

Foreign Aid: an Instrument for Fighting Poverty or Communism?*

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Abstract

In this paper, we argue that the sizeable reduction in aggregate aid levels in the 1990's was due to the end of the Cold war. We use a dynamic econometric specification to test this hypothesis on a panel of 17 donor countries, spanning the years 1970-1997. We find aid to be positively related to military expenditures in the former Eastern bloc, and that the substantial drop in these expenditures can indeed explain the reduction in aid in the 1990's. We also find that aid allocation has become less strategic in the 1990's.

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1 Introduction

The aggregate level of development aid dropped substantially in the 1990s. This is illustrated in Figure 1, which displays aggregate aid from the 17 major Western donors for each year between 1970 and 1997. Different explanations for the downturn in the 1990s have been advanced, such as recession and fiscal deficits in many of the donor countries.¹

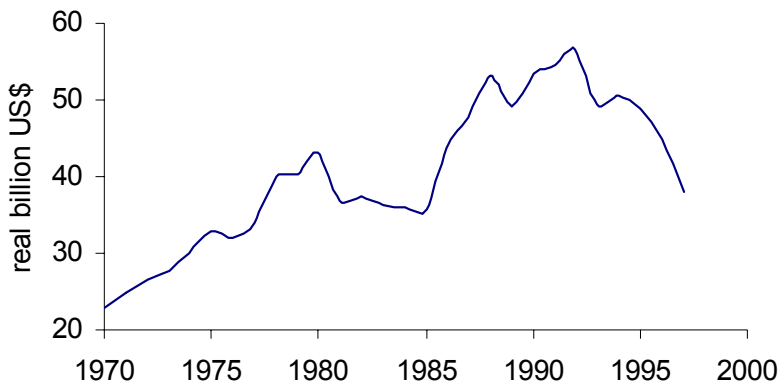


Figure 1. Aggregate development aid

In this paper, we suggest that the explanation might lie elsewhere, namely in the end of the Cold War. According to political rhetoric in most donor countries, the purpose of development aid is altruistic, with the reward for donations being the warm glow from giving to people in need. This altruistic motive has long been questioned by observers in this field, however, who argue that foreign aid has also been used for the donors' own foreign policy interests.² It is well-known that the Western and Eastern blocs supported regimes and guerillas in the developing world on ideological grounds in the bipolar world of the Cold War, and it is evident how foreign aid may have served as an instrument in this ideological struggle. Although well-established as an explanation of foreign aid flows, the impact of the donors' strategic motives on total aid flows has not been systematically tested on any larger scale with modern estimation techniques. There are studies of the aid flows of the

¹See World Bank (1998).

²See, for instance, McKinley and Little (1977) for one of the earlier contributions to this strand of literature.

major donor countries for shorter periods and, for example, the effect, or motivation, of a specific program in a particular region.³ But no study has yet fully exploited the unique – natural experiment like – possibility offered by the dissolution of the Warsaw Pact at the beginning of the 1990s to test the impact of strategic motives on total foreign aid flows.

The specific hypothesis tested in this paper is that foreign aid has been used strategically to gain political allies in the developing world in order to enhance the donors' own security in case of a military conflict with the Eastern Bloc. We identify the impact of the end of the Cold War in a simple theoretical framework, where aid is used as an instrument for the donor countries' own military security. Thus, we obtain the testable hypothesis that donor countries give more aid in times of high security risk, since political loyalty from aid recipients then becomes more important.

This and other predictions from the model are tested on a dynamic panel of 17 donor countries spanning the years 1970 to 1997. Following the economics of defense literature, we use the military expenditures of the former Eastern Bloc as a proxy for the perceived security risk in the donor countries.⁴ We find aid to be significantly and positively affected by the external threat faced by the donor countries, which supports our main hypothesis. This suggests that the dissolution of the Warsaw Pact, and the subsequent decrease in the military threat, caused a reduction in the motivation for aid, offering a potential explanation for the falling aid levels in the 1990s.

Previous papers considering the allocation of aid among recipient countries have found support for the idea that aid is used for other reasons than poverty alleviation. In particular, Alesina and Dollar (2000) find that recipient countries obtain more aid if voting in line with the donors in the general assembly of the United Nations, and that aid allocation is greatly influenced by former colonial status. Another example is Maizels and Nissanke (1984), who find the total aid receipts to be positively

³Two interesting articles in this literature are Schraeder, Hook and Taylor (1998), who perform a comparative empirical analysis of four donors' foreign aid policies towards Africa 1980-1989, and Ball and Johnson (1996) who study US food aid to Africa during the period 1971-1990.

⁴For surveys of the economics of defense literature, see Smith (1995) and Sandler and Hartley (1995).

related to transfers of arms from the major donors in 1969-1970 and 1978-1980. This strand of literature is well suited for finding the underlying pattern determining the allocation of aid, and thereby the size of the aid budgets in the recipient countries. However, as it takes the total supply of aid as given, it is less suitable for answering questions concerning the size of the aid budget in the donor countries, i.e. the major concern in our study. The two approaches are clearly complementary though, in the sense that they represent different ways of understanding the motives behind aid by using different types of data.

Therefore, we analyze a second panel, containing information on the allocation of foreign aid during 1970-1994, subdivided into five-year periods.⁵ We ask whether countries that were strategically important during the Cold War indeed got more aid than comparable countries during the 1970s and 1980s, but not in the 1990s. To test this hypothesis, we define countries that received US military aid at least two years out of five within the five-year period as strategically important.⁶ Then, we introduce this dummy linearly and interacted with a time dummy for the 1990s. We find that strategically important countries got more development aid during the 1970s and 1980s, but that the joint test of the impact of the linear and the interacted term shows up as insignificant, which indicates that strategic importance was not important for aid allocation in the 1990s.

The findings from this paper should be put in the context of the current debate about the future of development aid. George W. Bush has publicly affirmed his intention to increase the U.S. aid budget quite substantially in the upcoming years, a move likely to be followed by many other donor countries. In his announcement, President Bush referred to some of the work cited in this paper, showing that aid only has a positive impact on growth rates in countries with good macroeconomic policies, but that it has not necessarily been targeted to countries with good policies, due to the donors' strategic or commercial interests. The question is how much of

⁵We are grateful to Alberto Alesina and David Dollar for allowing us to use their dataset from Alesina and Dollar (2000).

⁶Our measure of development aid is official development assistance, as defined by OECD-DAC, which does not include military aid.

this awareness that will survive the "realpolitik" of aid that is likely to follow upon the "war on terrorism". The conclusion from this study is that the end of the Cold War may have improved aid allocation, but has also substantially cut the aggregate aid levels. If "the war on terrorism" has a similar effect as the Cold War, we expect an increase in aid flows to be followed by a deterioration of aid allocation.

The paper is structured as follows: Section 2 develops a simple framework for motivating the estimation; Section 3 discusses the empirical implementation of the model; Section 4 presents the results from the dynamic panel of donor countries and Section 5 reports donor-specific results; Section 6 deals with robustness issues; and Section 7 studies the extent of strategic motives in foreign aid allocation, while Section 8 concludes.

