

# Something, something, something about Foreign Aid

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March 13, 2015

## **Abstract**

In recent years, numerous studies have sought to explain the strategic and political motivations that direct foreign aid flows (e.g., Alesina and Dollar 2000; Berthélemy 2006; Werker 2012). To that end, scholars have tested many monadic and dyadic level hypotheses have done so using widely inconsistent measures of ‘strategic interest’. Moreover all the extant literature analyzes aid flows in a dyadic context where the assumption is that the flow of aid between any particular dyad is independent of any other. However, scholars are well aware of potential dependence in foreign aid allocations. Some scholars hypothesize for example that donors exhibit herding (Frot and Santiso 2011) or ”lead donorship behavior (Steinwand 2014) wherein donor countries are dissuaded from giving aid to a country that already has a major donor. This is also empirically problematic as failing to account for interdependencies leads to biased coefficients and standard errors. To explicitly incorporate these interdependencies, we used a mixed hierarchical model with random effects. In doing so we are able to shed new light onto the political and strategic considerations underlying the distribution of foreign aid in the international system.

# Introduction

Foreign aid describes the transfer of resources from one government to another. Although the term itself suggests a humanitarian motive, scholars and experts have long debated whether it would be more accurate to ascribe foreign aid a strategic motive instead. With some exceptions (?), most scholars have found that donors prioritize strategic considerations when dispensing aid (Alesina and Dollar 2000; Berthélemy 2006).

This seeming consensus belies the inconsistency with which scholars conceptualize and measure strategic considerations, which have variously included bilateral trade intensity, UN voting scores, colonial legacies and regional dummies among others. In this paper we seek to rectify fragmentation: First, we create an original measure of bilateral strategic interest that measures the latent distance between countries across the strategic policy space. In doing so, we seek to provide a more coherent measure of strategic interest which incorporates many of the measures that previous papers have used. Further this measure improves upon existing measures of strategic interest in that it maps strategic interest onto a “social space”, through which we can account for third order relationships between states (?).

The existing lack of coherence in evaluating strategic interest extends to model specification. Papers which have empirically evaluated the dominance of strategic over humanitarian motives with some exceptions (Berthélemy 2006), have done so by specifying models which pool all donors together or by running models for each donor country separately. In our model specification, we use a hierarchical random effects model with countries receiving aid nested in senders and senders nested in time. Applying this method will enable us to explicitly model the drivers of aid in an aggregate sense and to also explore how those drivers vary between senders. For now we present preliminary results that show our strategic interest variable does play a positive role in predicting aid flows between countries.

In what follows, we first give a brief overview of the literature before introducing our new measure of strategic interest. We then run our analyses of the motivations for foreign aid with our new measure using a hierarchical random effects model. We discuss the implications of our results before concluding.

## Lit Review

Scholars have sought to determine the primary motivation for foreign aid at least as far back as the modern foreign aid regime was erected in the post-WWII era. In doing so, they have erected a number of framing devices – e.g., donor interest vs. recipient interest (Lumsdaine 1993), realist vs idealist motivations (Schraeder, Hook and Taylor 1998), donors who give to recipients who practice bad governance or good governance (Dollar and Levin 2006; ?), donors who give to recipients who implement “bad polices” or “good policies” (Alesina and Dollar 2000) etc.

One reason for evaluating the motivations for aid and not aid outcomes is that aid given for strategic reasons may still further development objectives, albeit incidentally, while aid given for humanitarian reasons may also bring unexpected strategic benefits (Maizels and Nissanke 1984). However, evaluating the motivations for aid is not a straightforward process – any given aid project may work toward providing assistance to a recipient country as well as strategic benefits to a donor country. The question to be answered then is what relative consideration is given to donor interest or humanitarian need when making aid allocation decisions. At the root of these dichotomies is the suspicion that despite rhetoric to the contrary, foreign aid has been dispersed to address donor interest to a much greater extent than it has been for recipient needs.

Scholars sought to provide empirical evidence for answer or another since at least as far back as the late 1970’s (???) and onward to the 1980’s (Maizels and Nissanke 1984) and 1990’s (Lumsdaine 1993; Schraeder, Hook and Taylor 1998), with scholars finding ev-

idence to suggest that foreign aid allocation is driven by strategic concerns much more than humanitarian ones. Alesina and Dollar (2000) were among the first to extend this finding across a large panel of countries, that is to 21 donor countries and 181 recipient countries from 1970-1994. They find that countries that votes relatively more similarly to Japan in the UN are 172% more likely to receive more aid while Egypt and Israel receive upwards of 400% more foreign aid than other countries. Ceteris paribus they argue that inefficient, economically closed non-democratic former colonies are much more likely to receive aid than countries that had not been formerly colonized with similar poverty levels, a finding that ? echoe when they find that the US is more likely to give corrupt governments more aid. Berthélemy (2006) reaches a similar conclusion, noting that donor countries are generally much more likely to act based off of egotistic motivations than altruistic ones, while ? and ? find evidence to suggest that donor countries are more likely to use foreign aid to “buy influence”.

