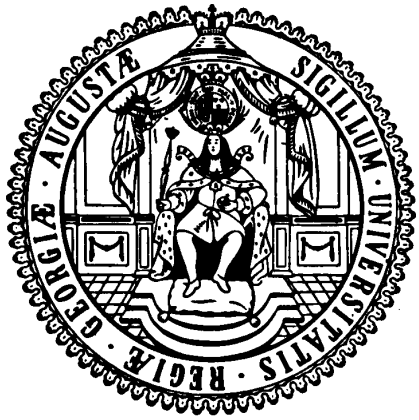
Ibero-Amerika Institut für Wirtschaftsforschung
Instituto Ibero-Americano de Investigaciones Económicas
Ibero-America Institute for Economic Research
(IAI)

Georg-August-Universität Göttingen
(founded in 1737)



Diskussionsbeiträge · Documentos de Trabajo · Discussion Papers

Nr. 170

Does German Development Aid Promote German Exports?

Inmaculada Martínez-Zarzoso, Felicitas Nowak-Lehmann D., Stephan Klasen, Mario Larch

März 2008

Platz der Göttinger Sieben 3 · 37073 Goettingen · Germany · Phone: +49-(0)551-398172 · Fax: +49-(0)551-398173
e-mail: uwia@gwdg.de · http://www.iai.wiwi.uni-goettingen.de

DOES GERMAN DEVELOPMENT AID PROMOTE GERMAN EXPORTS?

Inmaculada Martínez-Zarzoso [1]
Felicitas Nowak-Lehmann D. [2]
Stephan Klasen[3]
Mario Larch[4]

Date: 31/03/2008

Acknowledgements

We would like to thank Jutta Albrecht, Dierk Herzer, Adolf Kloke-Lesch, Rigmar Osterkamp, and Klaus Wardenbach for helpful comments and discussion. Funding from the German Ministry of Economic Cooperation and Development and from Projects Caja Castellón-Bancaja: P1-1B2005-33 and SEJ2007-67548 in support of this work is gratefully acknowledged.

[1] Department of Economics and Ibero-America Institute for Economic Research, University of Göttingen, Germany and Department of Economics and Instituto de Economía Internacional, Universidad Jaume I, Castellón, Spain.
[2] Ibero-America Institute for Economic Research and Center for Globalization and Europeanization of the Economy, University of Göttingen, Germany.
[3] Department of Economics and Ibero-America Institute for Economic Research, University of Göttingen.
[4] Ifo Institute.

DOES GERMAN DEVELOPMENT AID PROMOTE GERMAN EXPORTS?

Abstract

This paper uses a static and dynamic gravity model of trade to investigate the link between German development aid and exports from Germany to the recipient countries. The findings indicate that in the long run,German aid is associated with an increase in exports of goods that is larger than the aid flow, with a point estimate of 140 percent of the aid given. In addition, the evolution of the estimated coefficients over time shows an effect that is consistently positive but which oscillates over time. Interestingly, in the period from 2001 to 2005, a steady increase in the effect of aid on trade can be observed following a decrease in this phenomenon in the second half of the nineties. The paper also distinguishes among recipient countries and finds that the return on aid measured by German exports is higher for aid to countries considered "strategic aid recipients" by the German government.

Key Words: F10; F35

JEL Classification: International Trade; Foreign Aid; Germany

1. Introduction

The United Nations Millennium Development Goals (MDG8) are to promote growth and to reduce poverty in developing countries. In support of this effort, MDG8 calls for a new partnership for development, encompassing the goal of providing higher levels of aid to countries committed to poverty reduction. In recent decades, a great deal of research effort has been devoted to investigating the effects of development assistance on the economic performance of the recipient countries (e.g., Burnside and Dollar, 2000; Hanssen and Tarp, 2001) and to clarifying the recent debate on how aid can help increase the level of exports from developing countries, in line with the "aid for trade" concept (Morrisey, 2006).

Although promoting economic development is one of the main objectives of foreign-aid programs, the motivations for giving aid are diverse and include historical ties and

political and strategic goals, as well as consideration of the economic interests of aid-giving countries (Alesina and Dollar, 2000).

Given that the economic interests of aid-giving countries play a role in aid allocation, it is surprising that only a few authors have investigated the economic effects of aid from a donor's perspective (Nilson, 1998; Wagner, 2003; Osei, Morrisey, and Lloyd, 2004). In particular, the question arises whether the official development assistance (ODA) promotes exports from donors to recipient countries. This question is of special interest to Germany since the German government is committed, according to EU plans, and in line with various international commitments, to increasing its official development aid to 0.7 percent by 2015. In the late 1990s and early 2000s, German ODA was below 0.3 percent of GDP, rising to 0.37 percent (or about 9B US$) in 2005. To reach the goal of 0.7 percent and accounting for economic growth in the interim will imply that German ODA must more than double in real terms in the next eight years.

The only empirical study that quantifies the impact of aid on German exports is, to our knowledge, Vogler-Ludwig et al. (1999). Using data for the period 1976 through 1995 and simple ordinary least squares (OLS) panel regressions, the authors found that one Deutschmark spent on ODA increased exports by 4.3 Deutschmarks. The purpose of this paper is to address this issue using a longer time horizon, a much larger country sample, a more comprehensive set of control variables, and more advanced panel econometric techniques than previous studies, as well as using a number of robustness checks and fixed effects for country groups and different time periods. We estimate a static and a dynamic gravity model of German exports to 138 recipients augmented with development aid for the period 1962 to 2005.

To summarize our main results, we find that the increase in exports flowing from German aid is somewhat more moderate: around $0.70-$1.4 US increase of exports for every aid dollar spent. In addition, the effect is greater for developing countries which are target

countries of the German Ministry of Development (so called "BMZ countries"), i.e., countries where German aid is given based on agreements between the German government and the recipient-country government.[5] The overall effect is remarkably robust but oscillates over time. It is always positive and has increased in recent years (after a decline in the 1990s). Interestingly, we find no effect of aid given by the European Union (partly paid for by German contributions to the EU) on German export levels.

Section 2 presents the theoretical background. Section 3 reviews the recent literature on trade and aid. Section 4 discusses the structure of German aid over time and across recipients. Section 5 presents the model specification, data sources and variables and main results. Finally, Section 6 presents the conclusions.

2. Theoretical Background

In international trade theory researchers have long studied the welfare implications of bilateral transfers for donor and recipient countries. The first public discussion of this topic was the Keynes-Ohlin debate in relation to the paradoxical effects of German reparations[6]. Leontieff (1936) also raised the possibility of transfer paradoxes in that foreign aid can be donor-enriching and recipient-immiserizing. Since then, the theoretical literature on transfer paradoxes has been extended to cover more general settings and the findings indicate that while such paradoxes can still occur, under certain conditions, both donors and recipients can benefit from aid transfers (Gale, 1974; Brecher and Bhagwati, 1981, 1982; Bhagwati, Brecher, and Hatta, 1983, 1984). Bhagwati et al. (2004) present an early survey of this literature.

[5] Other developing countries also receive aid, but through different channels, such as funding from private foundations that receive support from the German government, government scholarships to students from these countries to study in Germany, and government support for German NGOs providing emergency assistance and other project support in that country. In these cases, the aid flow was not a result of German aid policy targeted to that particular country but rather an outcome of the policies and processes of these different programs.
[6] Keynes (1929a,1929b,1929c) and Ohlin (1929a,1929b).

More recently, Djajic, Lahiri, and Raimondos-Moller (2004) studied the welfare implications of temporary foreign aid in the context of an intertemporal model of trade. They find that the net benefits of an aid transfer may change over time for both the donor and the recipient. Assuming economic and political stability in the recipient country, a temporary transfer of income in the first period improves Period One welfare of the recipient and lowers that of the donor. But in the presence of habit-formation effects, aid in Period One may serve to shift preferences of the recipient in favor of the donor's export goods in Period Two. When the terms-of-trade effect associated with this shift is sufficiently large and the real rate of interest is sufficiently low, the second period welfare gain of the donor (at the expense of the recipient) overshadows its Period One loss. In addition, this transaction also results in a net increase in welfare of the recipient country if the real rate of interest used to discount the Period Two loss is sufficiently high, making its present value smaller than the Period One gain.

In this paper we focus exclusively on the effect of aid on the donor's exports. With this aim and taking into account the above-mentioned theoretical considerations, we expect that, in the context of an intertemporal model of trade, development aid could lead to an increase in the donor's exports for several reasons. First, there might be an impact as a result of the fact that a considerable share of donor aid in the time period we analyze was previously tied to exports from the donor country. Up until the 1990s, approximately 50 percent of the donors' development aid was tied to exports. However, this number is much smaller today, and for the German case amounts to only 7 percent of development aid (Development Assistance Committee, OECD (2007)). While tied aid is on the decline and now rarely given, it might have an effect. This "tied aid" effect would clearly be smaller than the amount of aid sent, as a considerable share of aid is spent paying local labor, funding technical assistance, and purchasing local supplies, and would thus not show up as exports from the donor country. Second, we hypothesize that there may be habit-formation effects in the sense that donor-

funded exports for aid-related projects might increase the proclivity of recipient countries to buy goods from the donor, as discussed in the model of Djajic et al (2004). Such an effect would go beyond tied aid and might be much larger than the direct effect of tied aid. Third, we assume that the aid relationship promotes a trade relationship in the sense that it creates "goodwill" towards donor exporters and as donor countries might often combine aid missions and negotiations with trade missions, the aid relationship might "open the door" for donor exporters.

