Political Economy of Aid Allocation: The Case of Arab Aid

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We develop a new theory of aid allocation, whereby a representative donor country's payoff depends on both the well-being of the representative recipient country as well as its political alignment with the donor. Our theoretical model suggests that there exists an increasing relationship between donors aid allocation and the solidarity and geopolitical alignment of the recipient country. Our model also predicts that donors allocate more aid to recipient countries with higher levels of human capital. We test these predictions using a unique dataset on aid allocation by major Arab donors. After constructing a new measure of solidarity and geopolitical alignment for recipient countries by using principal component analysis, we employ this measure as well as other control variables in our empirical analysis. The results suggest that solidarity and geopolitical alignment, as well as the human capital of a recipient country, are the key determinants of aid allocation from the Arab donors.

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Abstract

We develop a new theory of aid allocation, whereby a representative donor country's payoff depends on both the well-being of the representative recipient country as well as its political alignment with the donor. Our theoretical model suggests that there exists an increasing relationship between donors aid allocation and the solidarity and geopolitical alignment of the recipient country. Our model also predicts that donors allocate more aid to recipient countries with higher levels of human capital. We test these predictions using a unique dataset on aid allocation by major Arab donors. After constructing a new measure of solidarity and geopolitical alignment for recipient countries by using principal component analysis, we employ this measure as well as other control variables in our empirical analysis. The results suggest that solidarity and geopolitical alignment, as well as the human capital of a recipient country, are the key determinants of aid allocation from the Arab donors.

1 Introduction

Although the donors' stated objective of foreign aid is the economic development of recipient countries, there is a perception that donors may have ulterior political motives. These political motives are sometimes overt, as in US aid to both Israel and Egypt since the Camp David Accords was meant to keep peace between these two countries. More often however, these motives are covert. To what extent is foreign aid allocated due to the political alignment of recipient countries with donors and to recipients' development needs? This paper is intended to address this question theoretically and empirically.

Foreign aid allocation in response to a recipient's position on a particular political issue, such as voting behavior at the United Nations, has empirically been addressed in the literature (see Alesina and Dollar, 2000, Kuziemko and Werker, 2006, and Dreher et al., 2009, among others).[1] We define a more general measure of solidarity and political alignment that takes into account geographic, political, and cultural attributes of recipient countries with donors. We then construct a novel game theoretic model of aid allocation and political alignment.

Although the literature on the theory of foreign aid is rich (see Jones, 1970, Srinivaasan and Bhagwati, 1984, Easterly and Easterly, 2006, and Beladi and Oladi, 2006, among others), to our

[1]Empirical literature on foreign aid is extensive and certainly deserves an extensive review. However, such a review is beyond the scope this paper.

knowledge our approach is new. Our theory formulates both political and developmental motives of aid and shows how strategic alignment by the recipient countries may affect aid allocation. In our model, donors respond to socio-political-cultural positioning, while remaining benevolent in caring for development in recipient countries. We characterize the sub-game perfect equilibrium of this game. Two testable hypotheses emerge from the sub-game perfect Nash equilibrium of this game. First, there exists a positive relationship between aid allocation and the solidarity and geopolitical alignment of the recipient countries with donors. Second, at equilibrium, donor countries allocate more aid to recipient countries with higher levels of human capital.

We test these propositions by applying them to a unique dataset of aid allocation by Arab donors in 147 developing countries[2] during the time period 1996 to 2015. The benefits of applying our theory to aid allocation by the Arab donor block, referred to as the Arab Coordination Group (ACG), are twofold. While the empirical literature on aid and international development is extensive and rich, little attention has been paid to Arab aid. This is despite the fact that the ACG is the largest donor among non-OECD donors. Another advantage of our application to aid allocation by ACG is the unique dataset we possess. While the very few studies on Arab aid took on a major challenge, they all face data limitation due to lack of access. Their common source of data was limited to OECD database and, as a result, they were not able to cover a full time-series for all the ACG institutions (see Neumayer, 2003, Villanger, 2007, Dreher et al., 2011). Clearly, inaccessibility to data imposes a limit on the reliability of empirical results.

Indeed, the publicly available source of data on Arab aid commitments or disbursements is OECD database. However, this is incomplete and contains missing values for many years for the key Arab donors such as Kuwait, Saudi Arabia, and UAE. As an example, Dreher et al. (2011) faced this challenge and could only account for US$4.3 billion aid flow from Kuwait, Saudi Arabia, and UAE during 2001-2008. However, this amount understates the level of aid reported in our dataset which is obtained directly from the ACG Secretariat that covers the historical aid allocation by the ACG institutions. Therefore, our paper can be viewed as the first comprehensive study on Arab aid channeled through the ACG institutions. Nonetheless, we do not have additional data on (other) direct aid from Arab countries. For example, the aid that a major Arab donor such as Saudi Arabia may provide to the Egyptian government when Saudi King visits Egypt is not included in our dataset. In fact, such aid may not be recorded in any database. However, we believe that this sort of direct aid is strongly correlated to the aid

[2]As per UN classification.

channeled through the ACG institutions.

Yet another important feature of our empirical study is that it focuses on South-South aid, in contrast to North-South direction of the most of foreign aid (i.e., Official Development Assistance (ODA) of OECD). Notably, the Arab donors block leads amongst the non-OECD donors (Nielson et al., 2009). The genesis of Arab aid can be traced back to the 1960s when several Arab aid institutions were established. The prime objective of developing these institutions was to support Arab and other developing countries in their socio-economic development. The Arab aid institutions formed ACG as a donor block in 1974. ACG institutions have made remarkable contributions in socio-economic development in many Arab and non-Arab developing countries. Since 1962, they have provided funding of over US$164 billion (ACG Secretariate). Furthermore, over the past twenty years, these institutions witnessed a tremendous evolution in scale and scope of their activities compared to the levels attained during the early nineties and earlier decades. As an example, the average yearly commitment between 1990 and 1995 was only US$2.2 billion, while the annual average during the period we cover in this study (i.e., 1996-2015) was US$6.1 billion. This nearly threefold increase is primarily due to the awareness of these institutions of the need to cope with the increasing financing requirements of the beneficiary countries, as well as the imperatives of the changing economic environment.[3]

Our empirical study consists of two types of statistical analysis. We first employ principal component analysis to construct a composite index for solidarity and geopolitical alignment of recipients with major Arab donor countries. Our construction of this composite in it of itself contributes to the political economy literature. Second, we use our index to econometrically assess the effects of solidarity and political alignment on aid allocation.

The remainder of the paper is organized as follows. In Section 2, we review some stylized facts about Arab aid. We present our political economy theory of aid allocation in Section 3. Section 4 highlights the econometric modeling and methodology followed by a discussion on our data as well as the construction of our political alignment index in Section 5. Section 6 presents our econometric results. Section 7 provides some concluding remarks.