While scholars have certainly found variation in their results, the overwhelming consensus is that strategic interest largely takes precedence over humanitarian ones in foreign aid allocation. Despite this seeming consensus, we find that Alesina and Dollar (2000)’s remark that “unfortunately the measurement of what a ‘strategic interest’ is varies from study to study and is occasionally tautological”, still holds true. That is, strategic interest has alternately been measured by: trade intensity (??), UN voting scores (Alesina and Dollar 2000; ?; Dreher and Fuchs Forthcoming), arms transfers (Maizels and Nissanke 1984), colonial legacy (Alesina and Dollar 2000; ?; ?; Berthélemy 2006), alliances (?Schraeder, Hook and Taylor 1998), regional dummies (?Berthélemy 2006; Maizels and Nissanke 1984), bilateral dummies (Alesina and Dollar 2000; ?; Berthélemy 2006)<sup>1</sup> or some combination of the above.

Other papers take a negative approach and argue that any shortfall between what would theoretically be expected from poverty-efficient aid allocation and actual aid allocation (???), or similarly between a theoretical allocation based on good governance and

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<sup>1</sup>A US-Egypt or US-Israel dummy seems to be the most common instance of a bilateral dummy

actual aid allocation(Dollar and Levin 2006; ?), is evidence of strategic interest at play.

What's more, what some scholars measure as strategic interest other scholars interpret as a measure of humanitarian interest. As ? notes for example, there is some controversy in interpreting GDP per capita as a measure of humanitarian aid, as "the poorer a country is, the more it needs aid, and the easier it might be for donors to use aid to influence decisions in the recipient". She further notes that colonial legacy, a factor that some scholars see as evidence of strategic interest, may not necessarily be an appropriate measure of strategic interest but instead of "strategic development". In this sense, humanitarian and strategic interests are mutually complementary motivations as donor countries seek to further the development of countries that they have a self-interest in seeing develop. We would further add that increased aid among countries with former colonial ties could also be interpreted as a measurement of the greater degree of cultural understanding between these countries, which has long been argued to be a cornerstone of effective aid. In order to properly evaluate the motivations for foreign aid, what is needed is a better and clearer measure of strategic interest, something which we take up in the next section.

Meanwhile, we note that despite the general consensus that donors are more driven by strategic interests than humanitarian ones, researchers also recognize that there may be significant variation in aid allocation *across time*. In their analysis of 22 donor countries and 137 recipient countries from 1980-1999, ? finds that following the Cold War, foreign aid allocation has been more responsive to a good governance and good economic policy in recipient countries, a result that ? and Dollar and Levin (2006) echoes. This suggests not only that humanitarian need has become more important in recent years but that the relative balance between strategic and humanitarian considerations are not fixed over time. This claim is disputed by ?'s findings however, whose analysis suggests that foreign aid dispersed from 1981 to 2002 has been *less* targeted to needy countries over time. What these studies hold in common however, is a lack of a *measure* of what they

think may be affecting aid allocation across time, only an *interpretation* of what these time effects might mean given their knowledge of the different time periods.

Finally, we similarly note that despite the general consensus that donors are more driven by strategic interests than humanitarian ones, researchers also recognize that there may be significant variation in aid allocation *among different donor countries*. To that end, many papers endeavor to provide an analysis of aid allocation on a cross national level and for individual donor countries (Alesina and Dollar 2000; Berthélemy 2006) while other papers choose to focus on the aid allocation strategies of one donor country at a time?Dreher and Fuchs (Forthcoming); ?); Neumayer (2003); Fleck and Kilby (2010). In none of the papers we have encountered however, have scholars sought to evaluate differences in aid allocation in a multi-level hierarchical model. We seek to account for both variation of foreign aid allocations in time and variation across countries in our model specification, which we detail further in the empirical section of this paper.

## Measuring Strategic Relationships

How one *measures* strategic relationships is essential to evaluating the relative importance countries may accord strategic motives when dispensing aid. However, as argued in the literature review, previous papers have been inconsistent in how they have measured strategic interest, which in turn produces incoherence as to what exactly is being measured. It is not simply a matter of using different data to measure the same concept but of using different data to measure different aspects of a concept. That is, while UN voting scores and arms transfers may be acceptable measures of strategic interest, surely nobody is arguing that they are conceptually equivalent in the same way as Polity and Freedom House.

A large reason for this inconsistency is that while a dyad's strategic bilateral re-

lationship is quite multifaceted, to date, there has not been a readily available measure of strategic relationships which captures its various aspects the same way that scholars have done for other complex concepts.<sup>2</sup> The most relevant research to date has been concerned with how to measure foreign policy similarity, starting with ?'s Kendall  $\tau_b$  measure followed by ?'s S Scores, with new work continually being done in this arena (???). However, foreign policy similarity arguably only captures the political dimension of strategic relationships, equally relevant is active military cooperation between two countries.

While military cooperation certainly has political dimensions, we would argue that it should be considered a separate aspect of a strategic relationship rather than an subset of political strategic relationship. That is, military security is set apart by its capacity to affect a country's security in a manner that is more immediate, concrete and unilateral than other security concerns across countries more generally, as compared to, for example, access to natural resources, humanitarian sanctions or environmental policy. Though military cooperation can certainly be mediated in the political arena, it is qualitatively different – that is it is one thing to jointly condemn the various atrocities of the North Korean government, it is quite another thing to take joint military action against it.