In order to evaluate this effect empirically, we have chosen the gravity model of trade as a basic framework. Solid theoretical foundations that provide a consistent base for empirical analysis have been developed in the past three decades for this model (Anderson, 1979; Bergstrand, 1985; Anderson and van Wincoop, 2003). The major contribution of Anderson and van Wincoop (AvW) was the appropriate modeling of trade costs to explain bilateral exports. The AvW model has been recently extended to applications explicitly involving developed and less developed countries by Nelson and Juhasz Silva (2007). They present an extension of AvW to the asymmetric north-south case and derive some implications related to the effect of aid on trade. Their results indicate that if the economy of a donor country (GDP) is larger than that of the recipient country by at least the monetary value of the foreign aid, there is an increase in exports from the larger country to the smaller. The intuitive rationale behind this effect is that the more similar in size two countries are, the more they trade with one another.

3. Empirical Literature on Aid and Trade

We now turn to the existing empirical literature on aid and trade. In line with the focus of our study, we concentrate on the causal links from aid flows to trade flows.

In recent years, a number of researchers have investigated the relationship between aid and bilateral trade flows from donors to recipients. Some of them focus on quantifying the

impact of donors' aid on trade. Since in many cases aid was once contingent upon purchasing goods from the donor, tied aid may automatically create such export effects.

The recent literature has been divided on the effect of aid on exports from donor countries. Most studies use the gravity model of trade as the empirical framework. Among those who found a positive effect of aid on trade was Nilson (1998), who analyzed the link between aid and exports for European Union donors to 108 recipients. He estimated a static specification of the gravity model for the period 1975 to 1992 (three-year averages) and found an elasticity of exports with respect to aid of 0.23 that translates into a $2.6 US increase of exports for each dollar of aid given. He also computed donors' specific elasticities, and for Germany the return on foreign aid was a $3.16 increase in exports for each dollar of aid given. Wagner (2003) also used a gravity model of trade to investigate the effect of aid on trade for twenty donors to 109 recipient countries for the years 1970 to 1990. He obtained elasticities of trade with respect to aid in the range of 0.062 (for fixed-effects (FE) specification) to 0.195 (for the pooled OLS). The estimated average return on donors' aid according to the OLS result was $2.29 of exports per dollar of aid. They also decomposed the direct and indirect effects of aid on trade and found that the direct effect was only a 35-cent increase and much lower than the indirect effect (98 cents). In addition, he concluded that the effect of past aid on trade was positive although very small (18 cents).

In the second subset of the literature, we find some studies that deviate from the gravity model framework. A few authors studied the direction of the causality by using Granger causality tests. On the one hand, Arvin, Cater, and Choudhry (2000) examined the direction of the causality between untied assistance and exports using German data for the period 1973 to 1995. Their findings provide some support for the export-promotion hypothesis whereby untied aid disbursements generate goodwill for the donor. On the other hand, Lloyd, McGillivray, Morrisey, and Osei (2000) examined data on aid and trade flows for a sample of four European donors and 26 African recipients over the period from 1969 to

1995. Using Granger causality tests, they found that there is little evidence showing that aid increases trade in a dynamic sense (only in 14 percent of the cases) and claim that the argument for tied aid is unproven in their analysis. Instead, they find that a more common link is that trade relations are a factor influencing donor allocation, rather than that aid generates these trade relations. Along the same lines, Osei, Morrisey, and Lloyd (2004) extended the analysis to more countries and also found no evidence that aid generates trade when testing for the relationship between aid and trade for different subsamples, although donors providing a higher share of aid tend to trade more with the recipients. They conclude that donors appear to be concerned with relative aid and trade shares rather than absolute volumes.

Our challenge and contribution in this paper is to consider dynamic effects of aid, as in the second strand of the literature, but relying on the gravity model of trade, as in the first strand of the literature. In addition, we will examine a longer time period, more recipient countries, more covariates, and a more advanced econometric framework, and will use extensive robustness checks.

4. The Volume and Structure of German aid

The standard used to measure development funding is the Official Development Assistance as a percentage of Gross National Income (ODA/GNI ratio). The repository of official information on aid is the Development Assistance Committee (DAC) of the OECD. DAC has two lists of countries. "Part I" countries are grouped into five categories: least developed countries (LDCs), other low-income countries (other LICs), low middle-income countries (LMICs), upper middle-income countries (UMICs), and high-income countries (HICs). "Part II" countries refer to transition or upper middle-income-level countries. Aid given to members listed in Part I is called ODA, whereas aid given to members listed in Part II is called "official aid" (OA). With successive revisions, recipient country history on this two-part List became

increasingly complex. At the same time, aid to more advanced developing and transition countries declined as they became more prosperous, with several former Soviet bloc states joining the European Union and becoming donors themselves. The DAC therefore decided in 2005 to revert to a single List of ODA Recipients, abolishing Part II.

ODA is further classified into bilateral ODA (given directly by a donor country) and multilateral ODA (given by an international institution such as the World Bank or the United Nations). As with most studies on aid, we focus on bilateral ODA, but specifically, that given by Germany. We also consider the effect of ODA given by the European Community (as part of the multilateral aid). We do this to find out whether a bilateral aid relationship has stronger effects than a multilateral one on the exports of individual donor countries.

Development aid has to satisfy three criteria to be classified as ODA. First, it has to be undertaken by official agencies. Second, the main objective of aid has to be the promotion of economic development, and third and finally, it has to have a grant element of at least 25 percent. It is worth noting that neither private aid given by non-governmental organizations nor military aid is considered part of ODA.

How much does Germany spend on development? Figure A.1 in the Appendix shows the German ODA-to-GNI ratio over the period from 1964 to 2005. Aid flows increased in the late 1970s and decreased in the 1980s and 1990s. Only after 1999 is a steady increase observed. In terms of relative importance, in the past three decades Germany has been among the five most important donors in terms of bilateral aid. According to OECD figures, German bilateral aid accounts for around 10 to 15 percent of total bilateral aid.

Concerning the geographical distribution, Figure A.2 in the Appendix shows the regional distribution of German ODA. German aid is more evenly distributed among recipients than is aid from the other larger donors. A higher percentage is directed to South Saharan Africa, the Middle East, and North Africa, especially in the most recent years, whereas aid shares to Latin America and Asia show a decreasing trend.

5. Specification and estimation of the gravity model

5.1 Model specification

The gravity model of trade is nowadays the most commonly accepted framework to model bilateral trade flows (Anderson, 1979; Bergstrand, 1985; Anderson and Van Wincoop, 2003). According to the underlying theory, trade between two countries is explained by nominal incomes and the populations of the trading countries, by the distance between the economic centers of the exporter and importer, and by a number of other factors aiding or preventing trade between them. Dummy variables, such as trade agreements, common language, or a common border, are generally used to proxy for these factors. The traditional gravity model is specified as

$$X_{ij} = \alpha_0 \; Y_i^{\alpha_1} Y_j^{\alpha_2} POP_i^{\alpha_3} POP_j^{\alpha_4} DIST_{ij}^{\alpha_5} F_{ij}^{\alpha_6} \; u_{ij} , \qquad (1)$$

where Y_i (Y_j) indicates the GDPs of the exporter (importer), POP_i (POP_j) are exporter (importer) populations, $DIST_{ij}$ is geographical distances between countries i and j, and F_{ij} denotes other factors aiding or preventing trade (e.g., trade agreements, common language, or a common border).

The gravity model has been used broadly to investigate the role played by specific policy or geographical variables in explaining bilateral trade flows. Consistent with this approach and in order to investigate the effect of development aid on German exports, we augment the traditional model with bilateral and multilateral aid and also with exchange rates[7]. Usually the model is estimated in log-linear form. Taking logarithms in Equation 1, restricting the income

[7] When the gravity model is estimated using panel data (with a time dimension), exchange rates are generally included as important determinants of bilateral trade flows over time.

and population coefficients to be equal ($\alpha_1 = \alpha_2$ and $\alpha_3 = \alpha_4$) and introducing time variation, the static specification of the gravity model is

$$\ln X_{jt} = \gamma_0 + \phi_t + \delta_j + \alpha_1 \ln(Y_{Gt} Y_{jt}) + \alpha_3 \ln(POP_{Gt} POP_{jt}) + \alpha_5 \ln DIST_j + \alpha_6 LNEXRN_{jt} + \\ + \alpha_7 \ln BAID_{jt} + \alpha_8 \ln EUAID_{jt} + \alpha_9 LDC_{jt} + \alpha_{10} ACP_j + \alpha_{11} INDEP_{jt} + \alpha_{12} WTO_{jt} + \alpha_{13} COL_{jt} + \eta_{jt} \quad (2)$$

where:

ln denotes variables in natural logs;

X_{jt} are the exports from Germany to country j in period t in current US$,;

Y_{Gt}, Y_{jt} indicates Germany's and the recipient's GDP, respectively, in period t at current PPP US$;

POP_{Gt}, POP_{jt} denotes the population of Germany and country j respectively, in period t in thousand inhabitants;

$DIST_{ij}$ is the great circle distance between Germany and country j;

$EXRN_{jt}$ is the nominal bilateral exchange rate in monetary units of the recipient currency per Euro;

$BAID_{jt}$ is bilateral official gross development aid from Germany to country j in current US$; and $EUAID_t$ is EU official gross development aid to country j in current US$;

The model includes a number of dummy variables for trading partners sharing specific trade agreements (ACP), for former German colonies (COL), for independent countries[8] (INDEP), for countries belonging to the GATT/WTO (WTO), as well as for Least Developed Countries (LDC). ϕ_t is specific time effects that control for omitted variables common to all trade flows but which vary over time. δ_j are importer effects that proxy for multilateral resistance factors. When these effects are included, the influence of the dummies that vary only with the "j"

[8] INDEP takes the value of one if the country is an independent state in a given year, zero otherwise.

dimension cannot be directly estimated. Since the variable of interest is development aid, the income and population coefficients are restricted to be equal.