2 Stylized facts

ACG comprises ten bilateral and multilateral institutions. The bilateral institutions include the Saudi Fund for Development (SFD), the Kuwait Fund for Arab Economic Development

[3]Details of the ACG Institutions shall be presented in section 2.

(KFAED), the Abu Dhabi Fund for Development (ADFD) and the Qatar Fund for Development (QFD). On the other hand, multilateral institutions are the Arab Fund for Economic and Social Development (AFESD), the Islamic Development Bank (IsDB), the OPEC Fund for International Development (OFID), the Arab Monetary Fund (AMF), the Arab Gulf Program for Development (AGFD), and the Arab Bank for Economic Development in Africa (BADEA). Many of these multilateral institutions provide funding to only their member countries. As an example, IsDB extends its funding to its 57 member countries. The largest contributor of funding commitments among the ACG members is the IsDB (40.2%), followed by the AFESD (18.3%) and KFAED (12.7%). The contribution of the other members of the group is in single digits. In terms of amount, IsDBs contribution is over US$66 billion out of the total ACG commitments, which stands at US$265 billion from 1962 to 2015. It should be noted that IsDB and OFID are not strictly Arab owned institutions as there are other non-Arab shareholders in their membership. However, the largest shareholders of these institutions are Arab countries and therefore are considered as Arab institutions. Figure 1 shows the ACG commitments from 1962 to 2015 (by institutions and in million US$).

[Insert Figure 1 here]

Figure 2 depicts annual commitments of the ACG members. Since the late 1990s, there has been a tremendous increase in commitments of ACG funding. Between 1996 and 2015, the total commitment was US$121 billion, which is about 73% of the total ACGs commitment of US$164 billion since inception. Moreover, the annual commitment has drastically increased from just above US$2 billion in 1996 to over US$17 billion in 2015. The figure also suggests that non-oil producing Arab countries are the largest beneficiaries of the funding with 55% of the total commitment, followed by Asia (25%), Latin America (18%) and Africa (17%). There is also a small percentage of commitment (3%) for regional organizations. In terms of regional allocation, there is a notable change in the scale of funding for Asia during the 2000s, which substantially increased from US$386 million in 1996 to US$5.9 billion in 2015. Further, there is a twofold increase in commitment post-2000 when compared with the commitment from the pre-2000 period.

[Insert Figure 2 here]

Several studies have suggested the price of oil is a key driving force for Arab aid (for example, see Werker et al., 2009). Figure 3 plots the cumulative Aid commitments from the Arab

institutions (left) and real oil price per barrel (right) for the period between 1996 and 2015. The figure suggests a moderate correlation between the two. However, a higher oil price may not always lead to an increase in aid commitments from the Arab institutions or vice versa. As an example, when oil price increased in 2004, 2006 and 2011, we observe a decrease in the commitments from the Arab institutions when compared to the previous year. Likewise, when oil price was on a declining path from 2013 to 2015, we observe an increase of the aid commitments from the Arab institutions. This may be due to the fact that the citizens of oil-producing Arab countries enjoy heavy subsidies from their central governments. It is often the case that years of budgetary shortfalls (as a result of low oil prices) are followed by years of massive capital expenditure, subsidies and other social benefits across the board (when oil prices start to take an upward trend) to make up for the "lost years" and to appease the always expectant public. Besides, the multilateral institutions within the ACG have a set financial structure based on subscribed capital and have own policies on commitment growth, which may not be correlated with oil price volatilities.

[Insert Figure 3 here]

Figure 4 provides an overview of Arab aid's global allocation. A clear concentration of Arab aid in South Asian and North African Muslim majority countries is quite visible. During 1962 to 2015, the top five beneficiaries of the ACG funding include three North African countries of Egypt, Morocco, and Tunisia, and two South Asian countries of Bangladesh and Pakistan. One may argue that the three North African Arab countries are in fact relatively better off in terms of poverty situation and general welfare compared with their Sub-Saharan African neighbors. Further, during the last two decades between 1996 and 2015, top five beneficiaries include Egypt, Morocco, Bangladesh, Sudan, and Tunisia, four of which are considered Arab countries. This anecdotal evidence suggests that although the scale of the ACG funding has increased over the last two decades, there seems to be little change in policy regarding aid allocation. These stylized facts may raise the question why a significant portion of the Arab aid has been allocated to countries such as Egypt, Morocco, and Tunisia rather than to less developed countries. This may be because major donors have proximity to the Arab region, have a common religion, common language, and are politically aligned. Despite this argument, it is not clear why countries like (pre-war) Yemen is not benefiting as much from the ACG aid

as it is a majority Arab and Muslim country, located in close proximity to the ACG institutions, and aligned with the major donors in international issues.

[Insert Figure 4 here]

3 A simple model of aid allocation

In this section, we develop a general theory of aid allocation by constructing an aid and geopolitical game. Consider a foreign aid recipient representative country and a donor, denoted by r and d, respectively. Let the base position of the recipient and the donor be given by $\beta_i \in [0,1], i = d, r$. That is, the recipient and the donor's ideal position located on geopolitical spectrum bonded by zero and one. Without lose of generality, let $\beta_r \leq \beta_d$. The recipient country takes an actual geopolitical position p on geopolitical spectrum, i.e., $p \in [0,1]$. The payoff function for the recipient country is given by:

$$W_r = u(C)\left[1 - g(\delta_r)\right] \tag{1}$$

where C denotes the aggregate consumption level in the recipient country and δ_r is the Euclidean distance between its location on geopolitical spectrum and the position it take, i.e., $\delta_r = |p - \beta_r|$. Note that u is the utility of consumption and $g : [0,1] \to [0,1]$ is the cost (dis-utility factor) for deviating from ideal geopolitical position.[4] We maintain that $u_C > 0, u_{CC} < 0, g(0) = 0, g' > 0$ and $g'' > 0$. This economy also produces an aggregate good using production technology $Y = Hf(K)$ where H denotes human capital, $K = \bar{K} + A$ is the capital stock, $\bar{K}$ is the fixed stock of domestic capital and A is foreign aid. We further assume that $f' > 0$ and $f'' < 0$. In this simply autarkic economy $C = Y$.

In addition to sending aid, the payoff of the donor depends on the consumption level in the recipient country (i.e, the development factor) and on the the utility of proximity of the recipient's geopolitical position to its own base position. Thus, we define the donor's payoff function as:

$$W_d = C - \nu(\delta_d, A) \tag{2}$$

where $\delta_d = |p - \beta_d|$ is the distance of the recipient's geopolitical position from the donor's location on geopolitical spectrum. The first term, consumption in the recipient country, is the

[4] Our formulation of cost is similar to iceberg-type trade cost in international trade literature as in Beladi and Oladi (2011).

benefits of aid, while the second term is the cost of aid, both in terms of dis-utility of recipient distancing itself from the donor's ideal position on geopolitical spectrum and in terms of the opportunity cost of providing the loan itself. Assume the standard assumptions on ν, i.e., $\nu_{\delta_d} > 0, \nu_{\delta_d\delta_d} > 0, \nu_A > 0, \nu_{AA} > 0$ and $\nu_{A\delta_d} > 0$. Marginal cost of aid is higher the more geopolitical distant a recipient country is from the donor.