## A new measure of strategic relationships

Our measure of strategic relationships attempts to introduce greater coherency to the literature by providing a more rigorous measure of these two aspects of a strategic relationship, political and military. We do so by first measuring the latent space of different dyadic variables that measure various aspects of the strategic relationship between countries. We then calculate the latent distance between each dyad for each component using a bilinear mixed effects model (?). Finally, we combine the latent distances for each variable through a principal components analysis (PCA). As such, our political strategic relationship measure is the first principal component that results from the PCA of the

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<sup>2</sup>For example, Polity and Freedom House have provided measures of political institutions while the World Bank's World Governance Indicators (WGI) project provides measures for six dimensions of governance

latent distance between dyadic alliances, UN voting and joint membership in an intergovernmental organizations (IGOs). Meanwhile our military strategic relationship measure is the first principal component of the PCA that results from the latent distance between dyadic arms transfers, militarized interstate disputes (MIDs), and wars. Note that MIDs and wars are of course, the opposite of military cooperation; for these latent measures we reverse the scale to account for this. We explain how we construct these measures of strategic interest in greater detail below while we detail the data sources we relied on in the data section.

The main advantage of calculating the latent space of different dyadic variables as opposed to using alternative specifications such as the S Score algorithm<sup>3</sup> is that we are consequently able to account for third order dependencies within the data. To review, first order dependency refers to the propensity for some actors to send or receive more ties than others, second-order dependency refers to reciprocity of exchange between actors, and a third-order dependency refers to interactions among three or more actors. Dyadic data are rife with these types of dependencies, and aside from first-order dependencies, they pose serious challenges to the basic assumption of independence between observations (??).

In particular, third order dependency includes the concepts of (a) transitivity, (b) balance and (c) clusterability. Formally, a triad  $ijk$  is said to be transitive if for whenever  $y_{ij} = 1$  and  $y_{jk} = 1$ , we also observe that  $y_{ik}$ . This follows the logic of “ a friend of a friend is a friend”. Meanwhile, a triad  $ijk$  is said to be balanced if  $y_{ij} \times y_{jk} \times y_{ki} > 0$ . Conceptually, if the relationship between  $i$  and  $j$  is ‘positive’, then both will relate to another unit  $k$  identically, either both positive or both negative. Finally a triad  $ijk$  is said to be clusterable if it is balanced or all the relations are all negative. It is a relaxation of the concept of balance and seeks to capture groups where the measurements are positive within groups and negative between groups.

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<sup>3</sup>? , for example, measure a states “threat environment” as the set of all states for which ones is contiguous with or which is a major power and with an S score below the population median.

In other words, third order dependencies suggest that “knowing something about the relationship between  $i$  and  $j$  as well as between  $i$  and  $k$  may reveal something about the relationship between  $i$  and  $k$ , even when we do not directly observe it” (?). Such a dependency is especially important to capture with regards to strategic relationships as dyadic relationships between two particular countries cannot help but be understood in the context of their relationship with other countries.

We run a null generalized bilinear mixed effects model (gbme)<sup>4</sup> to estimate the latent space for each component of our strategic interest variables. Formally, it is represented as follows:

$$\theta_{i,j} = a_i + b_j + \gamma_{i,j} + z'_i z_j$$

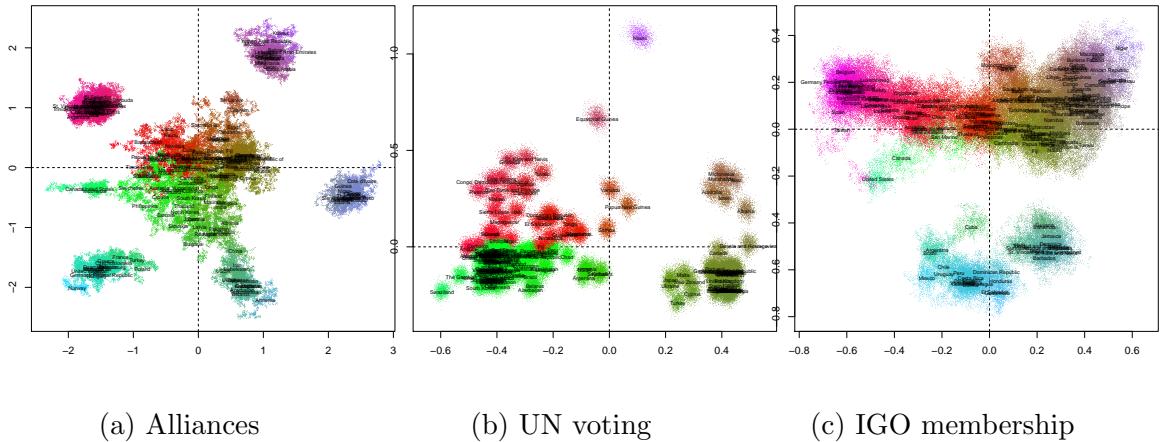
where  $\theta_{i,j}$  is the dyadic variable of interest (e.g., alliances),  $a_i$  estimates ‘sender’ effects,  $b_j$  estimates ‘receiver’ effects’ and  $z'_i z_j$  is the bilinear effect which estimates the latent space and accounts for third order dependencies common in dyadic data. We estimate the model via Gibbs sampling of full conditionals of the parameters. For a more detailed discussion of this model, see ????. In Figures 1 and 2, we present a visualization of the resultant latent space we calculated for each component for the year 2005.