Considering that trade relations once established might last for a long time, it makes sense to consider that current export volumes also depend on past exports. Therefore, we estimate a dynamic version of Equation 2. In order to model dynamics, we consider the introduction of the Koyck geometric lag structure that includes the lagged dependent variable as an additional regressor. The main problems of this specification are related to the statistical difficulties caused by the combination of an endogenous regressor (lagged exports) and autocorrelated errors. As a result, the OLS estimates are biased and inconsistent (the coefficient of the lagged dependent variable is biased towards unity, whereas the remaining coefficients are biased towards zero).

Nevertheless, these difficulties can be easily overcome using more sophisticated estimation techniques that control for endogeneity of the explanatory variables and for autocorrelated errors. The dynamic specification is given by

$$\ln X_{jt} = \gamma'_0 + \phi'_t + \delta'_j + \lambda \ln X_{j,t-1} + \beta_1 \ln(Y_{Gt} Y_{jt}) + \beta_2 \ln(POP_{Gt} POP_{jt}) + \beta_3 \ln DIST_j + \\ + \beta_4 \ln EXRN_{jt} + \beta_5 \ln BAID_{jt} + \beta_6 \ln EUAID_{jt} + \beta_7 LDC_{jt} + \beta_8 ACP_j + \beta_9 INDEP_{jt} + \beta_{10} WTO_{jt} + \varepsilon \quad (3)$$

where most of the variables are described above and $X_{j,t-1}$ is exports from Germany to country j in period t-1 in current US$. Since some of the dummies (mainly COL and WTO) were not statistically significant in the static model, they are not included in the dynamic model.

According to equations 2 and 3 we are assuming that the relationship between German aid and German exports is linear, this is plausible looking at the scatter plot between both variables (Appendix 5) and also given the small magnitude of the aid figures in comparison to the export figures. Specification tests also rejected the inclusion of a quadratic aid-term in the estimated equation.

5.2 Data sources and variables

Official Development Aid data are from the OECD Development Database on Aid from DAC Members[9]. We consider gross ODA disbursements in current US$[10], instead of aid commitments, because we are interested in the funds actually released to the recipient countries in a given year. Disbursements record the actual international transfer of financial resources, or the transfer of goods or services valued at the cost to the donor. Bilateral exports are obtained from the UN COMTRADE database. Data on income and population variables are drawn from the World Bank (World Development Indicators Database, 2007). Bilateral exchange rates are from the IMF statistics. Distances between capitals have been computed as great-circle distances using data on straight-line distances in kilometres, latitudes and longitudes from the CIA World Fact Book.

5.3 Results

A static and a dynamic version of the model are estimated for data on German exports and development aid (ODA) to 138 recipient countries during the period from 1962 to 2005. Table 1 reports the main estimation results obtained for the static model. The first column shows the results obtained for all countries. Individual (country) effects (modeled as fixed) are included to control for unobservable heterogeneous effects across recipients. Time-fixed effects are also included to model specific unobservable time effects. Those effects are also a proxy for the so-called "multilateral resistance" factors modeled by Anderson and Van Wincoop (2003). We rely on the two-way FE estimates, since a Wald test indicates that the individual effects are jointly significant, while a Hausman test indicates that these effects are correlated with the error term. Since our data consists on a time span of more than 40 years and a cross-section of 138 countries, we tested for the presence of autocorrelation and heteroskedasticity. The results of the Wooldrige test for autocorrelation in panel data and the

[9] www.oecd.org/dac/stats/idsonline.
[10] The gross amount comprises total grants and loans extended (according to DAC).

LR test for heterostedasticity indicate that both problems are present in the data. Hence, given the strong rejection of the null in both tests, the model is re-estimated with HAC (heteroskedastic and autocorrelated consistent standard errors) that are robust to autocorrelation and to heteroskedasticity. Column 2 reports the results for the two-way FE estimates with a common AR(1) term, and columns 3 and 4 report the result obtained when using feasible generalised least squares (FGLS) with an AR(1) term common to all recipients and with a specific AR(1) term, respectively.

With respect to the variable of interest, bilateral aid, controlling for autocorrelation slightly decrease the magnitude of the estimated coefficient from 0.08 to 0.056. The estimated coefficient is always positive and significant, indicating that a one-percent increase in German aid raises German exports by 0.056 percent. The effect is small compared to that shown in previous studies that did not control for country and time effects, but still positive and significant. However, the estimated coefficient for the EU official gross development aid is negative and not statistically significant in the first two specifications, whereas it is statistically significant at the 5 percent level when controlling for heteroskedasticity (FGLS results). This suggests that Germany does not benefit from EU aid. This implies that the "habit formation," "goodwill," and "door-opening" factors are not present in EU aid, at least not for German exporters.[11]

Most of the other variables present the expected sign and are statistically significant. The explanatory power of the model is good, since the included variables explain approximately 70 percent of the variation of German exports. The coefficient of total income is positive and significant and slightly lower than the theoretical value of unity. The same holds for the coefficient of total population which is negative and only statistically significant at the 5 percent level in the FGLS specification with specific AR(1) terms. The bilateral

[11] It would be interesting to investigate whether other EU members profit more from EU aid. The failure of EU exports to influence trade may also be related to the fact that EU aid is of a different type than direct aid from the donor countries, being more humanitarian and food aid, for which the export effects are likely to be smaller.

exchange rate has a negative coefficient that is only statistically significant when autocorrelation and heteroskedasticity are not controlled for. The negative sign indicates that depreciation of the Euro (a decrease in the exchange rate) with respect to the recipient currencies would have a positive effect on German exports. Distance from Germany to the recipient countries also seems to be an impediment to German exports, with a coefficient which is negative and always significant at the one-percent level. However, the effect of distance could not be directly estimated in the two-way FE estimation. Since distance is constant over time, its effect is subsumed in the country dummies. The LDC and ACP dummies are negative and significant indicating that Germany exports less to least developed countries and ACP countries than to the rest of countries in the sample and the "independent state" dummy presents a positive sign and is significant in the FGLS estimations. For comparison purposes, Table A.3.1 shows the OLS, random effects (RE), and FE estimates for yearly data and Table A.3.2 present the results of estimating Equation 2 on data of five-year averages, to reduce the effects of temporary shocks and to avoid cyclical effects. Two main differences are encountered with respect to the estimation for yearly data. First, the effect of German aid on German exports is considerably higher in magnitude than before (0.11). Second, the coefficients of populations, EU aid, and "independent state" dummy are no longer significant, according to the RE and FE estimates.

Summarizing, we find that, in static terms, the average return on aid for German exports is approximately 0.70 US dollar increase in exports for every aid dollar spent[12].

Tables 2 through 4 report the main estimation results obtained for the dynamic model (Equation 3). In general, the estimated parameter for lagged exports is always statistically significant and with the expected positive sign pointing towards the importance of persistence

[12] This average is calculated as

$$\beta_{LBAIDG} = \frac{\partial X}{\partial BAIDG} * \frac{BAIDG}{X} \Rightarrow \frac{\partial X}{\partial BAIDG} = \beta_{BAIDG} * \frac{X}{BAIDG} = 0.056 * \frac{229000}{18234} = 0.70$$

in export flows. The short-term coefficients of the variables are smaller than the long-term coefficients and the latter are slightly higher than those obtained before (static model) with the signs remaining generally unchanged.

Table 2 presents the parameter estimates of the dynamic model with the variables in levels. The first column shows the OLS results with a common constant ($\delta_j=\delta$). Since the country-specific effects are jointly significant ($\delta_j \neq \delta$), we cannot rely on the OLS estimates to make inference. Likewise, the time-specific effects are also statistically significant ($\phi_t \neq \phi$) and therefore, the two-way FE model is preferred to the one-way FE model. Therefore, the second and third columns present the within-regression estimates with two-way (country and time-specific) fixed effects and with an added AR(1) term, respectively, to correct for autocorrelation in the residuals[13]. The fourth column (Table 2) reports the results using 2SLS[14] (in the context of Generalized Method of Moment estimation) to control for the endogeneity of the lagged dependent variable. The Hausman test indicates that only the within estimator[15] is consistent, since the null hypothesis (orthogonality between the individual effects and the regressors) is rejected. In addition, the 2SLS within estimates are less precisely (higher standard errors), but consistently, estimated.[16]

According to the above figure, the long-term average return on aid for German exports is a 1.4-dollar increase in exports for every aid dollar spent. Therefore, aid appears to be export-creating when dynamics are modeled and the magnitude of the effect is higher than the one obtained using the static model.

