that $\sigma_{ii} < \min\{\sigma_{min}, 0\}$, so that i 's payoffs are concave in its own effort ($\sigma_{ii} < 0$). If $\sigma_{min} < 0$, i 's marginal returns to its own effort decrease at least as fast as the component of its private returns related to complementarities with j , which seems appropriate as long as the negative marginal effects of the actions of others on i 's private benefits are not too large. Set $\gamma = -\min\{\sigma_{min}, 0\} \geq 0$, $\lambda = \sigma_{max} + \gamma$, and assume that $\lambda > 0$, ensuring that there are at least some countries whose private benefits increase with their effort. Finally, set $g_{ij} = (\sigma_{ij} - \gamma)/\lambda$ for $j \neq i$ and $g_{ii} = 0$. The term g_{ij} is σ_{ij} normed to be on the interval $[0,1]$ and represents the relative strength of complementarities that increase i 's incentives to contribute to peacekeeping as j 's contribution increases. Adapting Ballester, Calvó-Armengol & Zenou (2006), (1) can be re-arranged as:

$$u_i(x_1, x_2, \dots, x_i, \dots, x_n) = \alpha(x_i + \sum_{j \neq i} x_j) + \pi x_i - \frac{1}{2}(\beta - \gamma)x_i^2 - \gamma \sum_{j=1}^n x_i x_j + \lambda \sum_{j=1}^n g_{ij} x_i x_j \quad (2)$$

EQUILIBRIUM CONTRIBUTIONS Terms g_{ij} can be thought of as entries in an $(n \times n)$ adjacency matrix representing a network. If $g_{ij} = g_{ji}$, the network is symmetric, but this is not a necessary assumption. In effect the network gives the *relative complementarities* in producing private goods via peacekeeping jointly with other countries. Ballester, Calvó-Armengol & Zenou (2006, 1408) show that under certain assumptions a game with the same best-reply functions as ours has a unique pure-strategy equilibrium.³ Because the equilibriums of two games with the same best-reply functions must be identical, it is possible to make use of their result: in equilibrium the relative contributions, in this case to

peacekeeping, are proportional to Bonacich centrality in the network of relative complementarities just discussed.

There exists an intuitive account of the conditions under which this result holds. For a valued graph Freeman centrality is the sum of the value of edges incident on a node i . Central nodes are well connected compared to others. Bonacich centrality further takes into account the centrality of nodes that i is connected to: connections to more central nodes are regarded as being more valuable. A path in a valued graph between i and j is a sequence of edges between successive nodes with value greater than zero, where the sequence of nodes starts with i and ends with j . The value of a path is the sum of the relevant edges. The Bonacich centrality of node i sums the value of all path from i to other nodes and from i to itself (so-called ‘loops’). Bonacich centrality discounts longer paths by an attenuation factor raised to the power of the number of edges in the path. Ballester, Calvó-Armengol & Zenou (2006: 1408) show that λ represents the attenuation factor, where in this case $\lambda > 0$. It is reasonable to expect that $\sigma_{\max} > 0$, i.e., there is at least one dyad where the positive complementarities in joint production of private benefits outweigh the disincentives to contribute because of free riding.

The conditions under which this game has *no* pure strategy equilibrium also provide insight. Assuming $\lambda > 0$, increased contributions made by one country encourage others to contribute more, because of jointly-produced private goods. Feedback effects through the network of (relative) complementarities trigger further increases in contributions. Unless restrained by increases in the costs of contributing (represented by the second term in 2), these feedback effects become boundless, so that contributions keep on expanding. In other words, an equilibrium only exists if the positive feedback effects are not too great relative to the costs of contributing to peacekeeping; in other words, λ must not be too great.

Heuristically, it is further useful to consider how shocks may increase contributions of a country i . Assume that the first order effect of a shock is to encourage a country (j) with foreign-policy preferences similar to i to do more. Increased contributions of j in turn encourage other countries with preferences similar to j to contribute more peacekeepers. We can imagine the effect of the shock rippling outward from i , and eventually even being “reflected back” to i along paths in the network. The attenuation factor mentioned above ensures that, like ripples on a pond caused by dropping in a stone with waves being reflected back from the edges, the feedback effects gradually die down as they travel through the numerous paths in the network. In equilibrium contributions are proportional to Bonacich centrality because a country with a centrally located policy preferences is located on many paths, *so it is more subject to these positive feedback effects* as they move backwards and forwards through the network.

Thus in our context, the Bonacich centrality represents the degree to which a country i is motivated to contribute because contributions of other countries increase its private benefits. The measure allows not only for first-order effects (direct links in the network) but also for second and higher order feedbacks (longer paths in the network). The attenuation factor λ relates to how much a country responds to these feedback effects. So a country’s equilibrium contribution (supposing there is one) increases with the direct *and indirect effects* of others’ contributions on its own private goods from peacekeeping. This seems intuitively appealing, but to move beyond pure theory to testable hypotheses requires auxiliary assumptions about when positive complementarities exist between members of a dyad.

HYPOTHESIS We focus on similarity of foreign policy preferences as a reason for why contributions to peacekeeping operation may have positive or negative complementarities: if i and j have similar foreign policy preferences, each gets higher private-goods payoffs from participating in peacekeeping when the other is involved. We have already provided a number of plausible reasons, such as increased domestic support for acting alongside like-minded countries. If the views of countries i and j on foreign policy are more similar (or positively correlated), country j should support a proposal by country i in international forums. On the other hand, if their views are more dissimilar (or negatively correlated), the countries are unlikely to support each other's proposals. Countries with similar foreign policy preferences strive to achieve compatible objectives during the implementation of the mission and be more likely to support each other's peacekeepers. The expected private benefits from mission success should increase as well as potential losses from mission failure should decrease when operating with like-minded countries. Further, these benefits increase if countries with similar policy views contribute more peacekeepers.

Several measures of the degree of similarity of foreign policy preferences exist. Generally these reflect positive or negative correlations between voting behavior in the UN. Allen and Yuen (2014) use this approach to control for whether similarity of preferences between permanent members of the UN Security Council and states where peacekeeping missions take place affect the mandate under which peacekeeping occurs. To generate a network \mathbf{G} of *relative* complementarities of the sort required by the theory, we rescale the measure of similarity of foreign policy preferences (m_{ij}) to lie on the interval $[0,1]$, so $g_{ij} = m'_{ij}$, where m'_{ij} is the normed measure of preference similarity. This allows us to test the following hypothesis:

Hypothesis: Other things being equal, the proportion of troops a country contributes to the overall numbers involved in a UN peacekeeping mission increases with its Bonacich centrality in network **G**.