The game played by the recipient and the donor is sequential. It is reasonable to assume that the recipient country moves first, followed by the donor country. The rationale is simple. In the real world, recipient countries often leave a long list of policy records over time, such as voting behavior at the UN, having a friendly relationship with donor countries, encourage and promote cultural affinity with that of donors, etc. Having observed these political and cultural aspects (or what we call geopolitical position), the donor countries decide on their loan allocation.

To find the sub-game perfect equilibrium of this game, we derive the implicit best response function for the donor as:

$$Hf'(.) - \nu_A(.) = 0 \tag{3}$$

Denote this best response function in its explicit form by $A = \tau(p)$. Notably, τ is not monotonic in general, it is monotonically increasing for all $p < \beta_d$. To see this, note that we can obtain from (3) that $d\tau/dp = [\nu_{A\delta_d}/(Hf''(.) - \nu_{AA})]d\delta_d/dp$. Since $d\delta_d/dp < 0$ for all $p < \beta_d$, it follows from our assumptions on f, and ν that $dA/dp > 0$ if $p < \beta_d$. The converse is true if $p > \beta_d$.

The recipient country chooses its geopolitical position, knowing how the donor will react in its aid allocation. Thus, the optimization that the recipient faces is given by $\max_{p\in[0,1]} W_r(.)$ subject to $a = \tau(p)$. Thus, at an equilibrium, we have:

$$Hu'(.)f'(.)[1 - g(.)]\frac{d\tau}{dp} - u(.)g'(.)\frac{d\delta_r}{dp} = 0 \tag{4}$$

That is, at sub-game perfect equilibrium we have $d\tau/dp = u(.)g'(.)/H[u'(.)f'(.)[-g(.)]]$. The right hand side of this expression is the slope of the iso-payoff curve for the recipient country and the left hand side is the slope of best response function for the donor country. Note that $p < \beta_r$ is never a best response to $a = \tau(p)$ since there exists a higher p at which both δ_r is lower and a is higher (along τ). This, along with equation (4) and the sign of $d\tau/dp$, implies that at sub-game perfect equilibrium $p > \beta_r$. We depict our sub-game perfect equilibrium (SPE) and

our Nash equilibrium (NE) in Figure 1, where the associated quantities are denoted by $(\hat{p}, \hat{A})$.[5]

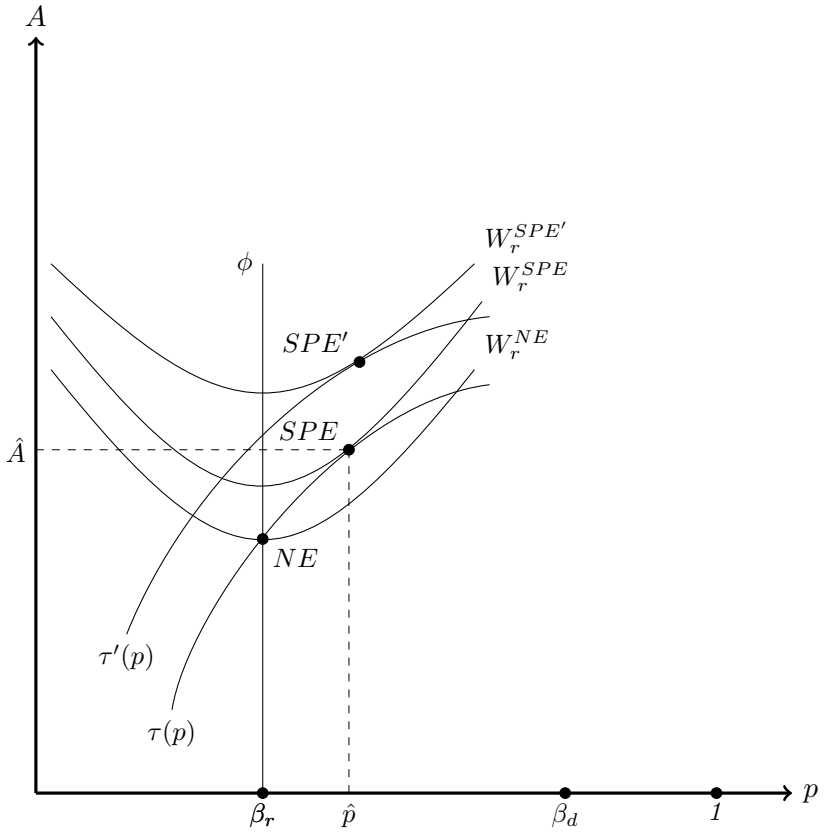

Figure 1: Geopolitical and Aid Game

Next, consider the effects of a change in human capital in the recipient country on sub-game perfect equilibrium. By totally differentiation equation (3), we get $d\tau/dH = -f'(.)/Hf''(.) > 0$. It then follows that a higher level of human capital in a recipient country will lead to a higher aid level. This is indicated by an upward shift in τ to τ', where its associated sub-game perfect equilibrium is denoted by SPE'.

4 Econometric model and methodology

Two testable propositions emerge from our general theory of aid allocation:

1. There exists an increasing relationship between foreign aid allocation and the geopolitical alignment of the recipient countries with the donors.

2. Donor countries allocate more aid to recipient countries with higher level of human capital.

[5]The best response function of an alternative simultaneous-move game (not analyzed here) for the recipient country is denoted by ϕ.

We shall take our general theory of aid allocation to the data and test our proposition by applying them to Arab aid in the remainder of this paper.

4.1 Empirical model

We employ a dynamic panel model to estimate simultaneously the short- and long-run effects of Solidarity and Geopolitical Alignment (SGPA) on received Arab aid. Intuitively, the recipient country has some desired level of funding and recognizes that the funding agency makes decisions based on a number of different variables. Some of these variables the potential recipient country has influence over. For example, the recipient country may be able to signal political alignment through voting behavior in international organizations. This idea suggests the potential for feedback between the actual level of funding and the observed level of the covariates. As such, our econometric model can be:

$$ADF^{*}_{i,t} = x'_{i,t}\beta + \epsilon_{i,t} \tag{5}$$

where, $ADF^{*}_{i,t}$ is the desired level of Arab Development Funding from the ACG institutions (referred as Arab aid or ADF hereafter), $x'_{i,t}$ is a vector of covariates, which include SGPA and human capital (among other covariates), and $\epsilon_{i,t}$ is the usual random disturbance. The desired Arab aid is not observable, rather we observe its actual level ($ADF_{i,t}$). As in the literature, we maintain a partial adjustment process whereby:

$$ADF_{i,t} - ADF_{i,t-1} = \theta(ADF^{*}_{i,t} - ADF_{i,t-1}) \tag{6}$$

where $0 < \theta \leq 1$ is the adjustment parameter and captures the speed of adjustment toward the desired Arab aid level. The larger the value of θ, the faster is the adjustment.

$$ADF_{i,t} = \gamma ADF_{i,t-1} + x'_{i,t}\lambda + \nu_{i,t} \tag{7}$$

where, $\gamma = (1-\theta), \lambda = \theta\beta$, and the new error term is given by $\nu_{it} = \theta\epsilon_{it}$. If there is a positive feedback effect, the coefficient of the lagged dependent variable γ should be positive (i.e., past Arab aid receipts induces the current Arab aid receipts).