[13] The Bhargava et al. modified Durwin-Watson test and the Baltagi-Wu test indicate autocorrelated residuals (second column) that disappear when an AR(1) term is added to the model (Column 3).
[14] We use STATA enhanced routines (xtivreg2) that address HAC standard errors, weak instruments and tests for endogeneity, functional form and autocorrelation for IV and GMM estimates, as described in Baum et al. 2007.
[15] Although the Hausman tests point towards the inconsistency of the random-effects estimates (not reported), the coefficient estimates for bilateral aid are practically equal in magnitude and sign.
[16] Relying on these fourth column estimates (Table 2), the average return on German aid is calculated as

$$\beta_{LBAIDG} = \frac{\partial X}{\partial BAIDG} * \frac{BAIDG}{X} \Rightarrow \frac{\partial X}{\partial BAIDG} = \beta_{BAIDG} * \frac{X}{BAIDG} = 0.111 * \frac{229000}{18234} = 1.391$$

With respect to the other variables included in the model, the expected positive coefficient for income is obtained; Germany exports more to countries with higher income. Population in the recipient countries shows a negative coefficient which is only significant in the 2SLS results. EU aid shows, as in the static model, a negative effect; however, this effect is not significant when controlling for autocorrelation and for endogeneity of the lagged dependent variable (columns 3 and 4 in Table 2). The dynamic model also clearly confirms that EU aid does not have an export-promoting effect for Germany.

Column 5 of Table 2 present the results obtained when lagged aid is added to the list of explanatory variables. We find that lagged aid does not affect exports since the corresponding estimated parameter is not significant. The reason for this could be that we are using aid disbursements and it is the announcement of the policy decision (aid commitment) which is the factor primarily influencing future donor's exports, whereas the actual international transfer (disbursements) has an effect exclusively on present exports.

Next, in order to test for the stability of the estimated coefficients over time, Equation 3 is estimated for eight different sub-periods. Although the first-differences GMM estimator suggested by Arellano and Bond (1991) has commonly been used in the literature of dynamic panel data estimations for short time spans, when data are highly persistent, as in the case of bilateral export flows, Blundell and Bond (1998) argued that this procedure can be improved by using the system GMM estimation, which supplements the equations in first differences with equations in levels; for the former, the instruments used are the lagged levels, and for the latter, the instruments are the lagged differences. Table 3 shows the results using system GMM for eight different subperiods. We keep the number of years in each period below eight because the number of instruments tends to explode upwards with time. The use of too many instruments, can over-fit endogenous variables and weaken the power of the Hansen test to detect over-identification. In the present case, the Hansen test does not reject the null hypothesis of validity of the instruments and the autocorrelation tests indicate that first (in

four subsamples) and second-order (in all subsamples) autocorrelation is not present in the data. The results concerning bilateral aid indicate that the return on German aid was much lower in the late 1960s and in the 1970s (around 60 cents of exports for each dollar of aid)) than in the early eighties (two dollars for each one dollar of aid) and it has been quite stable since 1986 onwards (around 1.5 dollars per dollar of aid). This result is reassuring and very similar to the average effect found for the whole sample using 2SLS ($1.4 per dollar of aid). These results also suggest that tied aid is not the most important driver of these export effects. While the export effects seem to have increased over time, tied aid was on the decline.

As a robustness check, we also estimated Equation 3 for different groups of countries (BMZ, non-BMZ, ACP and LDC) in order to ascertain whether the effect of bilateral aid could vary among recipients. Since we are interested in the within-country variation and in the average-long-term effect, the 2SLS with fixed effects and HAC standard errors provides the preferred estimates[17]. The results are shown in Table 4. It is worth noting that the return for exports on German aid is markedly higher for BMZ countries ($2.82 of exports for each dollar of aid), in fact, it is almost twice the average effect for all countries. This is quite plausible as only in these countries we would expect the export-increasing effects. Also, for the group of non-BMZ countries the coefficient of bilateral aid is not statistically significant. Finally, the return for exports is relatively low for ACP countries (0.28), and even lower for least-developed countries, for which one dollar of aid generates only 15 cents of exports[18].

Finally, Figure 1 shows the estimates of the 2SLS fixed-effect model which allows the bilateral aid coefficient to be time variant. The evolution of the estimate coefficients over time shows a positive long-term trend. Interestingly, in the 2001 to 2005 period, a steady increase

[17] The STATA xtivreg2 command with the gmm2s, robust and bw options is used. The gmm2s option requests the 2 step feasible efficient GMM estimator, which reduces to standard 2SLS techniques if no robust covariance matrix estimator is requested.

[18] These results indicate that what might have appeared to be differences in the variances of the disturbances across groups may well be due to heterogeneity associated with the coefficient vectors. This issue is investigated in Nowak-Lehmann D., F., Martínez-Zarzoso, I., Klasen, S, and Herzer, D. (2007) where the time series variation of the data is exploited and the focus is exclusively on the German aid-trade relationship for BMZ countries, which seems to be more robust.

in the effect of aid on trade can be observed following a decrease in the nineties. Concerning the significance of the coefficients, in only in three short periods (1965 to 1972, 1980 to 1984, and 1996 to 2000) were they not significant. In order to control for the high variation of the bilateral aid coefficients over time, we also re-estimated the model, averaging the data over five-year periods. Figure 2 shows the results. The figure shows a decreasing trend until 1985 and from then onward, an increasing effect of bilateral German aid on German exports.

Previous studies found a larger effect of development aid on German exports. For example, we obtained a lower return on aid for German exports than Nilsson (1997)[19]. He reported an average return on aid for exports of a roughly $2.6 increase in exports for every dollar spent, whereas in this study, the average return is around $1.5 (although larger for the BMZ countries). There are two explanations for the different results obtained by Nilsson (1997). First, in Nilsson (1997), the period under study is from 1975 to 1992, whereas we considered the period from 1960 to 2005. The larger time span give rise to a lower average return on aid. In fact, the results from the regressions for different subperiods indicate that the return on aid was higher in the 1980s and early 1990s than it was for the early seventies and the late 1990s. Second, in Nilsson (1997), the data were converted to three-year averages of constant 1987 dollars and fixed effects were not included; only specific aid coefficients for donors and a trend were specified.

Finally, we also considered the existence of reverse causation. Causation may run from exports to aid, as well, since a strong export performance may encourage the donor country to increase its level of aid to the recipient. A way to overcome this problem is to model German aid as an endogenous variable. Therefore, we also instrumented for development aid in the 2SLS regression and in the GMM regressions using the lagged values of aid. We then performed and endogeneity test[20]. Under the null hypothesis that the specific

[19] Also higher than ours was the return on German aid found by Vogler-Ludwig et al. (1999). They found, for the period from 1976 to 1995, that one Deutschmark spent on ODA increased exports by 4.3 marks.
[20] In Stata we use the endog option of ivreg2 to test for endogeneity of aid in the trade equation.

endogenous regressor can actually be treated as exogenous, the test statistic is distributed as a chi^2 with one degree of freedom. The results of the tests are shown at the end of column 4 in Table 2 and indicate that its null that bilateral German aid may be treated as exogenous cannot be rejected.

6. Conclusions

There are three basic messages in this paper. First, German aid has a positive effect on German exports. Although the effect is not as large as predicted by previous studies, it is still relevant. Our findings indicate that the average return for exports on German aid is about a 1.4-dollar increase in exports for every dollar spent. Second, this effect differs among groups of recipients. The return on German aid for exports is much higher for developing countries which have a real aid relationship with Germany (BMZ countries). Third, this effect is only present for German bilateral aid, and not for multilateral aid provided by the EU.

This investigation and the related literature suggest that the impact of aid on trade depends on the specific pair of trading countries evaluated and on the type of aid given, and also that the impact can change over time. The relationship between trade and aid could be more closely analyzed by using more donor countries, focusing on country case studies, or using disaggregated aid data and sectoral trade data to have a more precise characterization of the direction of causality and the quantification of the effects. Further research would also be desirable on the interactions between development aid and the recipient's trade policy to investigate the existence of complementarities.

References

Alesina, A. & Dollar, D. (2000), 'Who gives aid to whom and why?' *Journal of Economic Growth* 5 (81), 33-63.

Anderson, J. E. (1979), 'A Theoretical Foundation for the Gravity Equation,' *American Economic Review* 69(1), 106-116.

Anderson, J.E. & Van Wincoop, E. (2003), 'Gravity with Gravitas: A Solution to the Border Puzzle,' *American Economic Review* 93(1), 170-192.

Arellano, M. & Bond, S. (1991), 'Some tests of specification for panel data: Monte Carlo evidence and application to employment equations,' *Review of Economic Studies* 58, 227-297.

Baum, C. F., Schaffer, M. E. & Stillman, S. (2007), 'Enhanced routines for instrumental variables/GMM estimations and testing' Boston College Economics Working Paper No. 667.

Bhagwati, J.N., Brecher, R. & Hatta, T, (1983), 'The Generalized Theory of Transfers and Welfare: Bilateral Transfers in a Multilateral World,' *American Economic Review* 73(4), 606-18.

Bhagwati, J.N., Brecher, R.A., & Hatta, T. (1984), 'The paradoxes of immiserizing growth and donor-enriching 'recipient-immiserizing' transfers: A tale of two literatures,' *Weltwirtschaftliches Archiv* 120 (2), 228-243.

Bergstrand, J.H. (1985), 'The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence,' *The Review of Economics and Statistics* 67(3), 474-481.

Blundell, R. W. & Bond, S.R. (1998), 'Initial Conditions and Moment Restrictions in Dynamic Panel Data Models,' *Journal of Econometrics* 87, 115-143.

Brecher, R. A. & Bhagwati, J. N. (1981), 'Foreign Ownership and the Theory of Trade and Welfare,' *Journal of Political Economy* 89(3), University of Chicago Press, 497-511.

Brecher, R.A. & Bhagwati, J.N. (1982), 'Immiserizing transfers from abroad,' *Journal of. International Economics* 13, 353-64.