Data and research design

The analysis includes data on 35 UN peacekeeping missions between 1990 and 2011, where the units are country contributions to a mission in a particular year. We analyze contributions of military personnel. Countries retain control over the decision to contribute troops, and contributions accordingly vary from year to year. Military personnel make up the main part (approximately 90%) of all peacekeepers and limiting attention to military contributions reduces the impact of countries with only token contributions on the analysis. We only consider contributions to UN PKOs, because the domain of non-UN missions remains unclear encompassing regional peacekeeping but also military interventions. The theoretical model and key hypothesis predict the *proportion* of troops instead of the absolute number of troops contributed to a mission. The dependent variable is defined accordingly. The proportion of contributions (*prop_troops*) is the contributions of a country to a particular mission in a given year divided by total number of troops participating in that particular mission in the year concerned.

The measure of complementarities of foreign policy preferences draws on recent work by Bailey, Strezhnev & Voeten (2015). UN General Assembly roll-call data are used commonly to generate dyadic measures of preference similarity using a correlational approach (Signorino & Ritter, 1999). Bailey, Strezhnev & Voeten (2015) estimate cut-points applying methods used to position legislators on a left-right dimension. An advantage of their approach is that it provides a context-free positional measure, independent from the set of issues under

discussion. To ensure independence from the agenda, Bailey, Strezhnev & Voeten (2015) further anchor their scale on votes taken over identically worded resolutions that have appeared repeatedly on the General Assembly agenda. They provide an ideal-point position for each session for each member state with a delegation in that session. The positions do not capture all relevant foreign policy differences; e.g., India, Bangladesh and Pakistan on average have very similar scores over the period of our study, despite regional hostilities. However, it is widely accepted that UN voting data is the best available proxy.

We use the ideal-point positions to create a measure of policy similarity for each pair of countries for each year and to calculate country centrality in the network of policy complementarities. Policy similarity is the inverse of policy *dissimilarity* where the latter is calculated as the absolute difference between the ideal-point positions of two countries for any year. Policy dissimilarity is normed to fall between 0 and 1 by subtracting the minimum difference for that year and dividing by the difference between the maximum and minimum values. (Normed) dissimilarity is inverted by subtracting the score from 1. Next, we apply the measure for policy similarity to a valued network with all countries as nodes and edges having higher scores the more similar the dyad's preferences.

The analysis uses eigenvalue rather than Bonacich centrality. Bonacich centrality allows for the specification of an attenuation factor and an exogenous vector of factors influencing the importance of a node in the network (Bonacich, 1987; Bonacich & Lloyd, 2001). However, when capturing preference similarity, there is no good theoretical reason to include exogenous factors. As discussed above, Ballester, Calvó-Armengol & Zenou (2006) specify the relevant attenuation factor as $\lambda = \sigma_{\max} + \gamma$. Unfortunately, we cannot directly estimate the relevant preference parameters on which the attenuation factor depends. Instead we calculate

eigenvalue centrality scores using Miura's (2012) Stata ado-files. In effect, in our analysis the attenuation factor corresponds to the reciprocal of the largest eigenvalue, and to make this clear we call our main independent variable *eigen*.

Figure 1 shows how policy complementarities (*eigen* centrality) vary with a country's policy position (*ideal_point*). Notable is that countries with ideal point around zero have higher centrality scores. This is intuitive: *eigen* takes account not only of how many countries are near, but also how many states those countries are near to, and so on. The distribution of ideal points is bimodal, but each mode is quite near the zero point. It follows that countries with an ideal point near the center are located close to a lot of other countries also located near each other. Countries with more extreme ideal points are located close to fewer countries, either in direct terms or along indirect paths.

(Figure 1 about here.)

Recognizing this regularity in the data, our hypothesis amounts to the idea that countries that share policy preference with ideologically moderate countries provide higher proportions of peacekeepers than ideologically extreme ones, other things equal. They are likely to stand alongside other ideologically moderate countries in peacekeeping operations.

Our model proposes jointly-produced private benefits as an explanation for this regularity. A possible alternative explanation might be that ideologically moderate countries are more likely to set the objectives of peacekeeping missions compared to ideologically extreme ones. The UN decision-making procedures for peacekeeping operations do not necessarily favor moderate countries, since missions are *not* decided by majority rule of all UN members. Instead, decisions are made in the Security Council where each permanent member has a

veto, and the distribution of their preferences does not necessarily mirror that of the whole membership.

CONTROL VARIABLES The theory and hypothesis introduced above focus on proportionate contributions in equilibrium. Existing empirical work tends to explain the (absolute) number of troops contributed to peacekeeping missions, and doesn't necessarily provide guidance for our empirical models. Large absolute contributions can give moderate proportionate contributions in the case of big missions. Bove & Elia (2011), for example, find that troop contributions correlate with conflict intensity and number of displaced persons. Yet if this applies likewise to all countries considering sending peacekeepers, then these variables would not affect the proportion of troops sent by any particular country. In the light of this we start with a relatively sparse baseline model.

A possible explanation for the high contributions of countries like Bangladesh, India and Pakistan could be that the UN pays a fixed amount per peacekeeper (Bove & Elia, 2011). It is thus important to control for the impact of UN reimbursements on troop contributions. It is not easy to find a proxy, but especially poorer developing countries can use revenues from UN peacekeeping to fund their military. Assuming that the price of a soldier positively correlates with general real income levels, we use real GDP per capita (at year 2000 prices) (*rgdp_pc*). As an alternative proxy for the price of providing a soldier, we take the ratio of total military expenditures to the number of military personnel, *mil_per_sold*. The coverage of *mil_per_sold* is limited due to availability of data on military expenditure and troop numbers.

Countries are likely to have stronger security and economic interests in nearby countries providing them with private incentives to contribute towards peacekeeping in these countries. Further, it is also less costly to deploy troops regionally (Perkins & Neumayer, 2008; Bove & Elia, 2011). All models control for weighted distance (*dist_w*): a measure of the distance between two countries using the distances between urban agglomerations in each country and weighted by the population of these agglomerations (Mayer & Zignago, 2011).⁴

The empirical models include some plausible additional controls. Democracies are more likely to supply peacekeepers (Perkins & Neumayer, 2008), so we include the 21-point Polity democracy score of the contributing nation, *polity2*. The permanent five members of the Security Council (China, France, Russia, UK, and USA) have a veto power over the authorization of UN PKO, and thus we include dummies for each of the five members separately. The US dummy (*USA*) also reflects the hegemonic position of the USA during this period. On-going commitments to other peacekeeping missions (*num_missions*) may constrain the ability of countries to deploy peacekeepers to further missions, but could also measure a general commitment to UN peacekeeping.