2 A simple framework

In this section, we develop a simple model, where aid can serve as an instrument for the donor countries' own military security. There are three goods in the model, one private good, x , and two public goods, external security, S , and poverty alleviation, P . The economy is populated by n identical individuals who earn an exogenous per capita income, y . The utility function is written in a general, but separable form, and is assumed to be continuous and concave in all its arguments,

$$U(x, S, P) = F(x) + G(S) + (1 - \alpha) H(P) .$$

Following the literature, external security is assumed to increase with the country's own military expenditures, M , and decrease with the military expenditures of the enemy country, M^e . To introduce the main hypothesis, we allow what we refer to as strategic aid, A^s , to serve as a complement to military expenditures in the production of security. In addition, there is altruistic aid, A^a , which serves as the instrument for poverty alleviation. Total aid is thus given by $A = A^s + A^a$. The

security and poverty alleviation technologies are given by

$$\begin{cases} S = V(M) + \alpha W(A^s) - M^e \\ P = A^a \end{cases},$$

where $V(M)$ and $W(A^s)$ are concave and twice differentiable. The parameter $\alpha \in [0, 1]$ captures the degree to which the donor sees aid as an instrument for military security rather than poverty alleviation. As α increases, the weight on aid in the security function increases, while the weight on poverty alleviation decreases. Public goods are financed by an income tax, τ , and budget balance is required. The representative individual thus maximizes

$$F(x) + G(V(M) + \alpha W(A^s) - M^e) + (1 - \alpha) H(A^a)$$

subject to

$$\begin{aligned} x &= (1 - \tau)y \\ \tau ny &= M + A \\ A &= A^s + A^a \end{aligned}.$$

The first-order conditions of the optimization problem implicitly define the solutions for A^{s*} , A^{a*} and M^* as continuous functions of the exogenous variables:

$$A^{s*} = A(n, y, M^e; \alpha) \tag{1}$$

$$A^{a*} = A(n, y, M^e; \alpha) \tag{2}$$

$$M^* = M(n, y, M^e; \alpha). \tag{3}$$

As the equations above indicate, the equilibrium levels of aid and military expenditures depend on the parameter α . In particular, if $\alpha = 0$ then $A^{s*} = 0$ and $A^* = A^{a*}$, whereas if $\alpha = 1$ then $A^{a*} = 0$ and $A^* = A^{s*}$. Straightforward comparative statics show that $\frac{\partial A^{s*}}{\partial M^e} \geq 0$, whereas $\frac{\partial A^{a*}}{\partial M^e} \leq 0$, with strict inequality whenever $A^{i*} > 0$. The first implication of this is that $\frac{\partial A^*}{\partial M^e} < 0$ if $\alpha = 0$. In this case, the sole purpose of aid is to reduce poverty. A marginal increase in the military expenditures of the enemy has no direct impact on aid incentives in this case, but military expenditures will increase to meet the increased threat, meaning that the consumption of all other

goods – altruistic aid included – will be cut to meet the budget constraint. On the other hand, $\frac{\partial A^*}{\partial M^e} > 0$ if $\alpha = 1$. In this case, aid only serves as a complement to military expenditures in the production of security. Therefore, military expenditures and aid will both be raised to meet the increased threat from the military enemy. Finally, if $\alpha \in (0, 1)$ there are two counteracting effects; strategic aid will increase while altruistic aid will decrease. Which effect that dominates depends on parameter values (α included) and functional forms. To sum up the results of the model, comparative statistics also reveal that (i) $\frac{\partial A^{i*}}{\partial y} > 0, \frac{\partial M^*}{\partial y} > 0$; (ii) $\frac{\partial A^{i*}}{\partial n} > 0, \frac{\partial M^*}{\partial n} > 0$; and (iii) $\frac{\partial M^*}{\partial M^e} > 0$.

The model presented thereby suggests how the end of the Cold War might have led to a reduction in the level of aid disbursements. It generates an empirically testable hypothesis about the correlation between military expenditures in the former communist bloc and the size of the aid budgets in donor countries. Specifically, a positive correlation indicates that aid has indeed been used as an instrument in the security function of the donor countries.

3 Empirical implementation

3.1 The data set

As a first test of the model specified in the preceding section, we have constructed a panel data set ranging from 1970 to 1997, containing 17 donor countries.⁷ As a measure of aid, we use the OECD definition of Official Development Assistance (ODA), which includes bilateral aid and contributions to multilateral institutions.⁸ As an indicator of the enemy's military expenditures, we use the aggregate military expenditures of the Warsaw Pact (WP) before 1990, and thereafter the sum of the

⁷The sample includes all countries that were members of the OECD Development Association Committee (DAC) during the entire period, namely Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States.

⁸This definition covers all recipient countries except a set of transitional economies from 1993, labeled as class II countries by OECD/DAC.

military expenditures of the countries that belonged to the WP.⁹ The motivation for using the expenditures of all WP countries is that during the Cold War, there were two superpowers, the US and the USSR; if a country was allied with one of these, it automatically became the adversary of the other. In this respect, all donor countries in the sample had the USSR, and hence the WP, as their enemy during the period of analysis.¹⁰

In Appendix A, we list the variable definitions and sources, and in Appendix B, we present some descriptive statistics of the data. The correlation matrix in Table B1 indicates no significant relationship between our measure of military threat and the aid levels, but as will be evident below, this picture changes when controlling for other variables by multiple regression. In Table B2, the descriptive statistics show that there is a fair amount of variation in our main variables. Table B3 reports the descriptive statistics for the country-specific means and standard deviations, which reveal quite a large heterogeneity both in the panel dimension – variation in the country-specific means – and the time dimension – variation in country-specific standard deviations.

3.2 Econometric specification of the model

Our goal is to estimate aid as defined in equation (1), which means that we estimate a reduced form of the theoretical model.¹¹ For simplicity, we presume that a log-linear model captures the functional form of the demand equation for aid,

$$\ln AID_{it} = \alpha + \beta_0 \ln GDP_{it} + \beta_1 \ln POP_{it} + \beta_2 \ln THREAT_t + \epsilon_{it} , \quad (4)$$

where α is the constant term, GDP is the level of GDP per capita, POP is the size of the population, $THREAT$ is the level of military expenditures of the enemy and

⁹This is a standard indicator in the literature. See, for example, Seigle (1992) and Smith (1995).

¹⁰Ten countries out of the seventeen in the sample belong to NATO. Australia, Japan and New Zealand formed military alliances with the United States. Austria, Finland, Sweden and Switzerland were officially non-aligned during the Cold war, but can nevertheless safely be assumed to have considered the WP as the largest threat to their security.