Countries that cluster together in this two-dimensional latent space are more likely to interact with each other. The plots for the components for the political strategic relationship variable suggest that there is distinct clustering among countries. This is also true for latent space of arms transfers, a component of the military strategic relationship variable. However, there is much less clustering for the other two components of the military strategic relationship variable, suggesting that many conflicts involve more than one or two dyads and further that military conflicts can have broad ramifications beyond

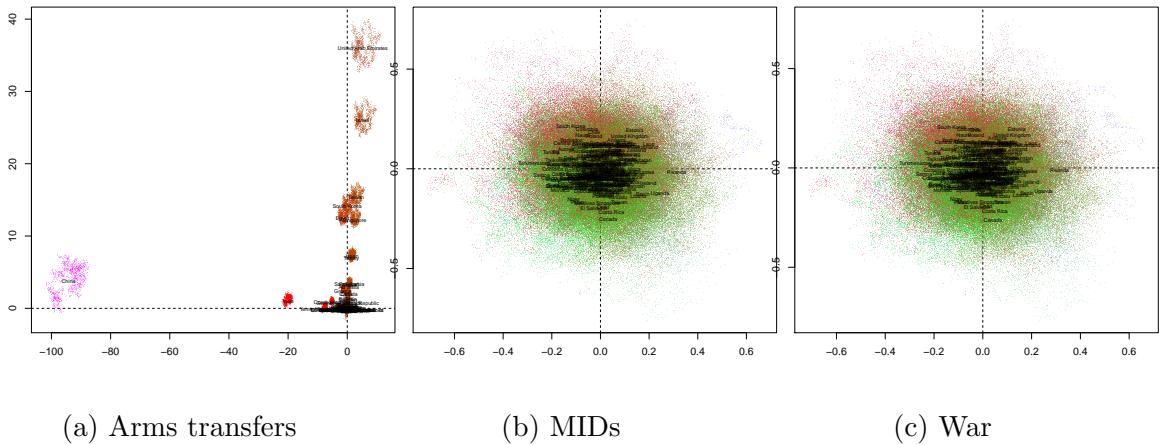
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<sup>4</sup>Code for running the gbme can be found from Hoff’s website at [http://www.stat.washington.edu/hoff/Code/hoff\\_2005\\_jasa/](http://www.stat.washington.edu/hoff/Code/hoff_2005_jasa/).

**Figure 1:** Latent Spaces for components of Political Strategic Interest Measure during 2005



**Figure 2:** Latent Spaces for components of Military Strategic Interest Measure during 2005



the dyads involved.

After estimating the latent spaces for these components, we calculate the euclidean distance between each dyad for each component. We then combine them in a principal components analysis to reduce the dimensionality of our measure while retaining as much variance as possible. That is, alliances, UN voting and joint membership in IGOs all capture certain aspects of political strategic interest. Instead of choosing only one of them as our measure of strategic interest as other papers have done, we combine them in order to increase our explanatory power. We estimate a PCA for each year separately<sup>5</sup> and use the

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<sup>5</sup>For each year, we conduct a bootstrap PCA of 1000 subsamples each

first principal component for each year as our measure of strategic interest. On average over all the years, we find that our political strategic interest variable, that is the first component of our PCA of the combination of alliances, UN voting and joint membership in IGOs, explains about 51% of its variance. Meanwhile we find that the our military strategic interest variable, that is the first component of our PCA of the combination of arms transfers, MIDs and war incidence, explains about 66% of its variance.

A visualization of the resultant dyadic PCA is shown below in Figures ?? for the political strategic measure and in Figure ?? for the military strategic measure for the year 2005. Along the x and y axes are the countries included in our analysis; any point within the plot represents the dyadic relationship between a country on the x and y axis with darker shading representing a stronger relationship and lighter shading representing a weaker relationship.

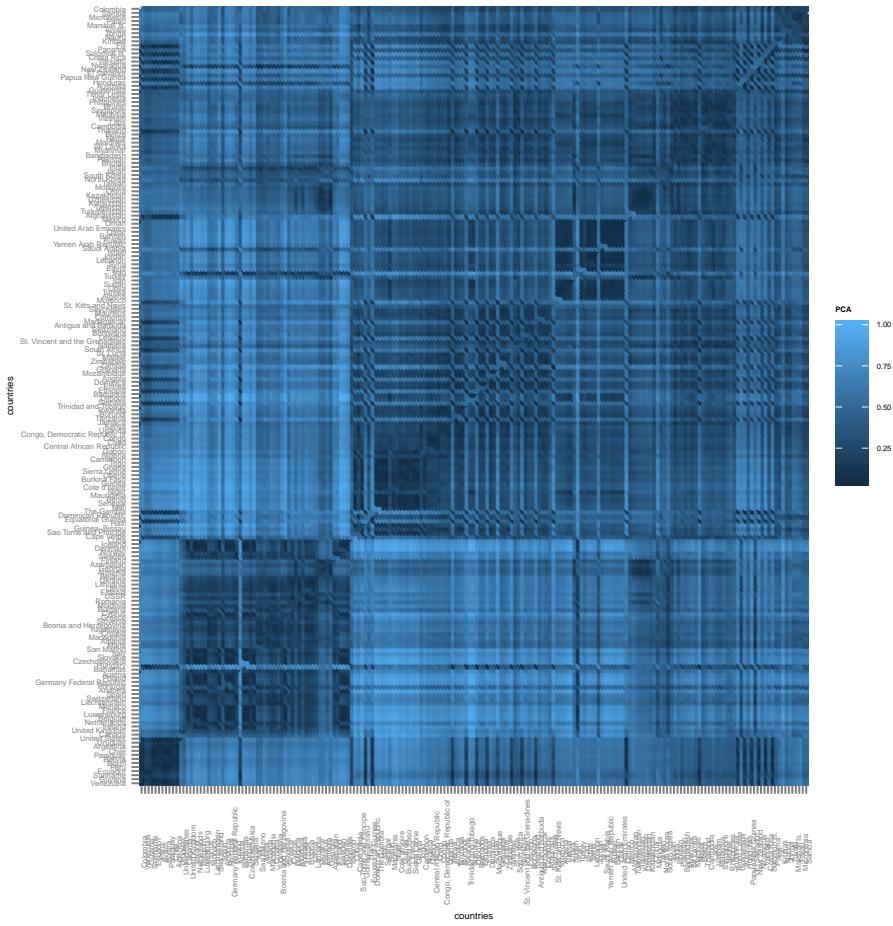
These plots suggest that there is much more variation in political strategic relationships than there are military strategic relationships, perhaps because the number of issues spaces in the political arena are much greater. They also suggest that on average, countries have a greater political strategic relationships than military strategic relationships. Since the military strategic relationships data is composed largely of actual military events, this makes sense as on average, conflict between any two countries is much rarer than diplomatic negotiations.