Historical colonial links have been suggested as a factor for peacekeeping (Perkins & Neumayer, 2008). The dummy *col45* takes on the value 1 if the nation contributing troops had a colonial relationship in the post 1945 period with the country where the mission was being carried out. Further, *comcol* indicates if the countries in dyad were subject to a common colonizer in this period (Mayer & Zignago, 2011). Exploratory analysis suggests that smaller countries are less likely to provide peacekeepers for operations in bigger countries: we include the ratio of the populations of the country providing troops to the population of the country where the mission was taking place, *ratio_pop*.

Countries more embedded in the normative order of the world system post-1945 could be more likely to contribute to peacekeeping. Previously, we have argued that countries central to the co-affiliation network generated by membership of IGOs are more open to normative pressure from other countries (Dorussen & Ward, 2008). While (Freeman) centrality in the trade network could capturing a country's overall stake in maintaining world trade (Dorussen & Ward, 2010). Accordingly, in further robustness tests, we control for IGO and trade centrality.

Results

Figure 2 provides a visual impression of the relationship between policy centrality (*eigen*) and the proportion of the total number of troops deployed in a mission/year contributed by a country, *prop_troop*. Even though our theory suggests a linear relationship between these two variables, empirically the relationship seems positive but non-linear. Figure 2 displays the country labels for the top-twenty contributors. Discernable is the high proportion of troops provided by India, Bangladesh, Pakistan, and Fiji. It is interesting to note that these countries also have relatively high scores on *eigen*. Financial incentives and policy complementarities are thus possibly competing explanations. Among countries with low scores on *eigen*, the USA stands out in having relatively high contributions. Bailey, Strezhnev & Voeten (2015) interpret their scale as measuring the degree to which countries support the US-led liberal international order, with low scores representing disagreement with this order. Many of countries with low *eigen*-scores generally fail to contribute to peacekeeping.⁵ Even countries with high *eigen*-scores often do not contribute in a particular year, but *only* countries with moderate to high scores on *eigen* (higher than approximately .05) contribute anything—the UK and the USA are the exceptions to the rule. Finally, there is considerable variation in

countries' contributions for higher values on the *eigen*, suggesting that a range of other factors could be at work.

(Figure 2 about here.)

A difference of means test allows us to explore whether policy preferences of contributors to UN PKOs tend to cluster. The mean absolute difference between ideal points of a random sample of a thousand pairs of countries equals 1.14 (with a standard deviation: 0.88).

Drawing a sample of thousand pairs of countries that participate in the same peacekeeping operation in a given year yields 0.97 as the mean difference of ideal points (standard deviation: 0.81). We test the one-sided hypothesis that the mean is lower for the random peacekeeping sample compared to the sample of all countries. The difference of means between ideal points in the peacekeeping sample is indeed significantly lower ($p < .000$) than would be expected at random. However, we also note that the difference is quite small in substantive terms given the standard deviation of ideal points.

The first regression in Table I provides the baseline model. Model 1 includes eigenvalue centrality (*eigen*) to capture the complementarities in foreign policy positions. It also includes the squared term of eigenvalue centrality ($eigen^2$) to capture possible non-linearities suggested by Figure 2. The model further includes wealth (*rgdp_pc*) as well as weighted distances (*dist_w*) to control for private financial incentives to provide peacekeepers as well as the salience of regional instability. It is reasonable to expect that countries maintain their commitment to a particular PKO for a number of years. The Woolridge test for autocorrelation in panel data confirms the need to control for autocorrelation ($prob > F = .000$). Accordingly, the models give GLS estimates allowing for an AR(1) process. Model 1 further assumes random effects for contributing country, mission and year.

In Model 1, policy complementarities as measured by both centrality terms are (marginally) significant suggesting a non-linear relation. A possible explanation is that payoff complementarities are not linear with the closeness of preferences of any two countries but exhibit declining marginal utility. If so, as observed, the marginal increase in *prop_troop* with *eigen* should be declining. Countries contribute a lower proportion of peacekeepers if they are located further—using population weighted distance, *dist_w*—from the location of the mission. In Model 1, however, the effect of wealth (*rgdp_pc*) is not significant.

Model 2 (Table I) includes (contributor) country fixed effects. Here, both eigenvalue policy centrality variables are significant at least at the 99% level. Countries contribute a larger proportion of peacekeepers if they are more centrally located in the policy-preference network, but the effect is non-linear. In the fixed-effects estimation, the coefficient of *rgdp_pc* is negative and marginally significant suggesting that poorer countries have financial incentives to provide peacekeepers. The coefficient of distance (*dist_w*) is largely unaffected.

(Table I about here)

Model 3 (Table I) returns to the random-effects specification but includes a number of additional controls, some of which are (largely) time invariant. In the immediate post-Cold War period, the USA held a special position, and Figure 2 further suggests it is an outlier in the centrality relationship. Democracies are more likely to supply peacekeepers (Perkins & Neumayer, 2008), perhaps because they benefit more from supporting a democratic world order. Historical colonial linkages may contribute to peacekeeping, while smaller countries are less likely to provide peacekeepers for operations in bigger countries, *ratio_pop*. We also control for country involvement in concurrent missions (*num_missions*). In Model 3, the

policy complementarities support the central hypothesis and remain highly significant. Wealth (*rgdp_pc*) and distance (*dist_w*) retain their level of significance. The other controls are all significant and, apart from number of missions, in the expected direction. We find that countries contribute a larger proportion of troops if they are simultaneously deploying to other missions. Rather than indicating a possible constraint, the variable seems to register a general willingness to engage with UN peacekeeping. Regardless of our uncertainty about the correct interpretation, because the coefficient is highly significant, we retain it as a control in all models to avoid omitted variable bias. Compared to Models 1 and 2, we lose about 8,000 observations (about 14%) in the third model.

Based on Model 3, we calculate the average estimated effect of policy complementarities (eigenvalue centrality) across contributing countries and over time by changing *eigen* from its empirically minimum to maximum value. Policy complementarities increase *prop_troops* with about 0.6 of a standard deviation. Since on average the UN force size was around 2635 in a given year per mission, this means that shifting *eigen* from its minimum to maximum value increases a country's contribution to an 'average' mission with approximately 50 troops. These calculations suggest a substantively modest but non-negligible effect from the motive to engage in peacekeeping alongside friends. Coleman (2013, 48) observes that relatively small, or token, contribution to UN PKOs are increasingly commonplace: "220 of the 322 national troop contributions deployed in UN peacekeeping operations in August 2011 were token contributions comprising less than forty military personnel," and "[t]he vast majority of these portfolios suggest that token troop contributions represent a deliberate strategy to spread a state's military resources over more multilateral operation" (50). The non-linear effect of policy complementarities does not greatly alter the overall interpretation of the model. In Model 3, the effect of policy complementarities is maximized when *eigen*

equals approximately .07. Here, the maximum substantive effect of policy complementarities equals about 55 troops, and the impact of any non-linear decrease is thus 5 troops at most.