¹¹This paper focuses on the demand for aid, but the conceptual framework also generates a demand equation for military expenditures. Appendix C shows estimates of the military expenditures function, and also contains a short discussion about their limitations.

the error term, ϵ_{it} , is assumed to be normally distributed and i.i.d.¹²

There are reasons to believe that the demand equation for aid should have a dynamic specification. As already pointed out in Wildavsky (1964), the current year's spending in any public agency is predominantly influenced by the budget of the previous year. According to Mosley (1985), this is particularly true for aid agencies, since aid projects often run over several years, with financial flows being committed already in year one. To shed light on the dynamic specification, we follow the procedure suggested in Maddala (1987) and Anderson and Hsiao (1982). According to these authors, it is possible to use a Wald test to study if the lagged dependent variable has a direct effect on the dependent variable, apart from the indirect influence generated by serial correlations of the errors.¹³ This test clearly shows that a state-dependence model should be adopted when explaining aid.¹⁴

For several reasons, a fixed effects model (FE) appears as the logical econometric specification. First, there may be state-invariant, unmeasured factors influencing aid levels, such as political institutions or taste parameters. Thus, it is desirable to allow for these differences by using country specific intercepts. Second, the dimension of our panel is significantly smaller than the number of time periods. While it is well-known that the fixed effects estimator generates biased results in a dynamic panel, this bias decreases in the number of time periods and vanishes as t goes to infinity. The FE-estimator is therefore recommended when working with data

¹²A great concern in the economics of defence literature is the lack of data on the capacity of the military stocks of the former Eastern bloc, which would be a better proxy for the perceived military threat than military expenditures in the current year. To check for this, we have run regressions on the first difference for our base specification, but using the level of military expenditures instead of the change in military expenditures as an explanatory variable. The idea is that if aid expenditures depend on the stock of military capacity, then the change in aid expenditures should depend on the change in this stock, which can be proxied by expenditures in the current year under the assumption of a constant depreciation rate. Using a GLS estimator, since first differencing introduces autocorrelation, we find that our threat variable still enters positively and significantly at the 1-percent level. Another specification we have tested is using aid per capita (non-logged) as the dependent variable, which yields equally strong and robust results.

¹³The procedure suggested in Maddala (1987) actually consists of two parts. First, it is tested whether a serial correlation model is to be used. For this purpose, reformulate a serial correlation model $y_{it} = \beta'x_{it} + \alpha_i + w_{it}$ with $w_{it} = \rho w_{it-1} + u_{it}$ as follows: $y_{it} = \rho y_{it-1} + \beta'x_{it} + \beta \rho x_{it-1} + \eta_i + u_{it}$. If there is serial correlation in the errors, then the coefficient of the lagged independent variables should be equal to minus the product of the coefficients of current x and lagged y . Second, once it has been established that a serial correlation model should not be used, it is tested whether $\rho = 0$.

¹⁴We only use one year lags, because additional lags turned out to be insignificant, and did not have a fundamental impact on the other estimates.

sets of our dimensions, since the alternative unbiased estimators are less efficient; see for example, Attanasio, Picci and Scorcu (2000) and Judson and Owen (1999). Finally, the countries in our sample constitute, in principle, the whole population of the donor countries, so that it is appropriate to treat the individual effects as fixed rather than random. The econometric model estimated is thus formulated as

$$\ln AID_{it} = \alpha_i + \beta_0 \ln AID_{i,t-1} + \beta_1 \ln GDP_{it} + \beta_2 \ln POP_{it} + \beta_3 \ln THREAT_t + \epsilon_{it} . \quad (5)$$

The difference from the specification in equation (4) is that the constant term, α_i , is country specific, but constant across time, and that aid expenditures of the previous year are included on the right-hand side.

4 The main results

Column 1, Table 1 shows the results of estimating equation (4). All variables have the expected signs and, except for population size, POP , the results are significant at the 1 percent level. Aid expenditures are relatively persistent, with a coefficient value of 0.69 on the lagged dependent variable, which is in line with the findings in Mosley (1985). The (short-term) income elasticity is 0.49, which means that aid increases less than proportionally to an increase in per capita GDP, implying that it is considered to be a necessity rather than a luxury good in our sample of countries. The positive correlation between $THREAT$ and AID is of particular interest, yielding support to our hypothesis that aid has been used as an instrument for the donor countries' own military security.¹⁵ To get an estimate of the quantitative impact suggested by our results, we calculated the estimated long run-impact of the actual drop in military expenditures in WP between 1989-1997 (from 214 billion US\$ to 32 billion US\$), holding all other variables constant at the 1989 level. Our estimation

¹⁵It can be questioned whether it is appropriate to treat all former members of the WP as threats after the end of the Cold War. Hungary and Czechoslovakia are even members of the NATO at present, and other former WP countries are applying for membership. We therefore adjusted our $THREAT$ variable by only incorporating Russian military expenditures from 1992 to 1997 (SIPRI has no disaggregated data on Russian military expenditures prior to 1992). This did not change the results, however.

suggests that the end of the Cold War can account for a 30-percent reduction in aid levels, in line with the actual reduction.

Reviewing the small literature estimating the size of foreign aid suggests two variables not included in the basic specification of our model. Beenstock (1980) and Mosley (1985) mention unemployment and budget deficits as important explanatory variables. The argument for both is that there may be obvious incentives to cut down aid expenditures and redirect funds towards domestic expenditures in times of fiscal problems. An additional variable that may be relevant is aid to more advanced Central and Eastern European Countries and new independent states from the former Soviet Union. These aid flows are not included in the definition of ODA used as our dependent variable, although these countries emerged as aid recipients in the 1990s, after the break-up of communism in the Eastern Bloc.¹⁶ A crowding-out effect may, therefore, be another potential explanation for the drop in our measure of aid in the last decade.

It is also reasonable that aid levels depend on the price of poverty reduction – although, for simplicity, it was assumed to be constant in the model in Section 2. Collier and Dollar (2001) argue that the marginal aid cost of poverty reduction decreases with the level of poverty and in the extent of economic reform in the developing world. We have, therefore, also included different measures of economic and political freedom, a headcount index of poverty and the expected number of years of life at birth, *LIFE*, but none of these had any substantial impact on the aid levels.¹⁷ Column 2 in Table 1 presents the results of including *LIFE* and the other additional variables.¹⁸ We find that none of these variables enter significantly, and that their inclusion has a negligible impact on the variables of the base specification.

¹⁶See OECD (1995) for more details.

¹⁷The index of economic freedom is from Gwartney et al (2001), while the index of political freedom is from Freedom House (2001). The headcount index measures the number of people living on less than \$2 a day, in millions. The series is based on Bourguignon and Morrisson (2001) and Chen and Ravallion (2001). *LIFE* is defined in Appendix A. All variables are average levels for developing countries. Linear extrapolations were used in the absence of yearly observations.

¹⁸*BUDGET* is defined as the change in the general government's financial balances as a percentage of nominal GDP, *UN* as the unemployment ratio and *CEEC* as the aid to Central and Eastern European Countries and new independent states from the former Soviet Union. The reason for capturing the importance of budget imbalances in this way is that it ought to be the changes and not the levels per se that are important for budget cuts. See Appendix A for exact definitions.