In addition to SGPA and human capital (that proxies a recipient's capacity), to control for other factors, our vector of covariates $x_{i,t}$ includes income, population, trade with major Arab donors, oil price, inflation rate and its current account balance.

Our primary hypothesis is that the more a country is aligned geopolitically and culturally with the major donors, the higher is the likelihood of getting development funding. We will construct a new composite measure of geopolitical and cultural alignment, to which we shall return shortly. Another important hypothesis we will test is that the higher a country's capacity (measured by human development index, HDI), the more aid it may receive. Since the sources of funds from major Arab donors are their oil revenues, oil prices might explain the variation in ADF. All the other control variables are standard covariates that are commonly used in the literature including income and measures of internal and external economic stability, mainly inflation rate and current account balance as a percentage of income.

4.2 Econometric methodology

As a starting point, we estimate equation (7) using OLS. While this approach does not account for potentially endogenous effects, it illustrates the general pattern of correlations among our variables of interest.

In addition to OLS, we use the system-GMM estimator (Arellano and Bover, 1995, and Blundell and Bond, 1998) to estimate our dynamic panel model. This estimator yields consistent and efficient estimates by addressing two important econometric problems. First, this approach allows us to control for possible bias due to unobserved country heterogeneity on estimated coefficients when compared with fixed effects estimators. Second, some of our covariates, including some factors in estimating our composite measure of SGPA, are likely to be endogenous. While it seems difficult to find a good instrument for many of these variables, the system GMM estimator helps to solve the endogeneity problem by using a series of internal instrumental variables based on lagged values of the dependent and independent variables that are potentially endogenous.

In particular, independent variables such as GDP and trade with major Arab donors may be endogenous. The other independent variables are treated as strictly exogenous.[6] Moreover, the system GMM estimator performs better as it uses additional moment conditions when it is compared with the "difference" GMM estimator. This method is much more efficient in small T and large N, which is the case in our dataset where N=147 countries and T=20 years (Roodman, 2009). System GMM also assumes that there is no first-order and second-order autocorrelation in the error terms. Thus, we test for autocorrelation and the validity of

[6]Note that in system GMM analysis, the lags of endogenous variables are used as instruments for the difference equation and the lagged differences of the endogenous variables are used as instruments for the level equation. As such, we do not include additional (external) instruments in the analysis.

instruments using Sargan/Hansen test for over-identifying restrictions. For second-order serial correlation of the differenced error terms, the statistics always indicate that there is no second-order serial correlation and that instruments are not correlated with residuals. Therefore, Hansen J test for over-identifying restrictions loses power when the number of instruments exceeds the cross-section sample size (Roodman, 2009). When the ratio of countries to instruments is lower than one, the estimation procedure may be biased and coefficients may be significant even if there is no statistical association. To overcome this type of possible bias in the results, we control for the relative number of instruments so that this number is never large relative to the number of countries.

Finally, we implement two-step "system" GMM estimator instead of one-step as it provides asymptotically efficient, robust and reliable results when facing endogeneity, dynamic issue, and heteroscedasticity (Windmeijer, 2005). These measures ensure that the estimated coefficients are not biased by reverse causality and only measures the direct effect of the independent variables on ADF.

5 Data and SGPA index construction

Our analysis is highly data demanding and consists of a large unbalanced panel containing nineteen variables for147 developing countries (based on UN classification) during 1996-2015. 121 countries (82%) in the data-set are the recipient of ADF, while 26 countries are not. We also drop the funding provided to the private sector (mainly for public-private partnership type of projects) in Saudi Arabia, Kuwait, and UAE by the ACG institutions. Overall, our dataset covers about 95% ADF receipts. We will use nine of our variables to construct our measure of solidarity and geopolitical alignment in this section. Summary statistics for all of our variables are provided in Table 1, where we classify our covariates into those used in constructing SGPA index, main baseline economic variables, other baseline economic variables, those variables that deal with economic stability, and institutional variables.

[Insert Table 1 Here]

5.1 Data sources

Our dependent variable, ADF, is the development funding receipts in millions of USD. We have obtained our data on ADF directly from ACG Secretariat. As highlighted earlier in the

paper, this direct access makes our dataset unique as it provides a significantly broader coverage compared with a few earlier studies of Arab aid that relied on publicly available data, mainly the OECD database. Another important key variable needed to test our general theory of aid is an index score for measuring solidarity and geopolitical alignment, which we shall construct shortly in the subsequent subsection. As will be discussed shortly, nine variables are used in our construction of this index. Regional classification such as Arab, Asia, etc. are also collected from the ACG Secretariat. UN voting records are obtained from UN database. Data on other geopolitical variables such as diplomatic relations with Israel is from the Ministry of Foreign Affairs of Israel, Muslim and Shia majority (over 50%) is collected from Pew Research Center database, and Organization of Islamic Cooperation (OIC) membership is collected from the OIC website.

Data on human development index (HDI) is collected from the UN database. We obtained our data on real income (in purchasing power Parity), population, inflation, and current account balance (as a percentage of income) from the World Bank database, while trade with Arab donors Saudi Arabia, Kuwait, and UAE (in millions of USD) are collected from the IMF database. Real oil price is collected from the U.S Energy Information Administration (EIA). Institutional variables such as political rights and civil liberties are collected from Freedom House database.

5.2 Principle Component Analysis of SGPA

In the aid literature, the problem of measuring aid motives is difficult. Many variables have been used since the pioneering work of Alesina and Dollar (2000). The variables used in different combination include votes of the recipient countries at the UN General Assembly, religion and ethnicity, language, colonial past, etc. These variables are possibly correlated and individually may be viewed as imperfect measures of aid motives while a composite measure provides more information due to their correlations. Thus, we provide correlation matrix amongst the SGPA variables in Table 2. Notably, SGPA variables are strongly correlated. As an example, the percentage of voting at the UN with Saudi Arabia is highly correlated being Arab, member of the OIC, not recognizing Israel and Muslim majority country. Similarly, not recognizing Israel for Muslim majority country and being a member of the OIC is strongly correlated.