We also conduct a series of post-estimation validation tests for our resulting strategic variables. In particular, we (1) evaluate the relationship between our political strategic interest variable and our military strategic interest variable against S scores and Kendall's  $\tau_b$  for alliances and (2) investigate how our measures describe well-known dyadic relationships. We perform a simple bivariate OLS with and with year fixed effects to evaluate how our measures compare to S scores and Kendall's  $\tau_b$ .<sup>6</sup> Note in order to make our strategic

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<sup>6</sup>Note for comparison that the bivariate relationship of S scores on Kendall's  $\tau_b$  is statistically significant with a coefficient of 0.62 while the bivariate relationship of Kendall's  $\tau_b$  on S Scores is statistically

**Figure 3:** Dyadic PCA for Political Strategic Interests for year 2005

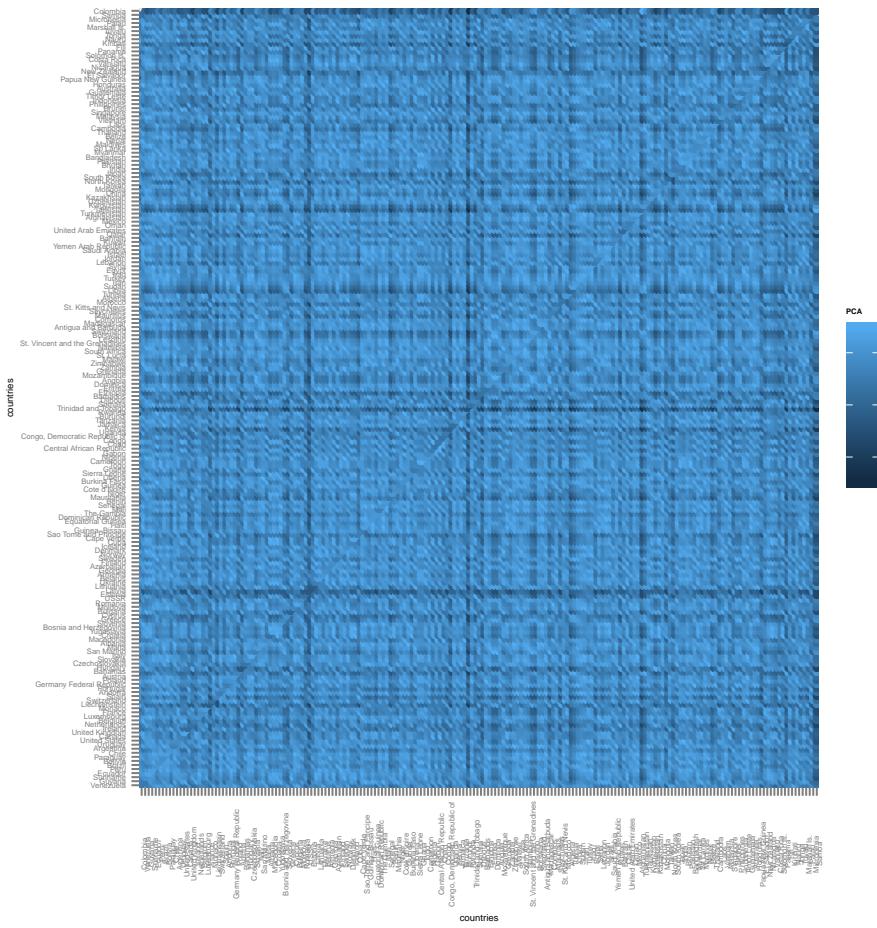


Along the x and y axes are the countries included in our analyses for the year 2005. The color gradient reflects the strength of the strategic relationship between any two dyads, with dark colors reflecting a stronger relationship and light colors reflecting a weaker relationship. Note that because the PCA is of latent distances between any two dyads, dyads that are closer in space and thus stronger strategic relationships will have smaller values.

measures somewhat interpretable, for the validation we scale our strategic measures to be between 0 and 1 just as S scores and Kendall  $\tau_b$  is scaled. The results are shown in Table 1 for political strategic interest and Table 2 for military strategic interest.