Burnside, G. & Dollar, D. (2000), 'Aid, Policies, and Growth,' *American Economic Review* 90 (4), 847-868.

Djajic, S., Lahiri, S., & Raimondos-Moller, P. (2004), 'Logic of Aid in an Intertemporal Setting,' *Review of International Economics* 12(1), 151-161. Blackwell Publishing.

Gale, D. (1974), 'Exchange equilibrium and coalitions: An example,' *Journal of Mathematical Economics* 1, 63-66.

Hanssen, H. &.Tarp, F. (2001), 'Aid and Growth Regressions,' *Journal of Development Economics* 64(2), 2001, pp. 547-570.

Keynes, J.M. (1929), 'The German Transfer Problem,' *Economic Journal* 39: 1-7.

Leontieff, W. (1936), 'Note on the Pure Theory of Capital Transfer,' in: *Explorations in Economics: Notes and Essays Contributed in Honor of F. W. Taussig* (New York: McGraw-Hill Book Company).

Lloyd, T.A., McGillivray, M., Morrissey, O., & Osei, R. (2000), 'Does aid create trade? An investigation for European donors and African recipients,' *European Journal of Development Research* 12, 1-16.

Morrissey, O. (2006), 'Aid or Trade, or Aid and Trade?' *The Australian Economic Review*, 39 (1), 78–88.

Nelson, D. & Juhasz Silva, S. (2007), 'Does Aid Cause Trade? Evidence from an Asymmetric Gravity Model,' Murphy Institute, Tulane University, New Orleans.

Nowak-Lehmann D., F., Martínez-Zarzoso, I., Klasen, S, and Herzer, D. (2007), 'Aid and Trade from a Donor's Perspective' Department of Economics, University of Goettingen. Mimeo.

Nilsson, L. (1997), 'Aid and Donor Exports: The Case of the EU Countries,' in Nilsson, L. Essays on North-South Trade, Lund: Lund Economic Studies, Number 70, chapter 3.

Ohlin, B. (1929), 'The Reparations Problem: A Discussion.' *Economic Journal* 39: 172-178 and 400-404.

Osei, R., Morrissey, O., and Lloyd T.A. (2004), 'The Nature of Aid and Trade Relationships,' *European Journal of Development Research* 16(2), 354-374.

Vogler-Ludwig, K., Schönherr, S., Taube, M., & Blau, H. (1999), 'Die Auswirkungen der Entwicklungszusammenarbeit auf den Wirtschaftsstandort Deutschland,' Forschungsberichte des Bundesministeriums für wirtschaftliche Zusammenarbeit und Entwicklung- BMZ - Band 124. Weltforum Verlag.

Wagner, D. (2003), 'Aid and Trade—An Empirical Study,' *Journal of the Japanese and International Economies* 17, 153-173.

Tables

Table 1. Static model results. Effect of bilateral aid on German exports

Variables:	2-Way FE	2-Way FE-CAR(1)	FGLS CAR(1)	FGLS SPAR(1)
LYY	0.769	0.664	0.895	0.919
	19.259	15.835	59.862	67.84
LPOP	0.081	-0.277	-0.075	-0.13
	0.268	-0.534	-1.599	-1.99
LDIST			-0.732	-0.82
			-25.142	-25.481
LEXRN	-0.02	-0.017	-0.002	-0.005
	-2.277	-1.236	-0.274	-0.851
LBAIDG	0.082	0.051	0.052	0.056
	5.167	4.467	6.662	7.946
LEUAIDG	-0.03	-0.002	-0.035	-0.018
	-1.771	-0.149	-3.846	-2.14
LDC	-0.416	-0.658	-0.433	-0.366
	-2.694	-2.512	-9.058	-8.495
ACP	-0.02	-0.075	-0.166	-0.093
	-0.414	-1.139	-4.055	-2.366
INDEP	0.963	1.488	0.319	0.313
	3.043	6.582	1.714	1.69
GATTWTO	-0.033	0.07	0.045	0.017
	-0.972	1.399	1.574	0.654
CONSTANT	-6.248	0.845	0.455	1.642
	-1.162	7.105	0.623	1.548
Time Effects	Yes	Yes	Yes	Yes
Adj. R Sq.	0.695	0.593		
Nobs	3845	3714	3843	3843
Wooldrige Test Autoc.	F(1,128)=18.276 Prob=0.00			
LR Test Hetero.	$Chi^2(130)$=1650 Prob=0.00			
Return on Aid	1.030	0.641	0.653	0.703

Note: Countries in each group are listed in the Appendix. All the variables are in natural logarithms. The dependent variable is bilateral exports at current prices, LYY is the product of GDPs of Germany and recipient country j, LPOP is the product of populations of Germany and recipient country j, LBAIDG is gross bilateral German aid to country j, and LEUAIDG is European Union aid to country j. LDC denotes Least Developed Countries, ACP denotes African, Caribbean and Pacific countries and INDEP denotes independent states. All the equations were estimated in levels. CAR(1) and SPAR(1) denote common and specific AR(1) terms, that were added to the regressions in the last three columns. **t-statistics reported.**

Table 2. Dynamic gravity model estimation results (Equation in levels, yearly data)

Variables	Pooled OLS	2-Way FE	2-Way FE-AR	2SLS_robust	2SLS_robust
LX(-1)	0.849	0.592	0.418	0.657	0.679
	58.257	46.691	28.444	14.136	14.968
LYY	0.091	0.332	0.464	0.293	0.283
	7.965	13.971	15.744	5.793	5.172
LPOP	0.006	-0.211	-0.18	-0.424	-0.618
	0.301	-0.831	-0.566	-1.939	-3.071
LDIST	-0.141				
	-8.728				
LEXRN	-0.007	0	-0.003	0.006	0.01
	-2.734	0.001	-0.356	0.956	1.489
LBAIDG	0.038	0.044	0.051	0.038	0.062
	3.956	4.709	4.626	2.635	2.282
LEUAIDG	-0.025	-0.013	-0.01	-0.007	-0.018
	-2.504	-1.21	-0.728	-0.392	-0.991
LDC	-0.096	-0.157	-0.131	-0.195	-0.06
	-3.768	-0.948	-0.632	-1.585	-0.946
ACP	-0.129	-0.07	-0.074	-0.073	-0.058
	-6.043	-2.055	-1.729	-2.386	-1.917
INDEP	0.518	0.814	1.287	1.129	1.418
	3.987	6.597	7.641	5.188	5.218
LBAIDG(-1)					-0.053
					-1.252
CONS	0.793	0.449	-0.138		
	2.509	0.096	-0.372		
Time Effects	Yes	Yes	Yes	Yes	Yes
LongRun Aid Coeff	0.252	0.108	0.088	0.111	0.028
Adj. R Sq.	0.961	0.8	0.72	0.764	0.785
Nobs	3784	3784	3653	3551	3383
Log-Likelihood	-2292.813	-1861.722	-1824.846	-1783.176	-1428.831
RMSE	0.444	0.4056381	0.4016305	0.4072717	0.376327
Hanson Test				1.585	2.293
Probability				0.208	0.318
F test α_j	F(130,3597)=4.28				
Hausman		570			
Bhargava et al., DW			2.06		
Baltagi-Wu			2.168		
Return on Aid	3.161	**1.354**	**1.101**	**1.391**	
Endogeneity Test				Chi-sq(1)=1.531	
Probability				P-val= 0.216	

Note: All the variables are in natural logarithms. The dependent variable is bilateral exports at current prices, LYY is the product of GDPs of Germany and recipient country j, LPOP is the product of populations of Germany and recipient country j, LDIST is distance between Germany and recipient country j, LEXCHRN is the bilateral exchange rate at current prices, LBAIDG is gross bilateral German aid to country j, and LEUAIDG is European Union aid to country j. All the equations were estimated in levels. denotes rejection of the null hypothesis at the 1 percent significance level. **t-statistics reported.**

Table 3. Dynamic gravity model. System GMM estimation results

Periods	1962-69	1970-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05
LX (-1)	0.581	0.876	0.593	0.280	0.524	-0.0117	0.587	0.645
	18.690	12.790	4.400	3.640	4.520	-0.070	4.010	7.090
LYY	0.535	0.191	0.470	0.822	0.488	0.938	0.446	0.405
	11.440	2.370	2.790	7.880	3.590	5.570	2.500	3.840
LPOP	-0.215	-0.082	-0.172	-0.244	-0.0995	0.0754	-0.0863	-0.080
	-5.38	-2.21	-1.93	-3.52	-1.35	0.66	-1.33	-1.41
LEXRN	0.002	0.011	-0.023	-0.021	-0.012	-0.037	-0.008	-0.011
	0.270	1.540	-1.230	-0.980	-0.690	-1.190	-0.670	-0.680
LBAIDG	0.0819	0.0566	0.103	0.182	0.169	0.165	0.0935	0.0780
	5.380	2.610	2.260	4.650	3.790	2.470	2.010	2.780
LEUAIDG	-0.011	-0.016	0.010	0.026	-0.052	-0.123	-0.056	-0.033
	-1.110	-0.880	0.240	0.520	-1.030	-1.680	-1.740	-0.900
CONS	-3.987	-1.914	-3.817	-7.678	-4.457	-10.79	-4.611	-4.557
	-8.360	-2.540	-2.270	-5.480	-2.780	-4.850	-2.190	-3.390
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nobs	379	332	300	349	391	438	472	474
Instruments	39	24	18	18	18	18	18	18
Ar1	-4.169**	-2.623**	-1.568	-1.971	-2.78	-2.618**	-2.615**	-1.977
Ar2	1.136	0.893	-0.348	1.252	1.818	-0.447	-0.500	0.757
Hansen	25.59	12.94	4.831	5.416	7.057	4.956	10.240	9.610
Hansen_df	26	13	8	8	8	8	8	8
Return on Aid	**0.584**	**0.604**	**1.184**	**2.026**	**1.254**	**1.631**	**1.364**	**1.520**