[Insert Table 2 Here]

Such multi-collinearity issues may lead to incorrect inferences (Johnston and DiNardo, 1997). Therefore, we resolve this issue by constructing an index score using Principle Component Analysis (PCA). Apart from multicollinearity issue, this index also contains all the information relating to geopolitical and solidarity variables.

PCA is a well-known statistical tool that summarizes the information accessible in a multivariate system into fewer dimensions. While the interpretation of estimated PCs is speculative, the coefficients obtained from the analysis shows the importance of each of the factors in the composite measure. PCA techniques help us analyze many variables and provide us with a more compact measure by exploiting the pattern of dependence among the variables. Generally, in PCA, the coefficient of all the variables in the composite measure is determined by maximizing the variation among the related variables. This allows extracting the maximum information relating to interdependence among the variables in a multivariate system, which subject to the constraint that the sum of the square of coefficients equals one.

We utilize PCA to calculate the principal components (PCs) of nine solidarity and geopolitical alignment related variables. Since donor interest and solidarity is one of the central interest in this paper, PCA helps us to develop an index that provides us with a single score for all geopolitical and solidarity variables. We call this Solidarity and Geopolitical Alignment (SGPA) index. Similar to previous studies, we could have separately added the SGPA variables in the regression, however, in doing so, we would have lost the impact of interactions (additional information) between all these variables. Further, the overall Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy statistics is 0.67, which suggests that undertaking PCA is well justified as the correlation among the SGPA variables are high.[7]

PCA results of SGPA variables shows that the cumulative proportion of the variance explained by the first three PCs is 69%. Each of the PCs from 4 to 9 adds less than 10% to the explanation of the variance within the variables. Therefore, these PCs can be classified as relatively unimportant, the significant portion of the useful information about SGPA is contained in the first three PCs. In general, we take the PCs up to Eigenvalue greater than one, apply factor loadings in predicting SGPA score for the dataset, and use it as an independent variable in the subsequent econometric analysis.

[7] As a rule of thumb, KMO of 0.5 or higher is acceptable. A formal mathematical analysis of PCA, as well as the result of the PCA, for SGPA variables are available on request.

6 Empirical evidence

6.1 Empirical results

Table 3 presents results of our analysis using OLS. For all models in this table, we report robust standard errors as well as results with and without time dummies. Our results for the baseline model, with and without time effects, are in columns one and two, respectively. We take a similar approach when we add the control variables in columns three and four. In columns five and six, we add economic stability variables and provide results with and without controlling for time effects as well.

[Insert Table 3 Here]

In the first and second columns of Table 3, baseline model results are presented. When we control for time effects, our three variables of interest, namely, SGPA, HDI, and log of GDP (income) are statistically significant. In columns three and four, we add control variables such as population, trade with Arab donors, and real oil price. The coefficients for population and real oil price are significant at the 1% level here. The signs suggest that countries with larger population get more ADF and ADF allocation is positively correlated with the real oil price. Furthermore, the coefficient for trade relationship with Arab donors is insignificant throughout, suggesting ADF allocation is not associated with a trade relationship between Arab donors and recipient countries. In columns five and six, we added economic stability variables such as inflation and current account balance. In these models, while SGPA and HDI are significant, income and population are statistically insignificant, trade with Arab donors continued to be insignificant while real oil price is significant. Besides, the coefficient on inflation is not statistically significant and current account balance is significant at the 1% level and has the expected negative sign. This suggests that the Arab donors may try to assist countries with challenging current account balance positions.

We present our principal results using system GMM in Table 4. In contrast to the OLS models previously reported, these models include the lag of ADF as an independent variable to capture the dynamic impact of the lag of ADF on current year ADF. Moreover, the model also accommodates an endogenous relationship between the dependent variable and the variables SGPA, trade with Arab donors, and income. Our primary hypothesis, predicted by the theoretical model, that ADF is increasing in SGPA index is supported by our empirical results. We observe that the SGPA is statistically significant almost in all our specifications.

The relationship between ADF allocation and the Human development index, HDI, as a proxy for recipient country, is the second prime variable of interest in this study. Our general theory of aid allocation predicts that, for a given level of income, donor countries will allocate more aid to countries with a higher level of human capital. Intuitively, this is because higher levels of human capital allow each aid dollar to be used more effectively in development projects. Although HDI is not a perfect proxy for human capital, the HDI index does correlate strongly with education levels (UN Human Development Report, 2016) and is indicative of an economy where human capital can work effectively with aid to improve development outcomes. In line with our theoretical prediction, the sign for the coefficient of HDI is consistently positive in all our specifications and it is statistically significant in most. Furthermore, the coefficient for the HDI variable is also large in magnitude. The coefficient for HDI suggests that a one-point increase in HDI score, increase ADF receipts by about US$878 million, keeping all else constant. To illustrate the magnitude of this effect, consider the two countries of the Arab world, Djibouti, and Tunisia. Between 1996 and 2015, Djibouti has an average HDI score of 0.41, while Tunisia has 0.61, which is 0.27 or about a quarter of a point more than Djibouti. During the same period, the average ADF allocation for Djibouti was US$48 million while the same for Tunisia was US$268 million. The difference of ADF allocation, which is on average US$220 million per year between these two countries, can be explained by their difference in country capacity and is in line with the estimates of our model.

These combined results provide support for the predictions from our general theory of aid allocation. In particular, we observe that development funding is targeted towards recipient countries that are (i) aligned geopolitically, culturally, and stand in solidarity with donor countries and (ii) have the required capacity for implementing development projects.

[Insert Table 4 Here]

We now present a short discussion on the results for other control variables. Many authors have suggested that development aid should be decreasing in the level of economic development, measured by income (for example, see Easterly, 2003). This implies that in our setup, ADF should be decreasing in log of income and increasing in log of population. While these expected signs hold in almost all our specifications, they are statistically insignificant, except for model (5). Furthermore, one may expect that trade with donors may have a positive impact on aid receipts. This hypothesis is not supported in the case of ADF in our results. This may be

due to the fact that Arab donors are mainly exporting petroleum and poorer countries are not traditionally large buyers of petroleum. This finding is similar to that of Neumayer (2003) in case of Arab donors. However, the effect of this variable may vary amongst donors as Younas (2008) finds that Western donors significantly value trade relationship when it comes to aid allocation.

We also control for real oil price as it the main source of revenue for the major Arab donors. We find the coefficients for real oil price is insignificant and has different signs depending on model specification. However, it is statistically insignificant in most specifications. Therefore, our analysis does not support the hypothesis that a higher price of oil leads to a higher allocation of ADF since the availability of these funds might be correlated the price of oil. However, this result contrasts with the current literature (see Werker et al., 2009).

Turning now to the economic stability variables, namely inflation and current account balance, it may be expected that countries suffering from economic instability are more in need of foreign aid. That is, developing countries that face higher inflation and lower current account balance may receive more aid. The foreign funds that Greece recently received from IMF and Eurozone countries is a good example. In our results, while the economic stability variables have signs consistent with this hypothesis, they are not significant. This is partly consistent with Dreher et al. (2009).