Model 4 presents a random effects model with additional time-invariant predictors as suggested by Bell and Jones (2015). The model distinguishes the effects of over-time and cross-sectional variation of relevant variables. For each on the country-mission panels, any within effects are based on the difference between the yearly observation and the panel mean ($x_{ij} - \bar{x}_j$), while the between effect is based on the panel mean (\bar{x}_j).⁶ With this transformation within and between effects can be consistently estimated together (Bell & Jones, 2015: 144–7). Notably, the within (over-time) effect of eigenvalue centrality remains significant, while the between (across country-mission) effect is now insignificant. If policy complementarities increase over time, countries become more willing to deploy troops to a particular mission, while policy complementarities are less important to explain differences in country willingness to contribute peacekeepers more generally across missions. A possible explanation is that countries respond to the participation of likeminded countries to specific missions rather than the latter's general engagement in UN PKOs. Democracy and population size are no longer significant when distinguishing between and within panel effects. In contrast, both with within and between effects of concurrent number of missions remain significant at 99%, making it more plausible that the variable registers a general willingness to engage with UN peacekeeping. The coefficients of wealth and the purely time invariant variables are unaffected.

ROBUSTNESS TESTS The significance of policy complementarities is robust for a number of further specifications, see Tables II and III. The dependent variable *prop_troop* is heavily skewed to the left, because many countries do not contribute to particular missions. The

variable is also censored at zero and one, making the distribution the error term non-normal. Further, strictly speaking the formal model does not predict zero contributions. Table II replicates the models presented in Table I, but drops all cases where a country never contributes to a particular mission. The dependent variable is log transformed to correct for the left-skew and non-normal distribution of errors.⁷ The qualitative impact of these changes to the main results is minor. Policy complementarities remain significant in Models 5 – 7, as does the within-panel effect in Model 8. The effects of the control variables are also largely robust even though there is a considerable loss of degrees of freedom with only 6,000 cases (about 10%) retained.

(Table II about here)

Table III presents a number of alternative model specifications based on Model 3 (Table I). As an alternative proxy for the price of providing a soldier, we take the ratio of a country's military expenditures to the number of its military personnel, *mil_per_sold*, as a measure of the cost to contributing countries. In Model 9 (Table III), *mil_per_sold* has the anticipated sign, but is insignificant. Due to limited availability of data on military expenditure and troop numbers, the regression loses about 20,000 observations (40%). Since all five permanent members of the Security Council must sanction (or at least not veto) a UN peacekeeping operation, Model 10 controls for each permanent member. Only the coefficient for the USA is significant. Model 11 explores whether policy positions rather than complementarities matter. Notably, there is no empirical support that countries with moderate spatial ideal points contribute a higher proportion of troops. The coefficients for the other variables (including policy complementarities) are unaffected by including these further controls.

Finally, it may be reasonable to expect that countries contribute more to peacekeeping if they are more embedded in normative order underlying the post WW II world system. Model 12 includes centrality in the IGO and trade networks. Contrary to expectations, the coefficients of centrality in the IGO network and centrality in trade are negative and only the latter is significant when added. Their inclusion reduces the significance of policy complementarities (especially *eigen*²) but not the significance of the other coefficients. Again there is some loss of degrees of freedom due to limited time coverage of the trade and IGO data, but estimates remain largely stable.⁸

Conclusions

UN PKOs are increasingly composed of troops from multiple countries, and we expect countries to care about the coalition of countries involved in a particular peacekeeping mission. The ‘coalition’ has an important say in the direction of the mission and the probability of success and risks of failure. All of this affects the reputation of the troops and governments of the countries involved both internationally and domestically. Peacekeeping has become a jointly-produced good. Using the framework of games on networks, specifically the model of Ballester, Calvó-Armengol & Zenou’s (2006), we analyze the effect of complementarities in foreign policy preference on the willingness to provide peacekeepers. The key insight is that countries provide a larger proportion of peacekeepers to a particular mission if they are more central in a network of policy preferences. In effect, countries that are more centrally located are closer to more countries that are then also closer to many other countries. Importantly, centrality in this network matters and not simply holding moderate policy preferences.

Policy complementarities are an understudied motivation for peacekeeping contributions. Most explanations have either focused on peace and security as public benefits or, alternatively, on private (financial) motives. Empirically, we show that policy complementarities matter. Moreover, the significance of centrality of the network of policy preferences is robust. An important qualification is that the theory suggests a linear relationship whereas we observe a quadratic, non-linear one between *eigen* and *prop_troop*. Substantially, comparing a poorly connected (extreme) country with a highly connected (centrally located) country makes a difference of about 50 to 55 military personnel to a UN PKO in a given year. Although this may seem minor, it encompasses the majority of contributions made to UN peacekeeping missions.

Notably, the policy complementarities among the group of contributor countries do not conform to a US based liberal-peace model. In fact, the USA is an outlier contributing more to UN PKOs than would be expected based on their foreign policy positions. Countries that contribute to peacekeeping generally share more moderate policy positions, and we show that these shared preferences motivate them to contribute to peacekeeping. In practice and on the ground, UN peacekeeping therefore may not be the pinnacle of liberal peace building, but rather a collective response of a coalition of countries that perceive a common interest to intervene in a particular situation. In other words, countries wish to stand alongside their friends when they engage in peacekeeping.

Data replication

An on-line Appendix with further robustness tests as well as the dataset, codebook, and do-files for the empirical analysis in this article can be found at <http://www.prio.org/jpr/datasets>.

Acknowledgements

Paper was previously presented at the Global Democratic Governance Workshop at the University of St. Gallen. We thank all participants for their insightful comments. We further acknowledge financial support from the International Studies Association and the University of St. Gallen. We thank Tobias Boehmelt and Vincenzo Bove for sharing data on peacekeeping contributions

References

- Abrams, Samuel; Torben Iversen & David Soskice (2011) Informal Social Networks and Rational Voting. *British Journal Of Political Science*, 41(02), 229-257.
<http://dx.doi.org/10.1017/s0007123410000499>
- Allen, Susan H & Amy T Yuen (2014) The politics of peacekeeping: UN Security Council oversight across peacekeeping missions. *International Studies Quarterly* 58(4): 621-632. <http://dx.doi.org/10.1111/isqu.12086>
- Bailey, Michael A; Anton Strezhnev & Erik Voeten (2015) Estimating dynamic state preferences from United Nations voting data. *Journal of Conflict Resolution*.
<http://dx.doi.org/10.1177/0022002715595700>
- Ballester, Coralio; Antoni Calvó-Armengol & Yves Zenou (2006) Who's who in networks. wanted: The key player. *Econometrica* 74(5): 1403-1417.
<http://dx.doi.org/10.1111/j.1468-0262.2006.00709.x>
- Beardsley, Kyle & Holger Schmidt (2012) Following the Flag or Following the Charter? Examining the Determinants of UN Involvement in International Crises, 1945–2002. *International Studies Quarterly* 56(1): 33–49. <http://dx.doi.org/10.1111/j.1468-2478.2011.00696.x>
- Bell, Andrew & Kelvyn Jones (2015). Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data. *Political Science Research and Methods* 3(1): 133 – 153. <http://dx.doi.org/10.1017/psrm.2014.7>
- Bellamy, Alex J & Paul D Williams, eds (2013) *Providing Peacekeepers: The Politics, Challenges, and Future of United Nations Peacekeeping Contributions*. Oxford: Oxford University Press.