	1	2	3	4	5	6
lnAID _{t-1}	0.69*** (0.02)	0.67*** (0.03)	0.57*** (0.04)	0.66*** (0.02)	0.69*** (0.03)	0.68*** (0.02)
lnGDP	0.49*** (0.04)	0.47*** (0.05)	0.56*** (0.06)	0.47*** (0.05)	0.49*** (0.06)	0.53*** (0.05)
lnPOP	0.05 (0.17)	-0.09 (0.21)	0.32 (0.25)	0.03 (0.19)	0.05 (0.18)	0.09 (0.20)
lnTHREAT	0.07*** (0.01)	0.07*** (0.02)	0.12*** (0.03)	0.39*** (0.15)	0.07*** (0.02)	0.07*** (0.02)
BUDGET		-0.01 (0.005)	-0.01 (0.01)			
UN		-0.005 (0.004)	0.002 (0.01)			
lnCEEC		0.002 (0.007)	0.001 (0.007)			
lnLIFE		0.48 (0.34)	1.50* (0.89)			
FATIGUE			0.004* (0.002)			
Id				1.48* (0.87)	-0.06 (0.24)	
lnAID _{t-1} *Id				-0.02 (0.03)	0.01 (0.03)	-0.26*** (0.09)
lnGDP*Id				0.15* (0.08)	0.00 (0.08)	-0.07 (0.10)
lnTHREAT*Id				-0.31* (0.16)	0.00 (0.02)	-0.01 (0.03)
lnPOP*Id				-0.02 (0.03)	-0.01 (0.03)	-0.07 (0.38)
cons	0.35 (0.53)	-0.94 (1.04)	-6.27 (3.59)	-1.12 (0.82)	0.40 (0.57)	0.71 (0.53)
R ²	0.88	0.88	0.77	0.88	0.88	0.88
N. of observations	459	459	306	459	459	459

*** denotes significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level. Standard errors are in parentheses. (1) is the basic framework. (2) extends the framework by including other variables. (3) adds a variable capturing the importance of aid fatigue. (4) includes a dummy for the 1990s and its interaction effects. (5) includes a dummy for political affiliation and its interaction effects. (6) contains a dummy for donors who predominantly give aid to former colonies and its interaction effects.

Table 1. Panel estimates using fixed effects. Dependent var: Log of foreign aid

This may be somewhat surprising, but it should be emphasized that we control for

GDP per capita in this regression, so that the effect of a general economic recession is already captured by this variable.¹⁹

In the 1990s, a recurrent topic in the foreign aid literature was the sense of *aid fatigue* characterizing many donor governments questioning whether the aid provided was effective in fighting poverty and enhancing economic growth. The failure of aid in relieving poverty led to a disenchantment of the beneficiary effects of foreign aid hypothesized to cause the decrease in aid levels.²⁰ Naturally, it is impossible to capture aid fatigue per se in a regression, but one way of incorporating it into the analysis is to consider the outcome performance of evaluated projects. We use an index of the outcome performance of World Bank projects measuring the satisfactory outcome performance in per cent of the evaluated projects. This means that if aid is given as a function of its success rate, then we should expect a positive coefficient on *FATIGUE*. Column 3, Table 1 reports the expected sign on this coefficient, and it is significant.²¹ Moreover, life expectancy turns out to be positively significant when controlling for aid fatigue. This can be interpreted as an indication that aid is given conditional on its probability of positive effects.

The breakdown of the former Eastern Bloc led to a political and economic re-orientation towards market liberalism and democracy in most of these countries, resulting in a relative normalization of international politics in the 1990s. We therefore find it interesting to check whether there was a structural break in the coefficient values around 1989. To test this hypothesis, we create a dummy variable taking on the value of 1 in the years 1990 to 1997, and 0 elsewhere. We then interact this dummy variable with our independent variables to see if the coefficient values are significantly different in the 1990s. The results are presented in Table 1, column 4. The interaction dummies of *THREAT* and *GDP* are indeed significant, indicating that the marginal impact on the size of the aid budget from an increase in military

¹⁹We have also tried to instrument *BUDGET* with its lagged values to avoid potential endogeneity problems due to the fact that aid expenditures are part of the government budget, as well as tested to use the level of budget deficit, but they are also insignificant.

²⁰World Bank (1998) was one of the many responses to this debate. See Collier and Dollar (2001) for an updated overview of the findings on aid effectiveness.

²¹Instrumenting for lagged values of *FATIGUE* gives the same results.

expenditures of the former Eastern Bloc has decreased substantially in the 1990s (though it is still positive), while a larger share of an increase in income is now devoted to aid.

Another variable of interest is *PARTY*, which is a dummy defined as 1 if the country had a right-wing government in a given year and 0 otherwise, according to the classification in Alesina, Roubini and Cohen (1997). The hypothesis we want to test is if left-wing governments act less strategically than right-wing governments, with respect to the size of the aid budget.²² Therefore, we have interacted the *PARTY* dummy with the other variables to see if there is any significant difference between the two political blocs in their reaction to a change in any of the exogenous variables. However, as shown in Table 1, column 5, all interaction terms appear to be insignificant, thus lending no support to this hypothesis.

Finally, Alesina and Dollar (2000) show that four of our donor countries, the United Kingdom, France, Belgium and Australia, give between 78 and 53.7 per cent of their aid to former colonies. (For the remaining countries in our sample, the figure is below 23 per cent.) Through interaction effects, we have studied whether these four countries determine their total aid expenditures in any different way from the rest of the sample. Column 6 in Table 1 indicates that the former colonial powers are less sensitive to changes in GDP, while all other interaction terms fail to be significant.

5 Country-specific results for donors

To further investigate the determinants of foreign aid levels, we have estimated equation (4), augmented with the variable for capturing fiscal imbalances (*BUDGET*) for all countries in our sample. *BUDGET* is included to capture the potential importance of budget considerations at the country level.

²²This hypothesis is stressed by Lumsdaine (1993).