6.2 Robustness

In terms of the robustness of our econometric models, the system-GMM estimator checks for the validity of the moment conditions through performing the Sargan/Hansen test for over-identification. This is the test for serial correlation of the differenced error term. As can be seen from the corresponding p-values of these tests, reported at the bottom of Table 4, the null hypothesis of the validity of instruments cannot be rejected. Furthermore, the first- and second-order serial correlation tests suggest existence of negative first-order serial correlations and no evidence of second-order serial correlation in the differenced error terms.

To ensure that our conclusion with respect to SGPA and HDI holds and to further check the robustness of our econometric results presented in the preceding section, we also provide results of alternative model specifications. We do this by including two institutional quality variables, political rights, and civil liberty, in our benchmark dynamic panel models presented in column (5) and (6) of Table 4. The civil liberties score includes considerations such as

fair electoral process, political pluralism and participation, and function of government. The political rights score includes considerations such as freedom of expression and belief, association and organizational rights, rule of law, personal autonomy, and individual rights. The results of this extension are presented in Table 5 below. The first two columns provide results from our benchmark columns in Table 4 (for comparison purposes) and the second two columns provide results with institutional variables using system GMM approach. As before, we provide the results with and without controlling for time effects. The results suggest that adding these two institutional quality does not change any signs or significance level for the variables discussed in the earlier section. Nonetheless, this provides alternative evidence that SGPA and HDI are significant in different specifications. Moreover, civil liberties and political rights are not statistically significant.[8]

[Insert Table 5 Here]

7 Conclusion

Despite substantial political change in the Arab and Muslim world during the past decades, Arab donors have shown consistent support for the Arab world and for other Muslim nations. In this paper, we highlight several stylized facts about the contribution of the Arab donors block in development and develop a game theoretic model of aid allocation consistent with these stylized facts. Our empirical analysis shows results consistent with this model. We find a statistically significant relationship between aid allocations and solidarity or geopolitical alignment using a unique dataset from the ACG. Furthermore, our measure of human capital is found to be an important factor in aid allocation. This result may be due (at least in part) to the fact that most aid funds are given as concessional loans channeled through the ACG institutions (Rouis, 2010).

In order to assess whether aid is driven by developmental need or by solidarity and geopolitical alignment (SGPA) (or both), we construct a composite score that measures SGPA using principal component analysis. Then, we show empirically that, in fact, solidarity and geopolitical alignment play a positive and statistically significant role in aid allocation. Our econometric analysis also shows that development needs have limited explanatory power. Moreover, our

[8] We also included these variables in our OLS results (not presented here) and our results of Table 5 did not change.

analysis suggests that human capital (country capacity) is an important determinant of aid allocation.

While several studies find trade relationships to be a key determinant of aid from OECD donors, we find little evidence to suggest that Arab donors employ aid as a tool for advancing commercial self-interests. Another interesting finding is that the aid allocation is not affected by volatility in the price of oil. This result stands in contrast to earlier studies such as Werker et al. (2009).

Our results contribute to the growing literature showing that there is no single factor that drives development aid; there are political, strategic, and other interests at play. All in all, our study suggests that Arab aid from the ACG institutions has three distinctive features: First, it is confined to the developing countries of the south. Second, it is solidarity and geopolitical alignment based. Last but not least, aid is given more to countries having better capacity to implement projects. This latter feature has the potential to make the development interventions impactful.

It is important to highlight several caveats of this study. First, our dataset only captures the Arab aid that is channeled through the ACG institutions. Second, we do not have the breakdown of the amount of aid that is given by the bilateral and the multilateral Arab institutions. Third, we are unable to qualify the funding in terms of funding modality, i.e. grant and concessional loan, which is similar to the concessional terms of IDA-type funding provided by the World Bank. An analysis based on the nature of the institutions and funding modality could be a fruitful avenue for future research.

References

Alesina A. and A. Dollar, 2000, "Who gives foreign aid to whom and why?" *Journal of Economic Growth,* 5(1): 33-63.

Arellano, M. and S. Bond, 1991, "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations." *Review of Economic Studies,* 58(2), pp.277-297.

Arellano, M. and Bover, O., 1995, "Another look at the instrumental variable estimation of error-components models." *Journal of econometrics,* 68(1), pp.29-51.

Beladi, H. and R. Oladi, 2011, "An elementary proposition on technical progress and non-traded goods." *Journal of Mathematical Economics,* 47: 68-71.

Beladi, H. and R. Oladi, 2006, 'Chapter 4: Does Foreign Aid Impede Foreign Investment?." *In Lahiri, S. (ed.), Theory and practice of Foreign Aid (pp. 55-63).* Emerald Group Publishing Limited.

Blundell, R. and S. Bond, 1998,"Initial conditions and moment restrictions in dynamic panel data models. " *Journal of Econometrics,* 87(1), pp.115-143.

Dreher, A., J. E. Sturm, and J. R. Vreeland, 2009, "Development aid and international politics: Does membership on the UN Security Council influence World Bank decisions?" *Journal of Development Economics,* 88(1), pp.1-18.

Dreher, A., P. Nunnenkamp, and R. Thiele, 2011, "Are new donors different? Comparing the allocation of bilateral aid between non-DAC and DAC donor countries." *World Development,* 39 (11): 1950-68.

Easterly, W., 2003, "Can foreign aid buy growth?" *The journal of economic perspectives,* 17(3), pp.23-48.

Easterly, W. and Easterly, W.R., 2006, "Can foreign aid buy growth?" *The white man's burden: why the West's efforts to aid the rest have done so much ill and so little good.* Penguin.

Johnston, J. and J. DiNardo, 1972, "Econometric Methods." *New York* 19 (7): 22.

Jones RW., 1970, "The transfer problem revisited." *Econometrica,* 1970 May 1:178-84.

Kuziemko, I. and E. Werker, 2006, "How much is a seat on the Security Council Worth? Foreign aid and bribery at the United Nations." *Journal of Political Economy,* 114 (5): 905-30.

Neumayer, E., 2003, "What factors determine the allocation of aid by Arab countries and multilateral agencies?" *Journal of Development Studies,* 39 (4): 134-47.

Nielson, D. L., R. M. Powers, and M. J. Tierney, 2009. *Broad Trends in Foreign Aid: Insights from PLAID 1.6.*

Roodman, D., 2009, "A note on the theme of too many instruments." *Oxford Bulletin of Economics and Statistics,* 71(1), pp.135-158.

Rouis, M., 2010, *Arab Development Assistance: Four Decades of Cooperation.*

Srinivasan T. N. and J. N. Bhagwati, 1984, "On transfer paradoxes and immiserizing growth: Part II." *Journal of Development Economics,* 1984 Jun 1; 15(1-3):111-5.