Note: All the variables are in natural logarithms. The dependent variable is bilateral exports at current prices, LYY is the product of GDPs of Germany and recipient country j, LPOP is the product of populations of Germany and recipient country j, LEXCHRN is the bilateral exchange rate at current prices, LBAIDG is gross bilateral German aid to country j, and LEUAIDG is European Union aid to country j. A system of two equations is estimated, one in levels and the second one in first differences.*, **, *** denote rejection of the null hypothesis at the 1, 5 and 10 percent significance level respectively. **t-statistics reported.**

Table 4. Dynamic gravity model estimation results for sub-groups of countries (Equation in levels, yearly data)

Variables	BMZ	Non_BMZ	LDC	ACP
LX(-1)	0.772	0.416	0.536	0.459
	23.852	3.692	6.866	4.454
LYY	0.222	0.447	0.269	0.285
	5.566	4.746	3.333	3.892
LPOP	-0.64	-0.261	-0.75	-0.529
	-2.836	-0.277	-1.153	-0.752
LEXRN	0.012	0.001	-0.023	-0.018
	2.079	0.052	-1.456	-1.221
LBAIDG	0.056	0.021	0.047	0.039
	3.802	0.908	2.007	1.99
LEUAIDG	-0.037	0.03	0.058	0.012
	-2.167	1.029	1.735	0.434
LDC	-0.058	-2.077		
	-1.135	-3.396		
ACP	-0.039	-0.273		
	-1.134	-2.821		
INDEP	2.108	-0.324	1.381	
	4.118	-1.308	2.823	
Time Effects	Yes	Yes	Yes	Yes
Long-Run Aid Coeff	0.246	0.036	0.101	0.072
Adj. R Sq.	0.862	0.542	0.556	0.542
Nobs	1931	1346	1198	1699
Log-Likelihood	-176.651	-1023.710	-773.505	-1070.444
Hansen test	3.038	2.070	2.285	5.499
Probability	0.552	0.723	0.683	0.240
Return on Aid	2.82	0.77	0.15	0.28

Note: The dependent variable is bilateral exports at current prices, LYY is the product of GDPs of Germany and recipient country j, LPOP is the product of populations of Germany and recipient country j, LEXCHRN is the bilateral exchange rate at current prices, LBAIDG is gross bilateral German aid to country j, and LEUAIDG is European Union aid to country j. All the equations were estimated in levels. BMZ denotes Federal Ministry for Economic Cooperation and Development. denotes rejection of the null hypothesis at the 1 percent significance level. **t-statistics reported.**

Figure 1. Estimates of time-varying coefficients for bilateral aid in the 2SLS fixed-effects model

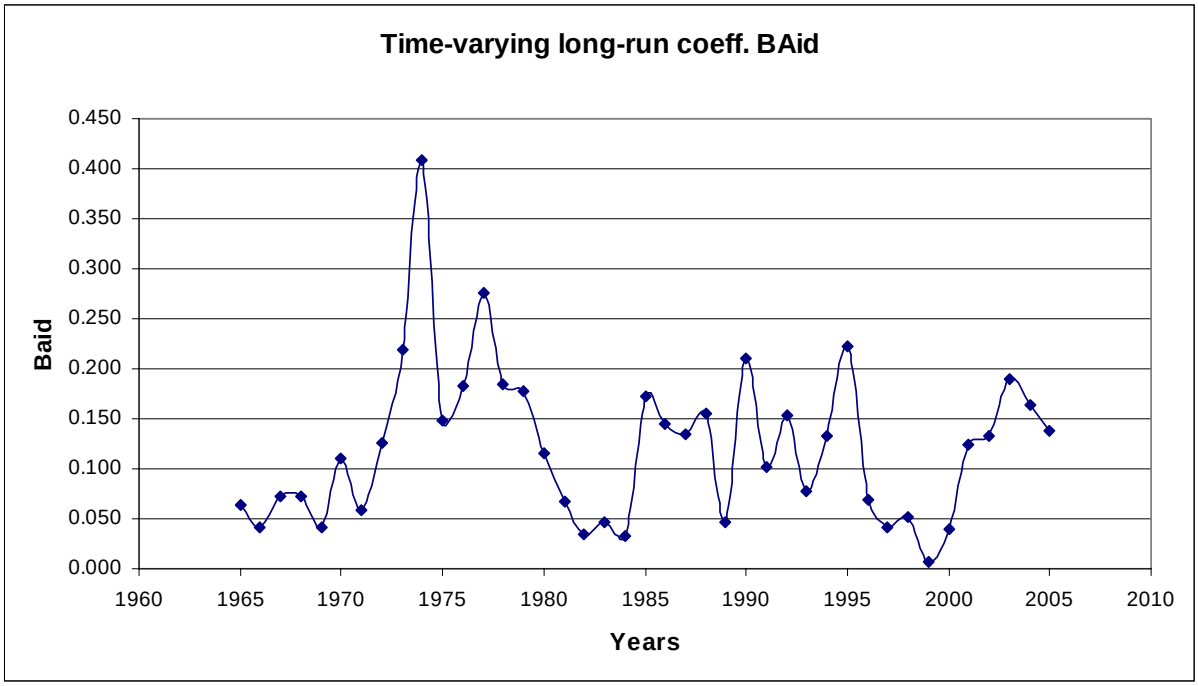
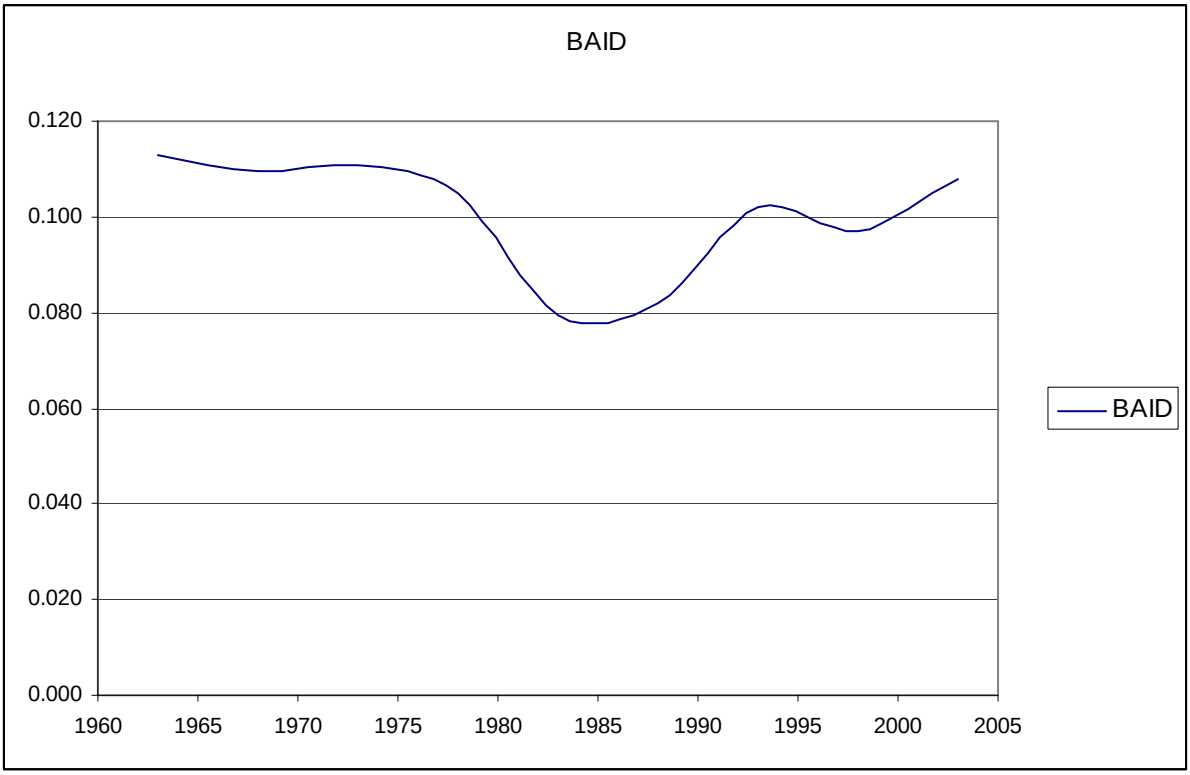