	lnGDP	lnAID _{t-1}	lnPOP	lnTHREAT	BUDGET	R ²	N obs
Australia	0.68*** (0.20)	0.14 (0.17)	0.15 (0.38)	0.09* (0.05)	-0.03** (0.01)	0.49	27
Austria	0.27 (0.29)	0.56*** (0.13)	18.6 (11.73)	0.51 (0.31)	0.05 (0.03)	0.88	27
Belgium	0.53*** (0.10)	0.34*** (0.11)	-3.07 (3.12)	0.05 (0.05)	-0.03* (0.01)	0.78	27
Canada	0.65** (0.27)	0.51*** (0.13)	0.22 (0.34)	0.06 (0.04)	-0.01 0.01	0.83	27
Denmark	0.61*** (0.11)	0.59*** (0.12)	2.64 (4.67)	0.03 (0.03)	0.02* (0.01)	0.98	27
Finland	0.58*** (0.16)	0.52*** (0.11)	9.02*** (3.20)	0.30*** (0.07)	-0.01 (0.02)	0.97	27
France	0.38*** (0.07)	0.51*** (0.13)	1.23 (0.97)	0.10** (0.04)	-0.02 (0.01)	0.90	27
Germany	0.51*** (0.08)	0.56*** (0.06)	0.68 (0.46)	0.12 (0.08)	-0.02** (0.01)	0.94	27
Italy	0.66* (0.37)	0.60*** (0.19)	7.31 (6.76)	0.17 (0.11)	0.01 (0.04)	0.84	27
Japan	0.73*** (0.18)	0.39*** (0.12)	1.24 (1.84)	0.13** (0.05)	0.003 (0.02)	0.96	27
Netherlands	0.51*** (0.10)	0.51*** (0.09)	2.08** (0.97)	0.09** (0.04)	-0.04*** (0.01)	0.95	27
New Zealand	0.33** (0.16)	0.66*** (0.10)	-0.19 (0.58)	0.001 (0.06)	-0.03* (0.01)	0.76	27
Norway	0.55*** (0.15)	0.54*** (0.11)	3.32 (2.49)	0.12 (0.07)	-0.02* (0.01)	0.97	27
Sweden	0.56*** (0.13)	0.57*** (0.09)	2.02 (2.25)	0.07 (0.06)	-0.01 (0.01)	0.92	27
Switzerland	0.46** (0.17)	0.53*** (0.17)	6.94** (3.16)	0.22** (0.10)	0.07 (0.03)	0.93	27
United Kingdom	0.63*** (0.15)	0.45*** (0.14)	-8.65*** (2.97)	-0.10** (0.05)	0.004 (0.01)	0.82	27
United States	-0.71 (1.21)	0.12 (0.24)	1.35 (1.52)	0.17*** (0.03)	-0.02 (0.03)	0.49	27

*** denotes significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level. Robust standard errors are in parentheses. The constant term is not reported.

Table 2. Country-specific estimates using OLS. Dependent var: Log of foreign aid

As reported in Table 2, our model performs relatively well, explaining more than 80

percent of the variation in 13 of the 17 countries. The coefficient value on *THREAT* is positive for all countries except the United Kingdom, and it is significant at the 1-per cent level for Finland and the United States, at the 5-per cent level for France, Japan, the Netherlands, Switzerland and the United Kingdom, and at the 10-per cent level for Australia. This group is rather heterogenous, including countries that have been found to act strategically in their allocation of aid in Alesina and Dollar (2000), in particular the United States, Japan and France, but also Finland and the Netherlands that are generally considered as less strategic donors.

BUDGET has a significant negative impact on aid in 6 countries in our sample, meaning that increases in fiscal imbalances decrease the aid budget in these countries. (This is plausible since the these countries have experienced periods of increasing budget deficits.) Fiscal problems are therefore important in determining the size of the aid budget on the country level in almost half the sample. To summarize, the group of countries with positive and significant coefficients on *THREAT* consists of 7 out of the 17 countries in our base specification. However, the United States, Japan and France are the three largest donors, and alone account for 54 percent of the total aid flows in the sample. Hence, even if only a minority of the countries responds to changes in the military threat, the impact on the aggregate aid level is likely to be substantial.

6 Robustness of the results

The sensitivity analysis in this section focuses on six potential pitfalls in our estimation approach. The first addresses the measurement problems associated with our main explanatory variable, *THREAT*. The problems arise from raw data not having been available to researchers outside the WP, especially for the period before 1980. Estimates of these figures have predominantly been made by SIPRI (Stockholm International Peace Research Institute) and the United States Arms Control and Disarmament Agency. We have chosen to use SIPRI data in our analysis. Figure 2 illustrates the military expenditures of the Warsaw Pact as estimated by SIPRI and

the United States Arms Control and Disarmament Agency – the so called WMEAT (World Military Expenditures and Arms Transfers) data – in real US\$.²³ When comparing the series from SIPRI and WMEAT, the difference is mostly a matter of level where the US Agency has a somewhat higher estimation of the military expenditures of the Warsaw Pact than SIPRI. Column 1 in Table 3 reports the results of the basic specification – equation (4) – when using WMEAT instead of SIPRI data. The difference in outcomes is negligible.

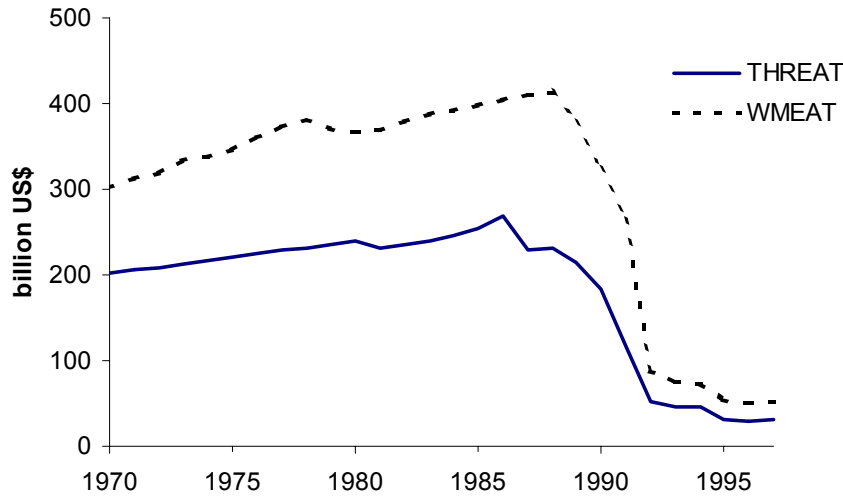


Figure 2. Different measures of the military expenditures of the Warsaw Pact

The second concern emerges from the analysis of country-specific slope coefficients in the previous section. Is it appropriate to assume poolability across donor countries? As shown, e.g., by Pesaran and Smith (1995), incorrectly pooling data yields inconsistent estimates in a dynamic panel. To address this problem, we also estimate our basic equation using the Hildreth-Houck random coefficients model. This model treats the coefficient vector as the realization of a stochastic process and, as suggested in Swamy (1971), the estimator is computed as a precision weighted average of panel-specific OLS estimators. The results in column 2, Table 3 are by and large consistent with those using the fixed effects estimator. In fact, the coefficient values

²³We wish to thank Silvia Pezzini at STICERD, London School of Economics, for having shared her WMEAT data with us.

do not vary dramatically (with the exception of *POP*) or change signs. The coefficient value on *THREAT* increases somewhat from 0.068 to 0.092, which is in line with the results of the individual country regressions, where the coefficient values are, in general, higher in countries with more precise estimates. As expected, the standard errors are somewhat higher when relaxing the homogeneity assumption, but AID_{t-1} , *GDP* and *THREAT* are still significant at the 1-percent level.