Villanger. E., 2007, "Arab foreign aid: Disbursement patterns, aid policies and motives." *Forum for Development Studies,* 34(2), 223256.

Werker, E., F. Z. Ahmed, and C. Cohen, 2009, "How is foreign aid spent? Evidence from a Natural Experiment." *American Economic Journal: Macroeconomics,* 225-244.

Windmeijer, F., 2005, "A finite sample correction for the variance of linear efficient two-step GMM estimators." *Journal of Econometrics,* 17(3), pp.23-48..

Younas, J., 2008, "Motivation for bilateral aid allocation: Altruism or trade benefits." *European Journal of Political Economy* 24 (3): 661-74.

Table 1: Summary statistics

Variables	N	mean	sd	min	max
Dependent variable					
Arab Development Funding ($millions)	2,925	41.41	138.1	0	2,990
Solidarity and Geopolitical Variables					
Voting in UN with Saudi Arabia (%)	2,925	0.721	0.222	0	0.987
Arab	2,925	0.116	0.321	0	1
Africa	2,925	0.364	0.481	0	1
Asia	2,925	0.280	0.449	0	1
Latin America	2,925	0.178	0.383	0	1
Member of OIC	2,925	0.349	0.477	0	1
Israel	2,925	0.164	0.370	0	1
Muslim Majority	2,925	0.280	0.449	0	1
Shia Majority	2,925	0.0342	0.182	0	1
Baseline Economic Variables					
Log (gdp, PPP constant 2011 international $)	2,605	10.20	2.346	3.149	16.74
Human Development Index Score	2,493	0.599	0.147	0.237	0.925
Other Baseline Economic Variables					
Log (population)	2,913	0.696	0.988	-2.034	3.137
Real oil price	2,925	61.15	30.64	18.11	111.6
Trade with Arab (Saudi, Kuwait & UAE)	2,925	1,815	8,984	0	142,573
Economic Stability Variables					
Inflation	2,556	21.21	490.7	-35.84	24,411
Current account balance	2,372	-4.518	11.36	-148.0	48.21
Institutional Variables					
Freedom House Political Rights Index	2,885	3.968	2.056	1	7
Freedom House Civil Rights Index	2,885	3.874	1.686	1	7

Table 2: Correlations for SGPA variables

	UN	Arab	Africa	Asia	LAmerica	OIC	Israel	MM	SM
Arab	0.190***	1							
Africa	0.00268	0.169***	1						
Asia	0.159***	0.106***	-0.472***	1					
L.America	0.108***	-.169***	-0.352***	-0.291***	1				
OIC	0.179***	0.496***	0.222***	0.246***	-0.264***	1			
Israel	0.195***	0.646***	0.0868***	0.258***	-0.206***	0.606***	1		
MM	0.190***	0.581***	0.0972***	0.356***	-0.289***	0.821***	0.710***	1	
SM	0.0683***	0.284***	-0.142***	0.301***	-0.0876***	0.257***	0.323***	0.301***	1

*** p<0.01, ** p<0.05, * p<0.1

Table 3: OLS Estimates

Variables	(1) Baseline	(2) Baseline	(3) Control	(4) Control	(5) Benchmark	(6) Benchmark
Solidarity and geopolitical alignment (SGPA)	33.12***	33.56***	34.58***	35.28***	37.77***	38.67***
	(2.14)	(2.24)	(2.31)	(2.42)	(2.93)	(3.12)
Country capacity (HDI)	-24.59*	15.24	111.66***	177.53***	69.25	125.54**
	(14.49)	(14.84)	(36.83)	(42.56)	(53.07)	(57.41)
Log (GDP)	9.47***	9.17***	-10.01**	-16.63***	0.23	-2.45
	(1.45)	(1.45)	(4.80)	(5.19)	(7.68)	(7.84)
Log (Population)			46.80***	61.58***	29.85	38.54**
			(12.16)	(13.54)	(18.23)	(19.03)
Trade with Arab donors			-0.00	0.00	-0.00	0.00
			(0.00)	(0.00)	(0.00)	(0.00)
Real oil price			7.40***	0.36***	8.83***	0.26***
			(1.81)	(0.09)	(2.45)	(0.10)
Inflation					0.10	-0.07
					(0.09)	(0.10)
Current account balance					-1.30***	-1.76***
					(0.29)	(0.32)
Constant	-70.17***	-60.77***	-221.88***	38.25	-342.80***	-61.36
	(16.28)	(15.95)	(67.47)	(23.81)	(95.54)	(40.37)
Time dummies	Yes	No	Yes	No	Yes	No
Observations	2,266	2,266	2,266	2,266	1,937	1,937
R-squared	0.24	0.20	0.24	0.21	0.25	0.21
VIF (Multicollinearity test)	2.00	1.13	20.55	9.62	22.19	10.13

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Dynamic System GMM Estimates

Variables	(1) Baseline	(2) Baseline	(3) Control	(4) Control	(5) Benchmark	(6) Benchmark
L.ADF	0.89***	0.92***	0.87***	0.89***	0.93***	0.95***
	(0.10)	(0.10)	(0.11)	(0.11)	(0.11)	(0.11)
Solidarity and geopolitical alignment (SGPA)	47.38*	34.27	52.81**	43.24**	51.64**	37.89*
	(24.88)	(23.23)	(22.93)	(21.11)	(20.84)	(20.80)
Country capacity (HDI)	470.80	208.67**	877.65	588.01*	2,280.87**	964.51*
	(360.76)	(87.90)	(613.93)	(320.24)	(1,132.39)	(536.25)
Log (GDP)	-0.56	0.63	-52.65	-32.02	-255.84*	-87.67
	(10.14)	(10.03)	(67.39)	(50.91)	(145.40)	(79.37)
Log (Population)			125.77	74.50	596.85*	212.79
			(160.28)	(117.20)	(330.99)	(181.80)
Trade with Arab donors			-0.00	-0.00	0.00	-0.00
			(0.00)	(0.00)	(0.00)	(0.00)
Real oil price			-0.89	-0.23	7.65	-0.35*
			(3.28)	(0.15)	(5.75)	(0.19)
Inflation					0.51	0.31
					(0.49)	(0.29)
Current account balance					0.33	-0.96
					(1.91)	(1.37)
Constant	-265.81	-123.05	0.00	-54.62	0.00	182.04
	(190.65)	(82.12)	(0.00)	(291.81)	(0.00)	(396.89)
Time dummies	Yes	No	Yes	No	Yes	No
Observations	2,173	2,173	2,173	2,173	1,859	1,859
Number of countries	125	125	125	125	116	116
Number of instruments	74	74	111	94	113	96
First order (p-value)	0.00	0.00	0.00	0.00	0.01	0.01
Second order (p-value)	0.41	0.39	0.42	0.40	0.44	0.43
Sargan test (chi^2)	248.94	264.56	263.13	279.14	239.34	267.28