- Bobrow, Davis D & Mark A Boyer (1997) Maintaining system stability: Contributions to peacekeeping operations. *Journal of Conflict Resolution* 41(6): 723-748.
<http://dx.doi.org/10.1177/0022002797041006001>
- Böhmelt, Tobias (2016) The importance of conflict characteristics for the diffusion of international mediation. *Journal of Peace Research* 52(2): XXX-XXX
- Bonacich, Phillip (1987) Power and centrality: A family of measures. *American Journal of Sociology* 92(5): 1170-1182. <http://dx.doi.org/10.1086/228631>
- Bonacich, Phillip & Paulette Lloyd (2001) Eigenvector-like measures of centrality for asymmetric relations. *Social Networks* 23(2): 191–201.
[http://dx.doi.org/10.1016/s0378-8733\(01\)00038-7](http://dx.doi.org/10.1016/s0378-8733(01)00038-7)
- Bove, Vincenzo & Leandro Elia (2011) Supplying peace: Participation in and troop contribution to peacekeeping missions. *Journal of Peace Research* 48(6): 699–714.
<http://dx.doi.org/10.1177/0022343311418265>
- Calvó-Armengol, Antoni; Eleonora Patacchini & Yves Zenou (2009) Peer effects and social networks in education. *Review of Economic Studies* 76(4): 1239-1267.
<http://dx.doi.org/10.1111/j.1467-937x.2009.00550.x>
- Choedon, Yeshi (2005) China's stand on UN peacekeeping operations: Changing priorities of foreign policy. *China Report* 41(1): 39-57.
<http://dx.doi.org/10.1177/000944550504100103>
- Coleman, Katharina (2013) Token troop contributions to United Nations peacekeeping operations. In: Alex J Bellamy & Paul D Williams (eds) *Providing Peacekeepers: The Politics, Challenges, and Future of United Nations Peacekeeping Contributions*. Oxford: Oxford University Press, pp. 47–70.
- Cornes, Richard & Todd Sandler (1984) Easy riders, joint production, and public goods. *Economic Journal* 94(3): 580-598. <http://dx.doi.org/10.2307/2232704>

- Dorussen, Han & Theodara-Ismene Gizelis (2013). Into the Lion's Den: Local Responses to UN Peacekeeping, *Journal of Peace Research*, 50 (6), 693 – 708.
<http://dx.doi.org/10.1177/0022343313484953>
- Dorussen, Han & Hugh Ward (2008). 'Inter Governmental Organizations and the Kantian Peace: A Network Perspective', *Journal of Conflict Resolution*, 52(2), 189 - 212.
<http://dx.doi.org/10.1177/0022002707313688>
- Dorussen, Han & Hugh Ward (2010). 'Trade Networks and the Kantian Peace', *Journal of Peace Research*, 47(1), 29 – 42. <http://dx.doi.org/10.1177/0022343309350011>
- Doyle, Michael W & Nicholas Sambanis (2006) *Making War and Building Peace. United Nations Peace Operations*. Princeton: Princeton University Press.
- Findlay, Trevor, ed. (1996) *Challenges for the New Peacekeepers. SIPRI Research Report No. 12*. Oxford: Oxford University Press.
- Fortna, Virginia P (2008). *Does Peacekeeping Work? Shaping Belligerents' Choices after Civil War*. Princeton: Princeton University Press.
- Gaibullov, Khusrav; Justin George, Todd Sandler & Hirofumi Shimizu (2015) Personnel contributions to UN and non-UN peacekeeping missions: A public goods approach. *Journal of Peace Research* 52(6): 727-742.
<http://dx.doi.org/10.1177/0022343315579245>
- Gaibullov, Khusrav; Todd Sandler & Hirofumi Shimizu (2009) Demands for UN and non-UN peacekeeping: Nonvoluntary versus voluntary contributions to a public good. *Journal of Conflict Resolution* 53(6): 827-852.
<http://dx.doi.org/10.1177/0022002709338509>
- Gallop, Max (2016) Endogenous network and international cooperation. *Journal of Peace Research* 52(2): XXX-XXX

- Hafner-Burton, Emilie M; Miles Kahler & Alexander H Montgomery (2009) Network analysis for international relations. *International Organization* 63(3): 559–592.
<http://dx.doi.org/10.1017/s0020818309090195>
- Heldt, Birger & Peter Wallensteen (2006) *Peacekeeping Operations: Global Patterns of Intervention and Success, 1948 – 2004*. 2nd Ed. Stockholm: Folke Bernadotte Academy Publications.
- Hultman, Lisa; Jacob Kathman & Megan Shannon (2013) United Nations peacekeeping and civilian protection in civil war. *American Journal of Political Science* 57(4): 875-891.
<http://dx.doi.org/10.1111/ajps.12036>
- Jackson, Matthew O (2008). *Social and Economic Networks*. Princeton: Princeton University Press.
- Khanna, Jyoti; Todd Sandler & Hirofumi Shimizu (1998) Sharing the financial burden for UN and NATO peacekeeping, 1976-1996. *Journal of Conflict Resolution* 42(1): 176-195. <http://dx.doi.org/10.1177/0022002798042002003>
- Khanna, Jyoti; Todd Sandler & Hirofumi Shimizu (1999) The demand for UN peacekeeping, 1975-1996. *Kyklos* 52(3): 345-368. <http://dx.doi.org/10.1111/j.1467-6435.1999.tb00222.x>
- Larson, Jennifer M (2016) Interethnic conflict and the dangers of cross-group ties. *Journal of Peace Research* 52(2): XXX-XXX
- Lebovic, James H (2004) Uniting for peace? Democracies and United Nations peace operations after the Cold War. *Journal of Conflict Resolution* 48(6): 910–936.
<http://dx.doi.org/10.1177/0022002704269357>
- Maax, Zeev & Kyle Joyce (2016) The Effects of shocks on international networks: Changes in the attributes of states and the structure of international alliance networks. *Journal of Peace Research* 52(2): XXX-XXX