In brief, we find that our political strategic measure performs well against S scores and Kendall's  $\tau_b$  for alliances with and without fixed effects. Note that because the PCA is of latent distances between any two dyads, dyads that are closer in space will have smaller values and therefore represent a stronger strategic relationship. Therefore the negative relationship we find between the political strategic measure and S scores and  $\tau_b$  significant with a coefficient of 0.31.

**Figure 4:** Dyadic PCA for Military Strategic Interests for year 2005



Along the x and y axes are the countries included in our analyses for the year 2005. The color gradient reflects the strength of the strategic relationship between any two dyads, with dark colors reflecting a stronger relationship and light colors reflecting a weaker relationship. Note that because the PCA is of latent distances between any two dyads, dyads that are closer in space and thus stronger strategic relationships will have smaller values.

**Table 1:** Validation of Political Strategic Interest Variable against S scores and Kendall's  $\tau_b$

	Unweighted S Scores	Unweighted S Scores	Weighted S Scores	Weighted S Scores	Tau-B	Tau-B
(Intercept)	0.97*** (0.00)	1.03*** (0.00)	1.01*** (0.00)	1.02*** (0.00)	0.29*** (0.00)	0.25*** (0.00)
Political Strategic Interest	-0.80*** (0.00)	-0.84*** (0.00)	-1.22*** (0.00)	-1.26*** (0.00)	-0.89*** (0.00)	-0.87*** (0.00)
Year FE?	No	Yes	No	Yes	No	Yes
R <sup>2</sup>	0.28	0.32	0.32	0.34	0.17	0.17
Adj. R <sup>2</sup>	0.28	0.32	0.32	0.34	0.17	0.17
Num. obs.	824426	824426	824426	824426	824148	824148

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

**Table 2:** Validation of Military Strategic Interest Variable against S scores and Kendall's  $\tau_b$

	Unweighted S Scores	Unweighted S Scores	Weighted S Scores	Weighted S Scores	Tau-B	Tau-B
(Intercept)	0.75*** (0.00)	0.79*** (0.00)	0.68*** (0.00)	0.66*** (0.00)	0.02*** (0.00)	0.02*** (0.00)
Military Strategic Interest	0.01*** (0.00)	-0.05*** (0.00)	0.03*** (0.00)	-0.10*** (0.01)	0.02*** (0.00)	-0.00 (0.00)
Year FE?	No	Yes	No	Yes	No	Yes
R <sup>2</sup>	0.00	0.01	0.00	0.01	0.00	0.00
Adj. R <sup>2</sup>	0.00	0.01	0.00	0.01	0.00	-0.00
Num. obs.	824426	824426	824426	824426	824148	824148

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$

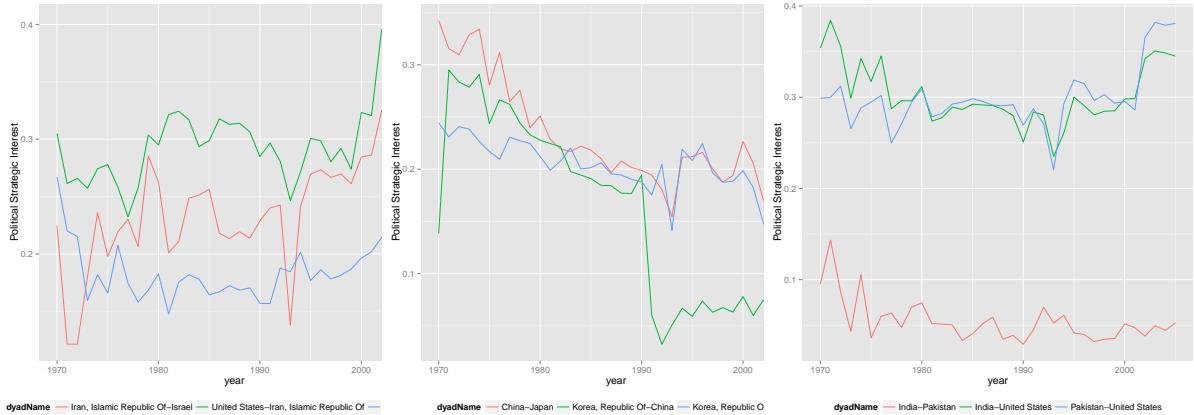
are interpreted to mean the greater the foreign policy similarity as measured by the S score or Kendall's  $\tau_b$ , the smaller the latent distance or the greater the political strategic relationship between a dyad.

Our military strategic measure performs will mixed results with respect to S scores and Kendall's  $\tau_b$  for alliances . It has a negative and statistically significant relationship between S scores with year fixed effects. It in fact has a positive and statistically significant relationship between S scores and Kendall's  $\tau_b$  without year fixed effects These mixed results suggest that the military strategic measure is perhaps measuring something qualitatively different than S scores.