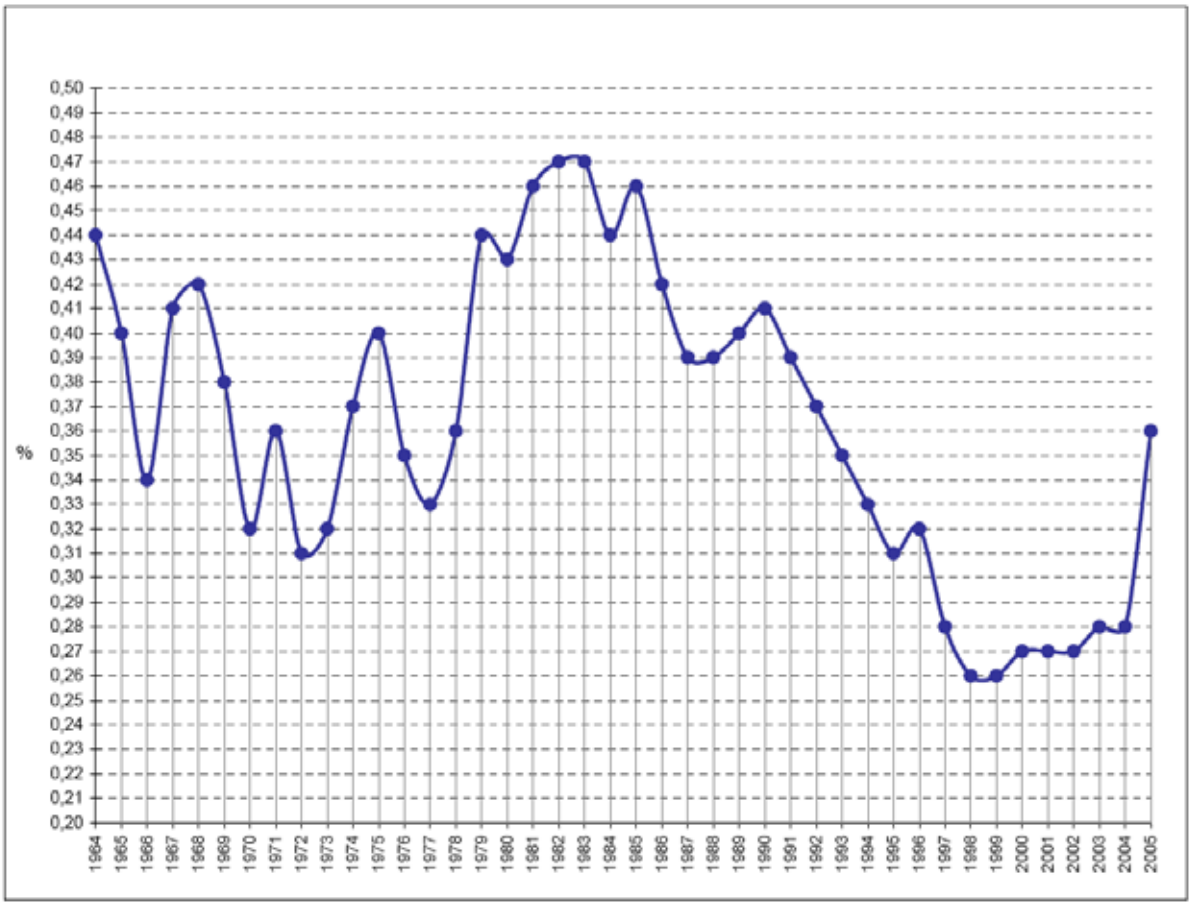
Figure 2. Estimates of time-varying coefficients for bilateral aid for the fixed-effects model



Note: FE model estimated on 5-year averages

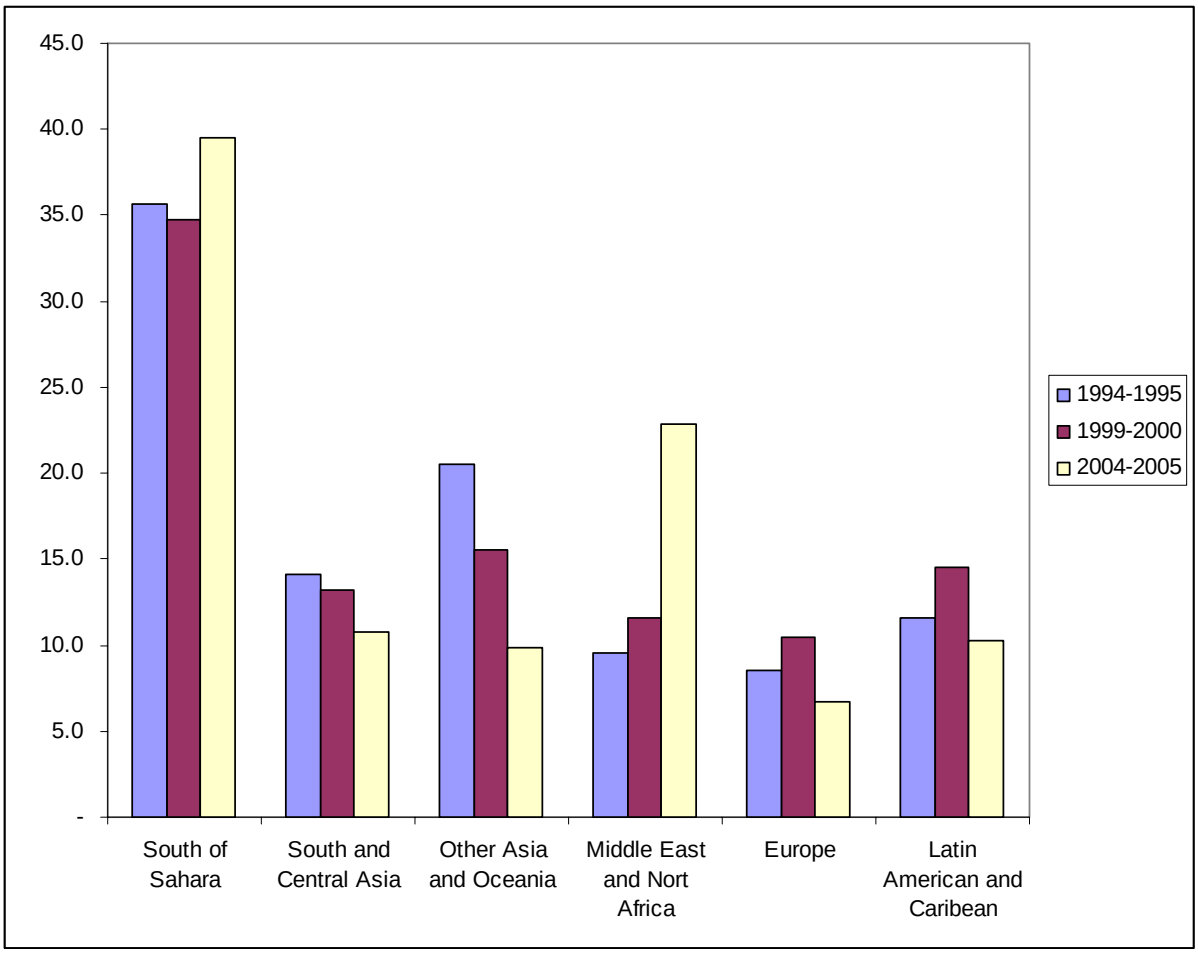
Appendix

A.1 German ODA-to-GNI ratio (1964-2005)



Source: Federal Ministry for Economic Cooperation and Development: http://www.bmz.de.

A.2. Regional distribution of German ODA



Source: OECD (http://www.oecd.org/dataoecd) and own elaboration.

Table A.3.1. Static model estimation results

DAC Countries	OLS	Random Effects	Fixed Effects
log of the GPD product yg*yj	0.728	0.818	0.768
	(53.52)**	(31.66)**	(27.38)**
log of the pop	0.141	0.085	-0.253
popg*popj	(8.95)**	(2.53)*	(2.53)*
log of distance between capitals in	-0.851	-0.889	-
km	(-29.78)**	(-9.61)**	-
log of gross ODA of Germany 1000	0.146	0.090	0.084
current $	(11.91)**	(7.89)**	(7.32)**
leuaidg1000	-0.136	-0.034	-0.029
	(9.90)**	(2.68)**	(2.26)*
LDC	-0.516	-0.413	-0.392
	(-13.76)**	(-4.07)**	(-1.83)
colony	-0.008	-0.177	-
	(-0.14)	(-0.86)	-
ACP	-0.190	-0.004	-0.02
	(-5.24)**	(-0.09)	(-0.48)
independent state	1.354	0.978	0.965
	(7.07)**	(6.55)**	(6.42)**
gatt wto membership	0.076	-0.028	-0.039
	(2.52)*	(0.79)	(1.09)
log of bilateral nominal exchange rate units of local currency per €	-0.027	-0.017	-0.024
	(-4.99)**	(-2.38)*	(-3.20)**
Constant	45.873	72.339	40.164
	(20.39)**	(9.29)**	(4.34)**
Observations	3837	3837	3837
Number of group(country)	-	131	131
Adjusted R-squared	0.870	-	-
R-squared within	-	0.699	0.700
R-squared between	-	0.918	0.798
R-squared overall	-	0.875	0.773
F-Stat./Wald-Stat.	1921.610	10181.140	160.800
Prob. F-Stat./Wald Stat.	0.000	0.000	0.000
Time fixed effects	No	Yes	Yes
Country effects	No	Yes	Yes
Prob. of Breusch and Pagan La-grangian multiplier test for random effects		0.000	

Table A.3.2. Static model estimation results. (Five-year intervals)