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Dynamic System GMM Estimates with Inclusion of Institutional Variables

Variables	(1) Benchmark	(2) Benchmark	(3) Institutional	(4) Institutional
L.ADF	0.93***	0.95***	0.93***	0.95***
	(0.11)	(0.11)	(0.11)	(0.11)
Solidarity and geopolitical alignment (SGPA)	51.64**	37.89*	49.34*	36.85
	(20.84)	(20.80)	(25.94)	(24.18)
Country capacity (HDI)	2,280.87**	964.51*	2,280.20**	1,026.92*
	(1,132.39)	(536.25)	(1,076.21)	(524.98)
Log (GDP)	-255.84*	-87.67	-256.09*	-94.64
	(145.40)	(79.37)	(143.00)	(73.25)
Log (Population)	596.85*	212.79	595.42*	228.12
	(330.99)	(181.80)	(324.41)	(167.04)
Trade with Arab donors	0.00	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Real oil price	7.65	-0.35*	6.89	-0.35*
	(5.75)	(0.19)	(5.57)	(0.20)
Inflation	0.51	0.31	0.47	0.30
	(0.49)	(0.29)	(0.52)	(0.33)
Current account balance	0.33	-0.96	0.35	-0.84
	(1.91)	(1.37)	(1.92)	(1.31)
Freedom House Political rights			-7.85	-6.57
			(8.10)	(5.26)
Freedom House Civil liberties			11.57	6.57
			(19.49)	(11.11)
Constant	0.00	182.04	0.00	206.76
	(0.00)	(396.89)	(0.00)	(352.76)
Time dummies	Yes	No	Yes	No
Observations	1,859	1,859	1,859	1,859
Number of countries	116	116	116	116
Number of instruments	113	96	115	98
First order (p-value)	0.00	0.00	0.00	0.00
Second order (p-value)	0.44	0.43	0.45	0.43
Sargan test (chi^2)	239.34	267.28	240.00	266.84

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1: The ACG aid allocation from 1962 to 2015 (by institutions and in US$ millions) suggests that IsDB is the leading provider of Arab Aid with over 40% of the total commitments by the ACG institutions.

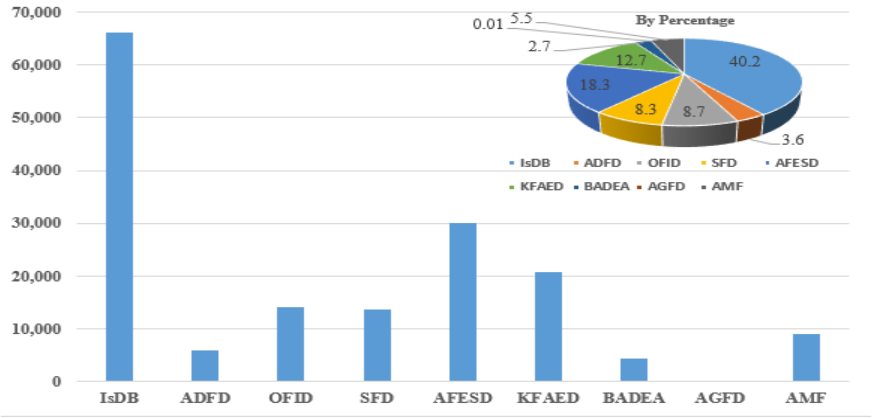

Figure 2: ACG commitments from 1996 to 2015 (in US$ millions) shows a dramatic increase of about nine fold. Further, the commitments for Asian countries increased at a faster rate than Arab countries, though the majority of the commitments were for Arab countries (55% of the total commitments).

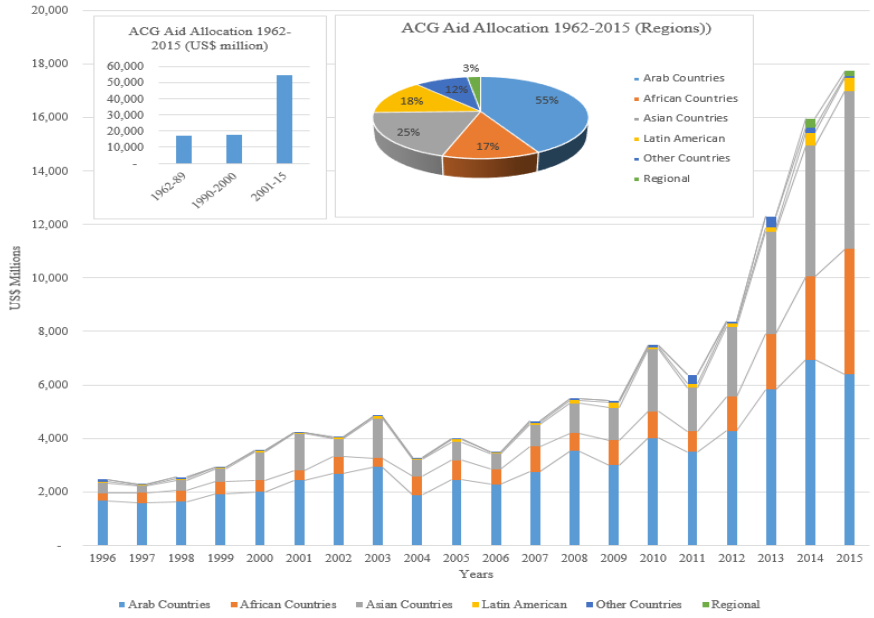

Figure 3: ACG commitments and real oil price between 1996 and 2015 does not show a clear positive correlation. This suggests that the commitments is not always increases with the increase in oil price.

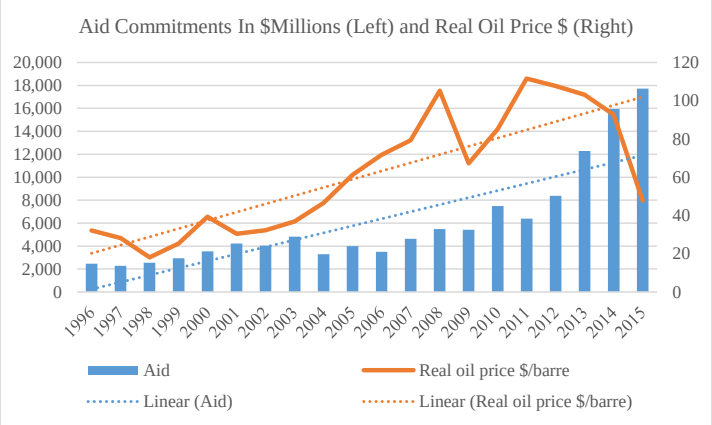

Figure 4: Global Allocation of ACG commitments from 1962 to 2015 shows a clear concentration in North African Arab Countries namely, Egypt, Morocco and Tunisia as well as in South Asian Countries such as Bangladesh and Pakistan.