	1	2	3	4	5	6
lnAID _{t-1}	0.69*** (0.02)	0.52*** (0.05)	0.69*** (0.03)	0.69*** (0.02)	0.69*** (0.02)	0.67*** (0.02)
lnGDP	0.48*** (0.04)	0.52*** (0.11)	0.49*** (0.06)	0.51*** (0.06)	0.50*** (0.04)	0.50*** (0.02)
lnPOP	0.01 (0.17)	1.19 (1.44)	0.05 (0.20)	0.10 (0.20)	0.13 (0.17)	0.0004 (0.20)
lnTHREAT		0.09*** (0.03)	0.07*** (0.02)	0.07*** (0.02)	0.08*** (0.01)	0.07*** (0.02)
lnWMEAT	0.06*** (0.01)					
GROWTH				(0.53) (0.53)		
AverGDP				-0.04 (0.11)		
cons	0.50 (0.52)	-0.70 (4.07)	-0.15 (0.35)	0.60 (0.83)	0.23 (0.98)	0.001 (0.002)
R ²	0.88		0.98	0.88	0.98	
N of observations	459	459	459	459	459	442

*** denotes significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are in parentheses. (1) Uses lnWMEAT instead of lnTHREAT. (2) Hildreth-Houck random coefficient model. (3) FE with corrected standard errors. (4) FE with additional variables. (5) GMM estimates. (6) IV using an instrument for THREAT.

Table 3. Sensitivity analysis. Dependent variable: Log of foreign aid

Another potential pitfall is the fact that the variable identifying the strategic use of aid in our estimations – i.e., the level of military expenditures in the former WP – is common to all donor countries in the panel. As pointed out in Moulton (1990), if there are year-specific unobservable characteristics that are common across panels, standard errors from OLS regressions can be seriously downward biased in

the presence of common explanatory variables. In Table 3, we present the results from two different approaches dealing with this potential problem. In Column 3, we have used the fixed effect estimator, but with standard errors corrected for potential heteroscedasticity and contemporaneous correlation in the error terms, as suggested in Moulton (1990). The standard errors increase as expected, but the estimated coefficients remain significant at the 1-percent level.

Another way of dealing with the issue of a common variable is to include other common variables that may have had an impact on the pattern of aid, to see how these affect the correlation between *THREAT* and *AID*. For this purpose, we introduce two other common variables, one measure of the worldwide business cycle and one measure of the worldwide level of GDP, into our base specification.²⁴ Both variables fail to be significant, and their inclusion has basically no impact on the size or significance of the *THREAT* variable coefficient, as shown in Table 3, column 4.²⁵

A fourth possible concern is potential endogeneity with respect to the *THREAT* variable. If aid is used as an instrument for military security in the West, it can be argued that Western aid may have had an impact on the level of military expenditures in the former WP. Finding appropriate instruments is a very difficult task in this case, however. What we can do is to use lagged values of *THREAT* as instruments in an attempt to remedy this potential pitfall. Table 3, column 6, shows the result from running an instrumental variable regression, using the value of previous year of *THREAT* as an instrument for this year's value. The coefficient

²⁴The proxy for the worldwide business cycle is constructed as the sum of the growth rates in real GDP in the seven largest economies (Canada, France, Germany, Italy, Japan, United Kingdom, United States), weighted by their shares of GDP in total GDP. The measure of the overall level of GDP is constructed as the sum of the levels of GDP in all countries in the sample, weighted by their shares of total GDP.

²⁵We have also tried with linear and quadratic time trends. There is no real economic reason to assume a trend in aid expenditures, apart from that driven by a trend in GDP per capita, but a time trend may catch some omitted and common variable that we cannot identify, such as aid fatigue. However, irrespective of how we enter these trends, separately or jointly, they always enter non-significantly and have basically no impact on the coefficient values of our explanatory variables. In the case when we enter both a linear and a quadratic trend jointly, the t-statistic of the threat variable drops, but it remains significant at the 5-percent level. Surprisingly, the time trend enters monotonically increasing, which indicates that our measure of the military threat does a good job in explaining the non-monotonicity in aid levels.

value on *THREAT* remains within the same range as before, and the t-statistics actually increases.

The fifth concern is inconsistency due to the presence of fixed effects in a dynamic panel. As mentioned previously, the fixed effects model is often recommended in dynamic panels of our size, but there are still reasons to check whether the results hold when we use a consistent estimator. Arellano and Bond (1991) suggest a technique using the general method of moments (GMM) to estimate a first-difference equation, with values on the dependent variable and the independent variables lagged twice and more as instruments. This model does not only generate consistent results in the presence of fixed effects, but it opens up for the possibility to treat our *THREAT* variable as predetermined, i.e. we can partly deal with its potential endogeneity. Treating *THREAT* as predetermined and allowing for heteroscedasticity, we get the results presented in Table 3, column 5. The coefficient value on *THREAT* is basically identical to that derived with the FE estimator, and all variables remain significant.²⁶

The final dimension of our sensitivity analysis concerns the sample of countries and the time span. Since our sample consists of the complete set of members of the OECD Development Assistance Committee during these years, we have difficulties in expanding our set of countries. However, we can experiment with dropping different countries to check that no single country drives our result. In fact, it might be suspected that outliers would weigh heavily in the results. The United States has, for example, had the highest level of military expenditures while, at the same time, being one of the countries giving the least foreign aid in terms of per capita, or as a share of GDP. Therefore, we have reestimated our fixed effect aid equation excluding, one at a time, the United States, as well as all other countries. This does not change our coefficient values or their significance more than marginally, however. It should also be emphasized that the positive impact of *THREAT* on *AID* remains

²⁶The consistency of these results rely on there being no second order autocorrelation. Testing for this shows that the hypothesis of zero second order autocorrelation cannot be rejected. Furthermore, a Sargan test of the overidentifying assumptions indicates that the instruments are valid.

highly significant, even if restricting the sample to some range between 1970-1990 and 1970-1986. The significant correlation is thus not only due to the events in the 1990s.

7 Strategic allocation of aid

If the decline in aid levels in the 1990s is due to the end of the Cold War, then aid allocations should also reflect this institutional change. In other words, the decrease in aid should be largest in those countries mainly receiving it for strategic reasons. This raises the question, which developing countries were strategically important during the Cold War?

The literature on aid allocation has made several suggestions in this respect. The problem is, however, that "strategic" can be very broadly defined. Schraeder, Hook and Taylor (1998) employ military expenditures (in per cent of GDP) in the aid recipient countries as an indicator of the country's strategic importance. They argue that a larger military arsenal makes a country more important as an ally. Ball and Johnson (1996) use US and Soviet arms transfers as indicators of strategic motives behind US food aid to Africa. Lately, Burnside and Dollar (2000) employed military imports (relative to total imports) to capture the strategic importance of developing countries. Alesina and Dollar (2000) use yet another indicator to measure strategic behavior in aid allocation. They argue that the voting patterns in the United Nations serve as a good indicator of the degree of alliance between donors and recipient countries: in general, UN-friends are found to obtain significantly more aid than other countries.

For our purpose we need to find a variable that, as precisely as possible, relates to the donor countries' own military security, and is specific to the Cold War motive.