- Mayer, Thierry & Soledad Zignago (2011) Notes on CEPII's distances measures. The GeoDist Database. *CEPII Working Paper* No. 2011 – 25.
<http://dx.doi.org/10.2139/ssrn.1994531>
- Miura, Hirotaka (2012) Stata graph library for network analysis. *Stata Journal* 12(1): 94-129.
- Olson, Mancur (1965) *The Logic of Collective Action. Public Goods and the Theory of Groups*. Cambridge, MA: Harvard University Press.
- Olson, Mancur & Richard Zeckhauser (1966) An economic theory of alliances. *Review of Economics and Statistics* 48(2): 266-279. <http://dx.doi.org/10.2307/1927082>
- Perkins, Richard & Eric Neumayer (2008) Extra-territorial interventions in conflict spaces: Explaining the geographies of post-Cold War peacekeeping. *Political Geography* 27(4): 895-914. <http://dx.doi.org/10.1016/j.polgeo.2008.11.001>
- Ratner, Steven R (1995) *The New UN Peacekeeping. Building Peace in Lands of Conflict after the Cold War*. New York, NY: St Martin's.
- Rost, Nicholas & J Michael Greig (2011) Taking matters into their own hands: An analysis of the determinants of state-conducted peacekeeping in civil wars. *Journal of Peace Research* 48(2): 171–184. <http://dx.doi.org/10.1177/0022343310396110>
- Ruggeri, Andrea, Han Dorussen & Theodora-Ismene Gizelis (2012). On the Frontline Every Day? Subnational Deployment of United Nations Peacekeepers. Paper presented at the Meeting of the International Studies Association, San Diego, April 2012.
- Ruggeri, Andrea, Han Dorussen & Theodora-Ismene Gizelis (2013). Winning the Peace Locally: UN Peacekeeping and Local Conflict. Paper presented at the Meeting of the International Studies Association. San Francisco, April 2013.

- Ruggeri, Andrea, Theodora-Ismene Gizelis & Han Dorussen (2013). Managing Mistrust: an Analysis of Cooperation with UN Peacekeeping in Africa. *Journal of Conflict Resolution* 57(3): 387-409. <http://dx.doi.org/10.1177/0022002712448906>
- Sambanis, Nicholas & Michael Doyle (2007) No easy choices: Estimating the effects of the United Nations peacekeeping. *International Studies Quarterly* 51(1): 217-226. <http://dx.doi.org/10.1111/j.1468-2478.2007.00447.x>
- Shimizu, Hirofumi & Todd Sandler (2002) Peacekeeping and burden-sharing, 1994-2000. *Journal of Peace Research* 39(6): 651-668. <http://dx.doi.org/10.1177/0022343302039006001>
- Signorino, Curtis S & Jeffrey M Ritter (1999) Tau-b or not Tau-b: Measuring the similarity of foreign policy positions. *International Studies Quarterly* 43(1): 115-144. <http://dx.doi.org/10.1111/0020-8833.00113>
- Sotomayor, Arturo C (2014) *The Myth of the Democratic Peacekeeper. Civil-Military Relations and the United Nations*. Baltimore, MD: John Hopkins University Press.
- Strezhnev, Anton & Erik Voeten (2013) United Nations general assembly voting data. <http://hdl.handle.net/1902.1/12379> UNF:5:s7mORKL1ZZ6/P3AR5Fokkw== Erik Voeten [Distributor] V7 [Version]
- Stojek, Szymon M & Jaroslav Tir (2014) The supply side of United Nations peacekeeping operations: Trade ties and United Nations-led deployments to civil war states. *European Journal of International Relations* 21(2), 352-376. <http://dx.doi.org/10.1177/1354066114532665>
- Wilson, Maya; David R Davis & Amanda Murdie (2016) The view from the bottom: Networks of conflict resolution organizations and international peace. *Journal of Peace Research* 52(2): XXX-XXX

HUGH WARD, b. 1952, PhD in Political Science (University of Essex, 1979); Professor, Department of Government, University of Essex (2003–); current main interests: international environmental politics and political economy, network analysis.

HAN DORUSSEN, b. 1962, PhD in Political Science (University of Texas, Austin 1996); Professor, Department of Government, University of Essex (2009–); current main interests: trade and conflict, peacekeeping, and peacebuilding.

Table I. Proportionate contribution of troops to UN peacekeeping operations, 1990 – 2011, GLS models with AR(1) disturbances

<i>prop_troops</i>	Model 1	Model 2	Model 3	Model 4
Policy complementarities				
<i>eigen</i>	4.27e-01 (1.76) †	1.04e+00 (3.43)**	1.41e+00 (3.30)**	
<i>eigen (within)</i>				1.89e+00 (3.34)**
<i>eigen (between)</i>				9.14e-01 (1.27)
<i>eigen</i> ²	-3.63e+00 (2.04)*	-7.74e+00 (3.56)**	-9.57e+00 (3.19)**	
<i>eigen</i> ² (within)				-1.25e+01 (3.24)**
<i>eigen</i> ² (between)				-6.09e+00 (1.17)
Wealth (<i>rgdppc</i>)	-2.25e-08 (0.82)	-1.05e-07 (1.95)†	-5.65e-08 (1.74)†	
<i>rgdppc (within)</i>				-1.14e-07 (1.70) †
<i>rgdppc (between)</i>				-6.49e-08 (1.66) †
Democracy (<i>polity2</i>)			1.30e-04 (2.71)**	
<i>polity2 (within)</i>				7.82e-05 (1.11)
<i>polity2 (between)</i>				4.55e-05 (0.69)
Population (<i>ratio_pop</i>)			1.75e-05 (2.08)*	
<i>ratio_pop (within)</i>				6.95e-05 (1.20)
<i>ratio_pop (between)</i>				7.23e-06 (0.85)
Missions (<i>num_missions</i>)			4.02e-03 (20.40)**	
<i>num_missions (within)</i>				3.22e-03 (14.83)**
<i>num_missions (between)</i>				7.78e-03 (16.81)**
USA			2.70e-02 (4.04)**	2.06e-02 (2.41)*
Distance (<i>distw</i>)	-2.39e-07 (2.88)**	-3.86e-07 (3.72)**	-2.44e-07 (2.47)*	-2.01e-07 (1.99)*
Common colonizers (<i>comcol</i>)			4.23e-03 (2.75)**	3.88e-03 (2.52)*
Colonial link (<i>col45</i>)			3.65e-02 (6.04)**	3.27e-02 (5.40)**
Constant	-6.24e-03 (0.75)	-2.80e-02 (2.39)*	-4.86e-02 (3.17)**	-3.24e-02 (1.30)
<i>N</i>	53,669	53,669	45,678	45,678
<i>Country Fixed Effects</i>	No	Yes	No	No
<i>Rho</i>	.52	.52	.52	.52
<i>R2 (overall)</i>	.001	.06	.04	.04