Finally we also investigate how our measure performs relative to well known dyadic relationships. In the figures below, we plot the dyadic relationships between countries that are well-known to have friendly or antagonistic relationships. Figure 5 shows for example the dyadic relationship between Iran and Israel, the US and Israel, and the US and Iran. The plot suggests that the US and Israel have consistently had a stronger political strategic relationship throughout time except for the early 1970's when Iran and Israel is shown to have had a stronger political strategic relationship. This is in fact consistent with historical evidence which suggests that Iran and Israel enjoyed close ties before the Iranian revolution. Meanwhile the plot of the dyadic relationships between

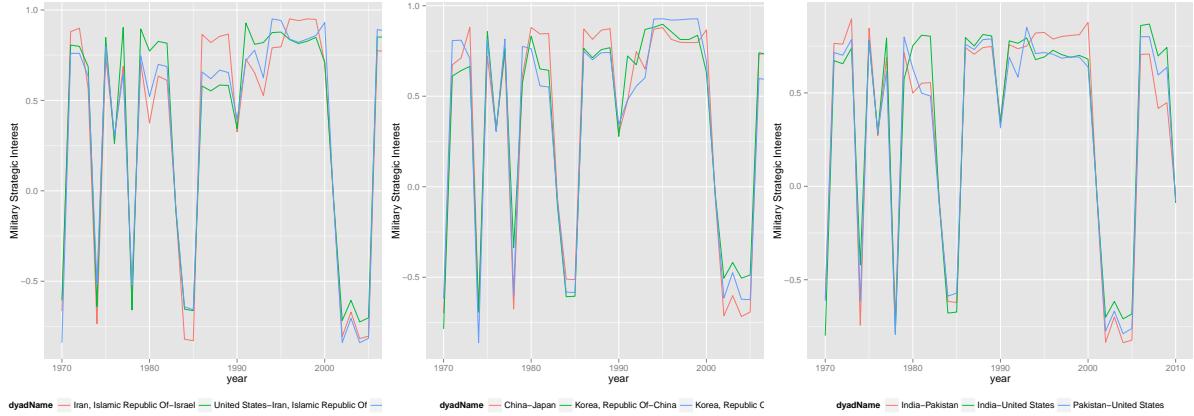
China and Japan and, North Korea and China and North Korea and Japan suggest more or less indifferent relations among the three before 1990 after which the political strategic relationship between China and North Korea becomes markedly stronger. This is also consistent with the disappearance of Soviet support for North Korea following the end of the Cold War and the emergence of China as North Korea's new protector. Finally, the plot of the dyadic relationship between India and Pakistan, India and the US and Pakistan and the US suggest in fact that India and Pakistan have a much stronger political strategic relationship than either do with the US. Given the history of antagonism between India and Pakistan, this is a rather surprising result; it also suggests however that a dyad's political relationship and military relationship may be quite different and indeed as two large bordering countries, cooperation between India and Pakistan is important to the security of both.

**Figure 5:** Dyadic relationships over time as measured by the political strategic interest variable



We plot the same dyadic relationships using our military strategic interest variable. Here, variation between different dyadic relationships is much more difficult to tease out, perhaps a function of the fact that military events are much more rare. There are two points of interest about these plots (i) they have large degrees of variation over time, suggesting that while military events may be rare, they also have a large influence on a dyad's military strategic relationship (ii) the dyadic relationships plotted here seem to be very similar over time potentially suggesting that third order dependencies are very strong with regards to military strategic relationships.

**Figure 6:** Dyadic relationships over time as measured by the military strategic interest variable



Before moving on to the next section, we note that it is possible to do a PCA on all different of the components of strategic interest — alliances, UN voting, joint IGO membership, arms transfers, mids and wars — combined. If we were to take this approach, we could run our models using the largest components of the resulting PCA. As discussed above, while we argue that political and military strategic interest are qualitatively different, we do acknowledge that both can inform each other and so taking such a course of action would be theoretically logical.

While we considered employing this approach, we decided to make the trade-off for better interpretability of our measure over increased precision of our strategic interest measure as the interpretation of different components of a PCA measure is generally not straightforward as it is. For example, we could end up with a first principal component that is explained by alliances %50 of the time, IGOs %40 of the time, arms transfers % 5 of the time and the rest of the components a combined %5 of the time and a second component that is explained by MIDS %60 of the time, alliances 30% of the time, and the rest of the components a combined %10 of the time. While we may be able to say that strategic interest matters, it would be more difficult to say in what way. In separating out the variables before hand for theoretical reasons, we increase the interpretability of any of our subsequent results while sacrificing some explanatory power. At the same time, whatever results we do find should represent a harder test for the importance of political or military strategic interest because of this trade-off.

# Data

## Aid flows

Our data from foreign aid flows is taken from the AidData project (?). This database includes information on over a million aid activities from the 1940s to the present. We use the country level aggregated version of this database to create a directed-dyadic dataset of total aid dollars committed. For now we focus on only the 18 most active senders and 167 receivers of aid flows from 1975 to 2006. Accounting for all possible senders of aid during this timeframe is difficult because of the amount of missing data. However, even with the limited number of senders in this version of our analysis we still have approximately 40,000 observations worth of data to work with.

## Political Strategic Relationships

To review, for our measure of political strategic relationships, we conducted a PCA on the latent distances for alliances, UN voting and joint IGO membership. Data for alliances was retrieved from the Correlates of War (COW) Formal Alliance dataset (?). Following (?) and (?), we distinguish between different types of alliances with the following weighting scheme: 0 = no alliance, 1 = entente, 2 = neutrality or nonaggression pact, 3 = mutual defense pact.