	ODAPC	ODAPC	OD AUS	ODAJPN	ODAFRA	ODAGER
STRAT	1.06*** (0.14)	0.78*** (0.13)	23.33*** (4.48)	3.41 (6.62)	3.59 (2.31)	6.78*** (1.54)
GDPIN	-0.82*** (0.11)	-0.70*** (0.10)	-18.18*** (5.32)	-10.09*** (3.21)	-1.88 (1.29)	-6.42*** (1.41)
OPEN	0.24 (0.19)	0.15 (0.18)	23.60 (15.23)	57.64*** (16.04)	7.65*** (2.92)	3.64 (3.53)
DEM	0.18*** (0.04)	0.17*** (0.04)	9.18*** (3.06)	2.66* (1.40)	1.98*** (0.56)	2.86*** (0.75)
POPDEV	0.30*** (0.06)	0.35*** (0.05)	13.64*** (4.26)	23.01*** (4.52)	4.93*** (0.85)	8.62*** (1.07)
USFRIEND		-0.01** (0.004)	0.36** (0.18)			
JPNFRIEND		0.04*** (0.01)		0.54 (0.35)		
XFRIEND					-0.02 (0.14)	0.24 (0.21)
COL	0.20*** (0.04)	0.20*** (0.04)	13.08** (6.00)	2.94 (15.81)	-0.02** (0.01)	1.37 (1.16)
D90	-1.30 (2.47)	-0.91 (5.46)	165.00 (116.31)	233.19 (249.02)	-158.81** (76.22)	-101.14 (91.31)
STRAT*D90	-0.56 ^{Note} (0.55)	-0.84* (0.45)	-58.56*** (17.40)	-84.90 (89.62)	16.31 (19.61)	-33.18*** (11.31)
GDPIN*D90	0.10 (0.28)	-0.004 (0.28)	-7.21 (8.88)	-13.58 (24.70)	6.89 (6.94)	-7.82 (5.22)
OPEN*D90	0.28 (0.44)	0.48 (0.43)	-11.85 (17.93)	23.64 (49.84)	-14.80 (11.18)	0.80 (8.18)
DEM*D90	-0.26*** (0.10)	-0.24** (0.10)	-6.60 (4.72)	1.10 (10.39)	-5.43 (3.35)	-1.17 (2.52)
POPDEV*D90	0.18* (0.10)	0.20* (0.10)	-8.98 (5.83)	42.13 (16.67)	4.46* (2.47)	8.39*** (3.01)
USFRIEND*D90		0.02 (0.03)	3.93 (3.05)			
JPNFRIEND*D90		-0.01 (0.06)		-8.51** (3.67)		
XFRIEND*D90					0.80 (0.75)	0.88 (1.06)
COL*D90	-0.27*** (0.09)	-0.19** (0.08)	24.60*** (6.78)	-88.94*** (31.27)	10.46** (4.61)	-2.07 (2.09)
R ²	0.52	0.57	0.78	0.45	0.58	0.60
N of observations	410	399	402	402	402	401

*** denotes significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level. Robust standard errors are in parentheses. The constant term and dummy variables for Israel and Egypt are not reported. Note: The joint significance of STRAT and STRAT*D90 is rejected when performing a F-test with p-value of 0.34.

Table 4. Aid allocation estimates using OLS

Looking at data from the Cold War era, a number of previous studies have found

disbursements of military aid to be highly dependent on strategic and political motives – see Poe and Meernik (1995) and Payaslian (1996), and Brozka (1995) for more details. This suggests that countries receiving military aid have in general been perceived as strategically important. We have, therefore, used data on US military aid throughout the period, and categorized countries that received military aid for more than two out of five years in a five-year period as strategically important (coding the dummy variable *STRAT* to 1). The underlying assumption is that American strategic considerations can be taken as a proxy for those of all donors, even though not all donor countries engage in military aid.

The data set spans the years 1970 to 1994, with data averaged in five-year periods. It contains information about bilateral aid flows from donor countries in the OECD. Besides a dummy for strategically important recipient countries and a variable capturing the voting patterns in the UN council, we have – as suggested in Alesina and Dollar (2000) – controlled for the recipient’s initial GDP level (*GDPIN*), the degree of economic openness (*OPEN*), the extent of democracy (*DEM*), the population size (*POP*) and the number of years as a colony to any donor country (*COL*). Dummies for Israel and Egypt are also included. (These variables are all described in Appendix A.)

Our specific hypothesis is that strategically important countries should get significantly more development aid in the 1970s and 1980s, and no more than comparable countries in the 1990s. To test this hypothesis, we include our strategic variable both linearly and interacted with a time dummy for the 1990s, called *D90*. What we expect to find is a positive linear term and an insignificant joint effect, reflecting the impact on the 1990s. The first two columns in Table 4 use aggregate levels of official development assistance in per capita terms as the dependent variable. The linear term is indeed significantly positive, whereas the interacted effect shows up as negative. To test the hypothesis that *STRAT* has had no impact on the 1990s, we use an F-test to check the joint significance of the direct and the interacted effect (which measures the significance of any impact on the 1990s). This test cannot

reject the null-hypothesis that *STRAT* did not have any impact on aid allocation in the 1990s, however.

Columns 3 to 6 in the table report on the results from country-specific regressions, with the same specification, for four dominant donor countries. The donor-specific regressions for the US and Germany confirm this pattern, while Japan and France appear to have other priorities. It is a well-known result in the literature that Japan mainly allocates aid to recipient countries of economic interest, while France predominantly gives aid to its former colonies.²⁷ In the cases when the UN-friend variable is significant for the period up to 1990, we cannot reject that it is different from zero in the 1990s – except for Japan. Other results from Table 4 show that more aid is given to recipient countries with large populations. Moreover, more democratic regimes obtain more development aid, and the absence of trade barriers can favor aid. Finally, a higher initial GDP level in a developing country implies, *ceteris paribus*, that the country gets less foreign aid.

Summarizing, the results reported in Table 4 support the hypothesis that strategically important countries received more aid than comparable countries during the Cold War, but not in the 1990s.

8 Conclusions

We have tried to answer the question why the aggregate supply of development aid decreased so much in the 1990s. In particular, we have focused on the end of the Cold War, and presented a simple theoretical framework where this should affect the aid budgets in donor countries. The testable implication from the model is that the aid levels should be related to the military threat perceived by the donors. This hypothesis is tested on two panels, one of the donor countries' aid levels and the other of their aid allocation over time.

²⁷See, for example, Schraeder, Hook and Taylor (1998) for a discussion of the aid flows of Japan and France. Although the coefficient for *Colony* is insignificant for France, this changes when including a dummy variable for Franc zone. Then, former colonies receive substantially more aid per capita.

In the dynamic panel of 17 donor countries, we use the military expenditures of the former Warsaw Pact as a proxy for the military threat and find that the total aid levels are significantly and positively affected by this variable. We also find that the substantial drop in the military expenditures of the Eastern Bloc during the 1990s is sufficient to explain the full reduction in aid levels in the same period. In accordance with previous studies, we show that donors' behavior differs, with the three largest donors (the United States, Japan and France) acting most strategically. The analysis of the aid allocation data confirms this pattern. More precisely, it shows that the strategically important developing countries – defined as those receiving US military aid – obtained more development aid than comparable countries in the 1970s and 1980s, but not in the 1990s.