Notes: z-scores in parentheses; † $p < 0.1$; * $p < 0.05$; ** $p < 0.01$

Table II. Proportionate contribution of troops to UN peacekeeping operations, 1990 – 2011, GLS models with AR(1) disturbances (excluding zero contributions)

<i>ln_prop_troop</i>	Model 5	Model 6	Model 7	Model 8
Policy complementarities				
<i>eigen</i>	3.99e+02 (3.67)**	1.22e+03 (5.60)**	7.11e+02 (3.84)**	
<i>eigen (within)</i>				6.43e+02 (3.02)**
<i>eigen (between)</i>				6.44e+02 (1.60)
<i>eigen</i> ²	-3.46e+03 (4.18)**	-9.30e+03 (6.10)**	-4.95e+03 (3.74)**	
<i>eigen</i> ² (<i>within</i>)				-4.44e+03 (2.96)**
<i>eigen</i> ² (<i>between</i>)				-4.71e+03 (1.60)
Wealth (<i>rgdppc</i>)	-3.20e-05 (2.57)*	4.09e-05 (1.55)	-2.18e-06 (0.17)	
<i>rgdppc (within)</i>				4.02e-05 (1.48)
<i>rgdppc (between)</i>				-2.18e-05 (1.31)
Democracy (<i>polity2</i>)			5.03e-02 (2.22)*	
<i>polity2 (within)</i>				8.66e-02 (2.88)**
<i>polity2 (between)</i>				2.22e-02 (0.65)
Population (<i>ratio_pop</i>)			-1.25e-03 (0.80)	
<i>ratio_pop (within)</i>				-9.72e-03 (0.93)
<i>ratio_pop (between)</i>				-1.09e-03 (0.69)

Missions			1.44e+00	
(<i>num_missions</i>)			(28.52)**	
<i>num_missions</i> (within)				1.56e+00
				(27.40)**
<i>num_missions</i>				9.02e-01
(between)				(7.93)**
USA			8.54e+00	7.26e+00
			(3.88)**	(1.81) †
Distance (<i>distw</i>)	-6.19e-05	-2.60e-04	-1.22e-04	-9.62e-05
	(1.54)	(4.63)**	(3.16)**	(2.46)*
Common colonizers			2.11e+00	2.20e+00
(<i>comcol</i>)			(4.06)**	(4.17)**
Colonial link (<i>col45</i>)			2.98e+00	3.03e+00
			(2.74)**	(2.71)**
Constant	-2.10e+01	-4.84e+01	-3.83e+01	-3.37e+01
	(5.70)**	(6.40)**	(5.87)**	(2.44)*
<i>N</i>	6,040	6,040	5,890	5,890
<i>Country Fixed Effects</i>	No	Yes	No	No
<i>Rho</i>	.51	.51	.50	.50
<i>R</i> ² (overall)	.01	.12	.16	.17
Notes: z-scores in parentheses; † $p < 0.1$; * $p < 0.05$; ** $p < 0.01$				

Table III. Proportionate contribution of troops to UN peacekeeping operations, 1990 – 2011, GLS models with AR(1) disturbances. Robustness checks

<i>prop_troops</i>	Model 9	Model 10	Model 11	Model 12
Policy				
<i>eigen</i>	1.50e+00 (3.01)**	1.34e+00 (3.06)**	1.68e+00 (3.79)**	1.04e+00 (2.01)*
<i>eigen</i> ²	-9.78e+00 (2.81)**	-9.13e+00 (2.97)**	-1.06e+01 (3.50)**	-6.97e+00 (1.94)†
Policy position (<i>abs_idealpoint</i>)			2.42e-03 (2.40)*	
Wealth (<i>rgdppc</i>)		-5.52e-08 (1.69)†	-5.26e-08 (1.61)	-3.57e-08 (0.86)
Deployment costs (<i>mil_per_sold</i>)	-4.48e-09 (1.48)			
Democracy (<i>polity2</i>)	1.64e-04 (3.01)**	1.22e-04 (2.55)*	1.55e-04 (3.18)**	2.48e-04 (4.25)**
Population (<i>ratio_pop</i>)	1.89e-05 (2.06)*	2.28e-05 (2.48)*	1.67e-05 (1.98)*	2.12e-05 (2.21)*
Distance (<i>distw</i>)	-2.87e-07 (2.57)*	-2.35e-07 (2.38)*	-2.26e-07 (2.28)*	-3.40e-07 (2.98)**
Missions (<i>num_missions</i>)	4.54e-03 (19.66)**	4.05e-03 (20.46)**	4.04e-03 (20.48)**	5.42e-03 (22.14)**
USA	3.08e-02 (4.05)**	2.57e-02 (3.76)**	2.80e-02 (4.18)**	5.35e-02 (5.19)**
UK		-9.54e-05 (0.02)		
Russia		6.71e-03 (1.37)		
China		-8.08e-03 (1.53)		
France		-7.11e-03 (1.41)		
Common colonizers (<i>comcol</i>)	5.25e-03 (2.98)**	4.16e-03 (2.70)**	4.15e-03 (2.69)**	5.01e-03 (2.75)**
Colonial link (<i>col45</i>)	3.64e-02 (5.48)**	3.81e-02 (6.03)**	3.65e-02 (6.04)**	4.10e-02 (5.80)**
IGO centrality				-5.31e-07 (1.93)†
Trade centrality				-1.42e-08 (3.36)**
Constant	-5.37e-02 (3.02)**	-4.58e-02 (2.90)**	-6.42e-02 (3.86)**	-3.33e-02 (1.79)†
<i>N</i>	34,481	45,678	45,678	32,073