UN voting data was obtained from the United Nations General Assembly Data set (?). Here we calculate the proportion of times two states agree out of the total number of votes they both voted on. Agreement means either both vote yes, both vote no, or both abstain. This measure is similar to the ‘voting similarity index’ readily available from the dataset except the voting similarity index does not account for mutual abstentions.

Meanwhile IGO voting data was obtained from the Correlates of War International Governmental Organizations Data Set. (?). Dyads were coded as 1 if they belonged to the same IGO as a full member or an associate member and coded as 0 if one or both of them was an observer, had no membership, was not yet a state or was missing data.<sup>7</sup>

## Military Strategic Relationships

Meanwhile, for our measure of military strategic relationships, we conducted a PCA on the latent distances for arms transfers, MIDs and instances of war. Data for the total sum of arms transfers per year were retrieved from the Stockholm International Peace Research Institute (SIPRI) Arms Transfers Database (?). Data for MIDs was retrieved from the Militarized Interstate Dispute (MID) data collection compiled by COW (?). Finally, war data was extracted from the COW Inter-State War Data set (?).

## Humanitarian Need

In addition to our dyadic strategic relationship measures, we include a number of covariates to capture characteristics of the countries receiving aid.

First, for our measure of humanitarian need, we use (1) life expectancy at birth extracted from the (?). This measure “indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.”

We also use (2) a count of the number of natural disasters a country has experienced a year from the Emergency Disasters Database (EM-DAT) database (?). For a disaster to be included into the database, at least one of the following criteria must be fulfilled: (a) Ten or more people reported killed (b) A hundred or more people reported affected (c) Declaration of a state of emergency (d) Call for international assistance.

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<sup>7</sup>Note we had attempted to make distinctions between different types of membership much like for alliances but found that very few states were noted to be Associate Members or Observers of an IGO for the time period that we are conducting our analysis. Thus we chose to use the simpler coding scheme.

These two measures of humanitarian need were chosen to reflect as much as possible the humanitarian need of a particular country. We eschewed using GDP per capita as our measure of humanitarian need in favor of life expectancy, which offers a more holistic measure of the level of health, education and income of a country. Life expectancy in turn was used instead of the UN Human Development Index as it was found that life expectancy is highly correlated with the UN HDI with better coverage.(?). Meanwhile natural disasters were included as the incidence of natural disasters are seen as exogenous to a country's current development (though of course the *impact* of a natural disaster is not).

## Additional Covariates

We also include a number of covariates in our model, including macroeconomic variables and measures for political institutions. For our macroeconomic indicators, we use GDP per capita, available from the World Bank (?). For our measure of political institutions, we use Polity IV data available from the Center for Systemic Peace (?). Polity IV captures differences in regime characteristics on a 21 point scale ranging from -10 (hereditary monarchy) to +10 (consolidated democracy). Note we rescale Polity IV to range from 1 to 21 for greater ease of interpretation.

We also control for the incidence of civil war as incidence of civil war in a recipient country certainly informs the ability for a donor country to dispense aid. We do so with data retrieved from the Uppsala Conflict Data Program (UCDP)/International Peace Research Institute (PRIO) Armed Conflict Database. (?). We code as civil war any armed conflict which either (a) “Internal armed conflict occurs between the government of a state and one or more internal opposition group(s) without intervention from other states” or (b) “Internationalized internal armed conflict occurs between the government of a state and one or more internal opposition group(s) with intervention from other states (secondary parties) on one or both sides.”

Finally for our data on former colonies, we used the Colonial History Data Set from the Issue Correlates of War (ICOW) Project (?). This variable is coded as a one when the receiver in a sender-receiver dyad is a former colony of the sender and zero otherwise.

## Data and Analysis

### Estimation Method

To model aid flows using our directed-dyadic panel dataset, we utilize a hierarchical model. To implement this we nest receivers within senders and senders within years. We include random intercepts in our model for every sender and year. The results of this analysis are shown below in table 3.

Our strategic interest variables are shown in the first two rows. The results for the political strategic relationship variable align with the extant literature, we can see that countries are likely to send greater levels of aid to those with whom they have strong political relationships. The same does not hold for strong military relationships, the relationship with this variable and aid is actually slightly negative. We also see that countries are more likely to send aid to former colonies, a finding which also has received support in previous literature.

Next we turn to particular characteristics of receiver countries that are associated with higher levels of aid flows. Our analysis finds that countries which are poorer, more democratic, or that have recently faced a natural disaster receive higher levels of aid on average. Lower levels of life expectancy, however, are not associated with greater levels of aid.

<i>Dependent variable:</i>	
	Ln(Aid <sub>sender-receiver,t</sub> )
Pol. Rel. <sub>s-r,t-1</sub>	0.059*** (0.009)
Mil. Rel. <sub>s-r,t-1</sub>	-0.004** (0.002)
Colony <sub>s-r,t-1</sub>	1.822*** (0.058)
Polity <sub>r,t-1</sub>	0.015*** (0.002)
Ln(GDP Capita) <sub>r,t-1</sub>	-0.580*** (0.017)
Life Expect <sub>r,t-1</sub>	0.017*** (0.002)
No. Disasters <sub>r,t-1</sub>	0.168*** (0.004)
Constant	17.463*** (0.107)
Observations	34,486
RMSE	2.09

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

**Table 3:** Hierarchical regression results on logged aid flows between senders and receivers from 1975 to 2005.

## **Results**

### **Conclusion**

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