Humanitarian concerns seem to have some impact on aggregate aid, even though the evidence is mixed. More aid is given to countries in need, while less is given if the general prerequisites are bad. The aid allocation analysis yields the expected result that poorer developing countries with larger populations receive more foreign aid. The panel-data analysis of aid levels, however, shows that a higher life expectancy in the developing world increases aid, as does a more satisfactory outcome of World Bank projects. This lends some tentative empirical support to the idea of aid fatigue.

Summarizing, the empirical evidence in this paper suggests that the downturn in total aid levels is due to the reduction in the military threat associated with the dissolution of the Warsaw Treaty at the beginning of the 1990s. New strategic threats, such as "the war on terrorism", can thus be expected to raise the aid budgets, but may again distort aid allocations towards strategically important allies in the developing world.

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Appendix A. Data sources

- *AID*: Official Development Assistance, as defined by OECD/DAC, in millions of real (1990 year prices) US\$. This definition includes non-military grants and net disbursements of concessional loans with at least a 25 percent grant element. From OECD, *Development Co-operation*, various years.
- *BUDGET*: Absolute change from the previous year in the general government's financial balances as percent of GDP. From OECD, *Economic Outlook*, various years, and IMF, *International Financial Statistics*, for Switzerland 1970-1997 and New Zealand 1970-1985.
- *CEEC*: The aid level, in millions of real US\$, to what OECD defines as Part II countries, which are basically the relatively more affluent transitional economies of the former Eastern Bloc. From OECD, *Development Co-operation*, various years.
- *COL*: Number of years as the colony of any colonizer since 1900 (in logs). From Central Intelligence Agency (1996).
- *DEM*: A democracy index with a seven-point scale, where 7 is the most democratic. From Gastil (1990).
- *Israel*: Dummy for Israel.
- *Egypt*: Dummy for Egypt after Camp David.
- *FATIGUE*: Satisfactory outcome performance, in per cent, of evaluated World Bank projects weighted by disbursement. From World Bank (2001).
- *GDP*: Gross Domestic Product per capita in real US\$. From IMF, *International Financial Statistics*, (IFS 1298).
- *GDPIN*: Real GDP per capita at the beginning of the period. From Summers and Heston (1988) – updated to 1992.
- *LIFE*: Life expectancy at birth in years. It indicates the number of years a newborn infant would live if the prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. From World Bank, *2000 World Development Indicators*.
- *MIL*: Military expenditures in billions of real US\$ (1990 year prices). From *SIPRI Yearbook*, various years.
- *OPEN*: The proportion of years a country is open. From Sachs and Warner (1995).

- *PARTY*: A dummy with value 1 if the incumbent party is right wing, and 0 if left wing. From Alesina, Roubini and Cohen (1997) for 1970-1993; Banks, various years, for 1994-1997.
- *POP*: The size of the population in millions in donor countries. From IMF, *International Financial Statistics* (1298), except the figures for 1997 for Belgium, Germany, Ireland, Japan, Luxembourg, Portugal, United Kingdom that are from OECD, *Labour Force Statistics*, 1999.
- *POPDEV*: The size of the population in millions in recipient countries at the beginning of the period. From Summers and Heston (1988) – updated to 1992.
- *ODAPC*: OECD’s official development assistant net per capita in real US\$ 1985 prices; ODAUS, ODAFRA, etc. are defined in the same way. From OECD (1996).
- *STRAT*: Dummy variable assuming value 1 if the recipient country got US military aid at least two years out of five. Constructed from USAID (2000).
- *THREAT*: Total military expenditures in the former WP countries in billions of real US\$, 1990 year prices. From *SIPRI Yearbook*, various years.
- *UN*: The rate of unemployment, OECD, *Labour Force Statistics*, 1999.
- *XFRIEND*: Percentages of times in which the recipient has voted in the United Nations as X, where X are different donor countries.
- *WMEAT*: Total military expenditures of countries in the Warsaw Pact in billions US\$ in 1990 year prices as estimated by United States Arms Control and Disarmament Agency in their publication *World Military Expenditures and Arms Transfers* (various issues).

Appendix B. Descriptive statistics

	lnAID	lnTHREAT	lnGDP	lnPOP
lnAID	1			
lnTHREAT	-0.12	1		
lnGDP	0.37	-0.38	1	
lnPOP	0.83	-0.03	-0.01	1

Table B1. Correlation matrix

	AID	THREAT	GDP	POP
Mean	2366.64	182.65	17.72	40.79
Std. Dev.	2822.69	79.41	6.02	57.93
Max.	12426.22	267.73	39.07	267.90
Min.	22.90	29.67	6.58	2.81
Obs.	476	476	476	476

Table B2. Descriptive statistics for main variables

	AID		GDP		POP	
	Mean _i	Std. Dev _i	Mean _i	Std. Dev _i	Mean _i	Std. Dev _i
Mean	2366.64	738.30	17.71	4.49	40.79	2.68
Std. Dev.	2689.10	826.04	3.76	1.94	59.40	4.86
Max	9802.80	3327.35	26.04	9.17	235.65	18.99
Min	95.64	23.28	11.48	1.73	3.23	0.08

Table B3. Descriptive statistics for country-specific means and standard deviations

Appendix C. The demand for military expenditures

This paper focuses on demand for development aid, but the conceptual framework presented in Section 2 also generates a demand equation for military expenditures. Based on (2), we specify a dynamic econometric model of military expenditures. In this case, there is an additional argument why a dynamic model should be used that comes from the fact that military security depends on the stock of military expenditures rather than just the expenditure level of the current year. It is shown in Smith (1995) that a stock specification can be rewritten in terms of the expenditure level of the current year, but that the expenditures of the previous year should then be included on the right-hand side.

$$\ln MIL_{it} = \alpha_i + \beta_0 \ln MIL_{i,t-1} + \beta_1 \ln GDP_{it} + \beta_2 \ln POP_{it} + \beta_3 \ln THREAT_t + \eta_{it}$$

The model assumes the military expenditures of the former WP countries to be exogenous to the military expenditures in our sample of donor countries.

	MIL
lnmil_L1	0,44*** (0,03)
lnGDP	0,58*** (0,03)
lnPOP	0,32*** (0,10)
lnTHREAT	0,10*** (0,01)
cons	1,93*** (0,30)
R ²	0,89
N of observations	457

Table C4. Military expenditures

This is a common assumption in the economics of defense literature, but inappropriate if we consider the build up of military equipment as an arms-race between the

West and the East. In that case, military expenditures in the former WP countries depend positively on the military expenditures in our sample of donor countries, and the coefficient value β_3 in the specification above will be upward biased.²⁸ One should therefore be somewhat careful when interpreting the results presented below.

Table C4 shows the results from using the fixed effect estimator. All variables are significant at the 1-percent level, and with the expected signs. The military expenditures are quite persistent in our sample, though somewhat less so than aid, and expenditures increase with the level of per capita GDP, the military expenditures of the former WP countries and the size of the population.

²⁸Keeping the potential problem of endogeneity in mind, we have tried system estimators like SUR, 2SLS and 3SLS in order to capture contemporaneous correlation in the error terms between the two demand equations. The coefficient values from those estimations are in line with those reported in Tables 2 and 4.