<i>Rho</i>	.37	.52	.52	.33
<i>R2</i>	.04	.04	.04	.05

Notes: z-scores in parentheses; † $p < 0.1$; * $p < 0.05$; ** $p < 0.01$

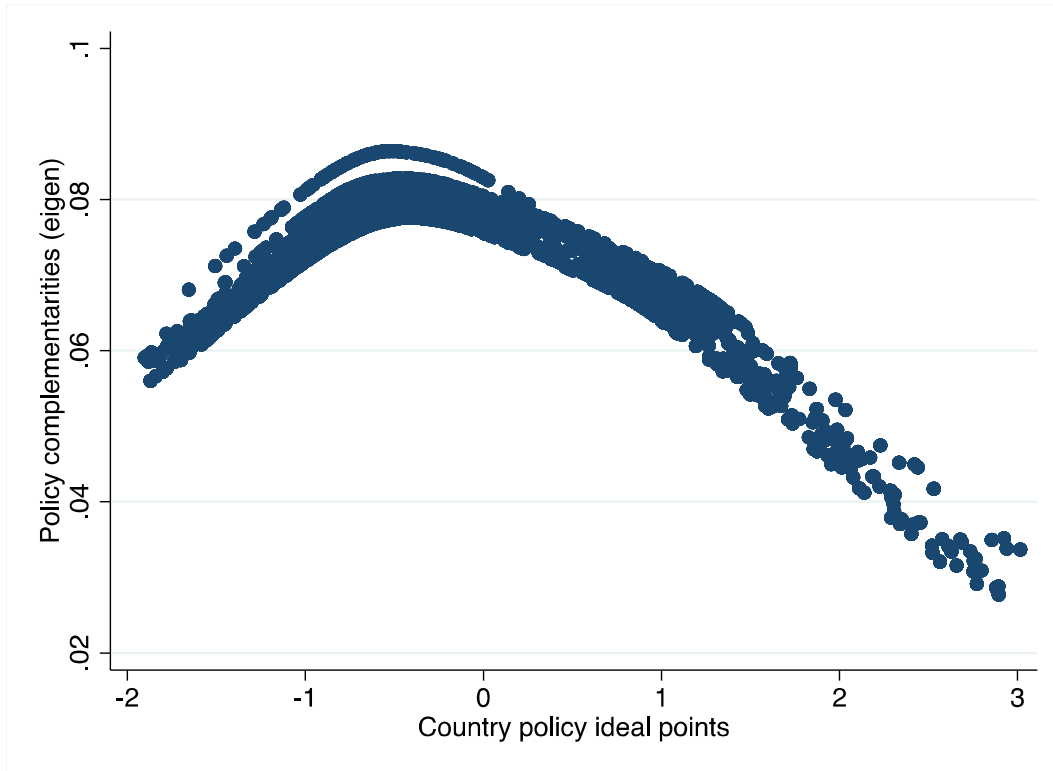


Figure 1. *Eigen* centrality scores by policy ideal point, 1990-2011.

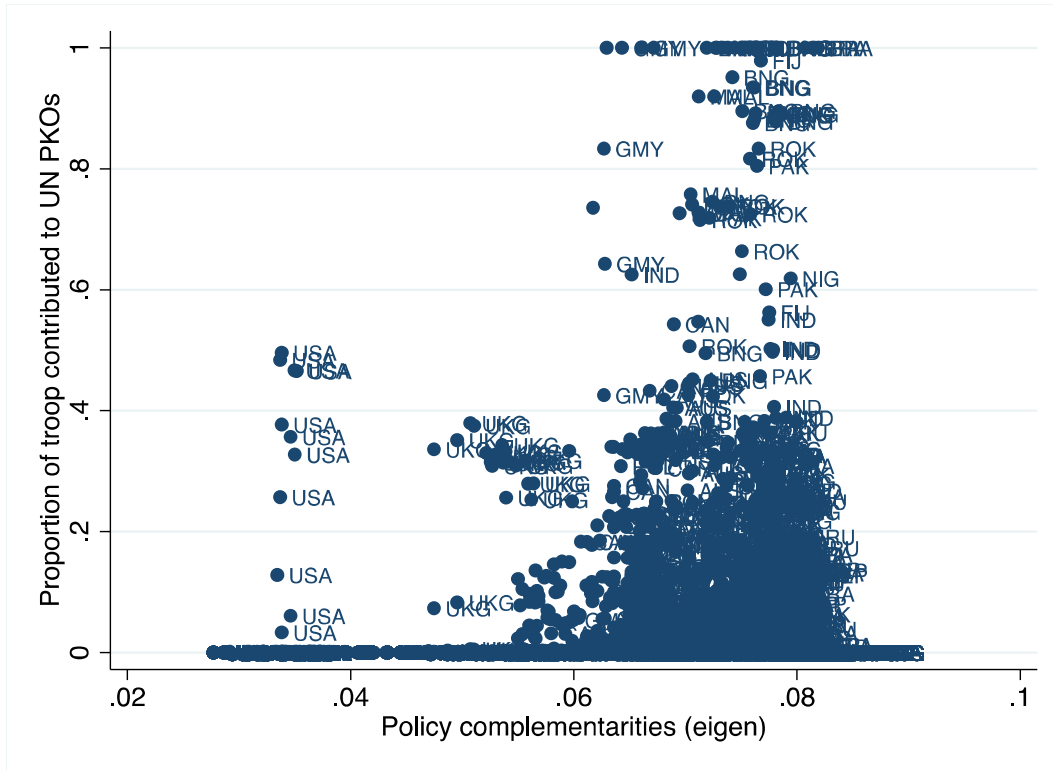


Figure 2. Proportionate contribution to UN peacekeeping per mission/year and eigen centrality.

¹ Since the end of the Cold War, the international community has increasingly intervened in order to contain intra- and interstate conflict using a variety of approaches. In this special issue, Böhmelt (2016) uses network analysis to study mediation, while Wilson, Davis & Murdie (2016) examine the relevances of networks of nongovernmental organizations in peacebuilding.

² Ballester, Calvó-Armengol & Zenou (2006) show how their results generalize if this assumption is relaxed.

³ As i 's payoffs are strictly concave in its own efforts, the first-order condition defines i 's best reply; our game has the same best reply functions as that of Ballester, Calvó-Armengol & Zenou (2006), setting $\alpha + \pi$ equal to the constant in their model that scales contributions into benefits dependent only on i 's actions. This holds because of our assumption that i 's benefits from the public good are linear in j 's contributions. The linearity assumption is reasonable if the difference country i makes to overall collective security is not too great.

⁴ We have also run spatial OLS models using a spatial lag over country troop contributions conditioned via policy complementarities. These spatial lags are positive, but not consistently significant across models. Most importantly, our central findings (for eigen and eigen²) are robust. Results in the on-line Appendix.

⁵ The empirical models presented below exclude countries that do not contribute to any PKO, which reduces the impact of lack of contributions by extreme countries.

⁶ Note that in Model 4 the time-invariant ('fixed') effects are country-mission specific, while Model 2 controls for country fixed-effects.

⁷ The models include cases where countries do not contribute troops to some years of a particular mission; in these cases, a minimal contribution was assumed in order to calculate \ln_prop_troops . The on-line Appendix gives the results for excluding all zero contributions.

⁸ The on-line Appendix provides additional robustness tests.