DAC Countries	**OLS**	**Random Effects**	**Fixed Effects**
log of the GPD product yg*yj	0.722	0.922	0.845
	(24.80)**	(19.52)**	(14.98)**
log of the popultaions product popg*popj	0.140	-0.018	-0.334
	(-4.22)**	(-0.35)	(-1.82)
log of distance between capitals in km	-0.867	-0.857	-
	(-14.43)**	(-7.81)**	-
log of gross ODA of Germany 1000 current $	0.138	0.119	0.11
	(5.16)**	(4.99)**	(4.29)**
leuaidg1000	-0.109	-0.022	-0.018
	(-3.69)**	(-0.88)	(-0.67)
LDC	-0.544	-0.352	-0.412
	(6.84)**	(2.63)**	(1.25)
colony	-0.125	-0.195	-
	(-1.06)	(-0.81)	-
ACP	-0.167	0.092	0.069
	(-2.05)*	(1.22)	(0.82)
independent state	0.624	0.316	0.292
	(2.33)*	(1.65)	(1.38)
gatt wto membership	0.133	-0.038	-0.057
	(2.01)*	(0.56)	(0.74)
log of bilateral nominal exchange rate units of local currency per €	-0.026	-0.009	-0.018
	(-2.36)*	(-0.76)	(-1.24)
Constant	49.533	-1.609	-2.327
	(10.22)**	(1.22)	(0.76)
Observations	845	845	845
Number of group(country)	-	131	131
Adjusted R-squared	0.880	-	-
R-squared within	-	0.775	0.777
R-squared between	-	0.916	0.796
R-squared overall	-	0.892	0.787
F-Stat./Wald-Stat.	1921.610	3739.640	134.560
Prob. F-Stat./Wald Stat.	0.000	0.000	0.000
Time fixed effects	No	Yes	Yes
Country effects	No	Yes	Yes
Prob. of Breusch and Pagan La-grangian multiplier test for random effects		0.000	

A.4 DAC list of ODA recipients

Least Developed Countries	Other Low Income Countries (per capita GNI < $825 in 2004)	Lower Middle Income Countries and Territories (per capita GNI $826-$3 255 in 2004)	Upper Middle Income Countries and Territories (per capita GNI $3 256-$10 065 in 2004)
Afghanistan	Cameroon	Albania	• Anguilla
Angola	Congo, Rep.	Algeria	Antigua and Barbuda
Bangladesh	Côte d'Ivoire	Armenia	Argentina
Benin	Ghana	Azerbaijan	Barbados
Bhutan	India	Belarus	Belize
Burkina Faso	Kenya	Bolivia	Botswana
Burundi	Korea, Dem.Rep.	Bosnia and Herzegovina	Chile
Cambodia	Kyrgyz Rep.	Brazil	Cook Islands
Cape Verde	Moldova	China	Costa Rica
Central African Rep.	Mongolia	Colombia	Croatia
Chad	Nicaragua	Cuba	Dominica
Comoros	Nigeria	Dominican Republic	Gabon
Congo, Dem. Rep.	Pakistan	Ecuador	Grenada
Djibouti	Papua New Guinea	Egypt	Lebanon
Equatorial Guinea	Tajikistan	El Salvador	Libya
Eritrea	Uzbekistan	Fiji	Malaysia
Ethiopia	Viet Nam	Georgia	Mauritius
Gambia	Zimbabwe	Guatemala	• Mayotte
Guinea		Guyana	Mexico
Guinea-Bissau		Honduras	• Montserrat
Haiti		Indonesia	Nauru
Kiribati		Iran	Oman
Laos		Iraq	Palau
Lesotho		Jamaica	Panama
Liberia		Jordan	Saudi Arabia (1)
Madagascar		Kazakhstan	Seychelles
Malawi		Macedonia, Former Yugoslav Republic of	South Africa
Maldives		Marshall Islands	• St. Helena
Mali		Micronesia, Fed. States	St. Kitts-Nevis
Mauritania		Montenegro	St. Lucia
Mozambique		Morocco	St. Vincent & Grenadines
Myanmar		Namibia	Trinidad & Tobago
Nepal		Niue	Turkey
Niger		Palestinian Adm. Areas	• Turks & Caicos Islands
Rwanda		Paraguay	Uruguay
Samoa		Peru	Venezuela
Sao Tome & Principe		Philippines	
Senegal		Serbia	
Sierra Leone		Sri Lanka	
Solomon Islands		Suriname	
Somalia		Swaziland	
Sudan		Syria	
Tanzania		Thailand	
Timor-Leste		• Tokelau	
Togo		Tonga	
Tuvalu		Tunisia	
Uganda		Turkmenistan	
Vanuatu		Ukraine	
Yemen		• Wallis & Futuna	
Zambia			

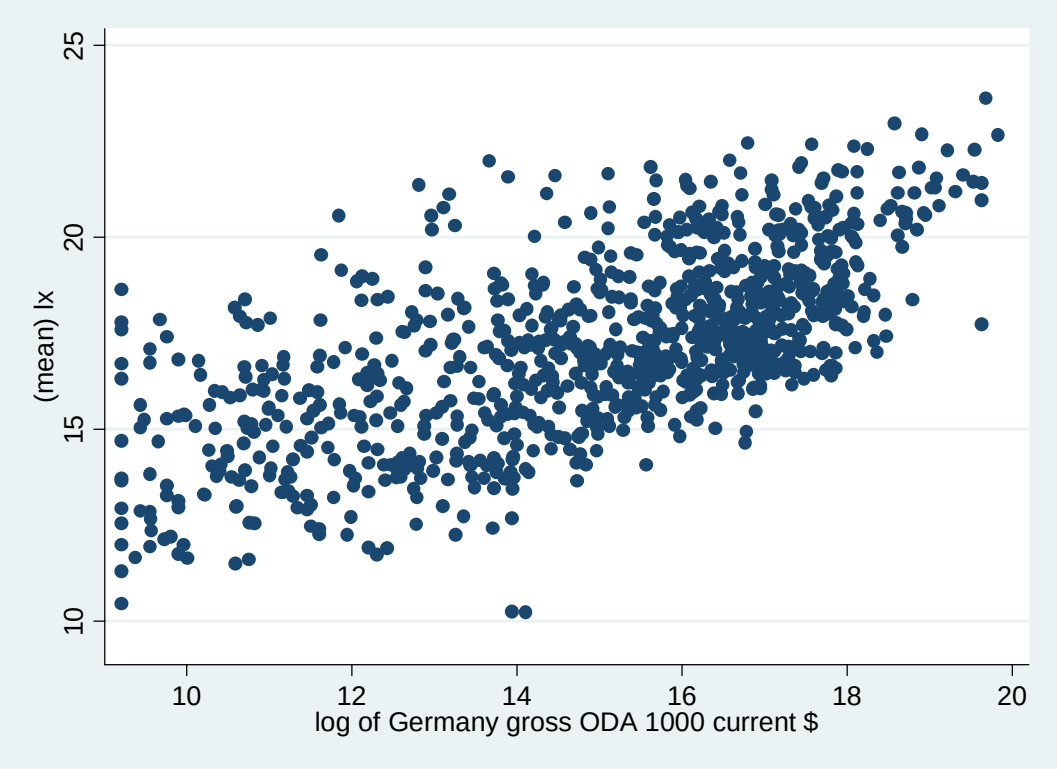
• Territory.

(1) Saudi Arabia passed the high income country threshold in 2004. In accordance with the DAC rules for revision of this List, it will graduate from the List in 2008 if it remains a high income country in 2005 and 2006.

As of November 2006, the **Heavily Indebted Poor Countries (HIPCs)** are : Benin, Bolivia, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo (Dem. Rep.), Congo (Rep.), Côte d'Ivoire, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Kyrgyz Republic, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Nepal, Nicaragua, Niger, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda and Zambia.

Source: OECD. http://www.oecd.org/dataoecd.

A.5. Relationship between German Aid and German Exports. Scatter Plot



A. 6. Country Classifications

Countries	BMZ	LDC	ACP
1	Afghanistan	Afghanistan	Angola
2	Albania	Angola	Antigua and Barbuda
3	Algeria	Bangladesh	Barbados
4	Armenia	Benin	Belize
5	Azerbaijan	Bhutan	Benin
6	Bangladesh	Burkina Faso	Botswana
7	Belarus	Burundi	Burkina Faso
8	Benin	Cambodia	Cape Verde
9	Bolivia	Cape Verde	Central African Republic
10	Bosnia-Herzegovina	Central African Republic	Chad
11	Brazil	Chad	Comoros
12	Burkina Faso	Comoros	Congo, Dem. Rep.
13	Burundi	Congo, Dem. Rep.	Congo, Rep.
14	Cambodia	Djibouti	Cote d'Ivoire
15	Cameroon	Equatorial Guinea	Cuba
16	Chad	Eritrea	Djibouti
17	Chile	Ethiopia	Dominica
18	China	Gambia	Dominican Republic
19	Colombia	Guinea	Equatorial Guinea
20	Congo, Dem. Rep.	Guinea-Bissau	Eritrea
21	Costa Rica	Haiti	Ethiopia
22	Croatia	Kiribati	Fiji
23	Dominican Republic	Laos	Gabon
24	Ecuador	Lesotho	Gambia
25	Egypt	Liberia	Ghana
26	El Salvador	Madagascar	Grenada
27	Eritrea	Malawi	Guinea
28	Ethiopia	Maldives	Guinea-Bissau
29	Georgia	Mali	Guyana
30	Ghana	Mauritania	Haiti
31	Guatemala	Mozambique	Jamaica
32	Honduras	Myanmar	Kenya
33	India	Nepal	Kiribati
34	Indonesia	Niger	Lesotho
35	Iran	Rwanda	Liberia
36	Jordan	Samoa	Madagascar
37	Kazakhstan	Sao Tome and Principe	Malawi
38	Kenya	Senegal	Mali
39	Kyrgyz Republic	Sierra Leone	Marshall Islands
40	Laos	Solomon Islands	Mauritania
41	Lebanon	Somalia	Mauritius
42	Lesotho	Tanzania	Micronesia
43	Madagascar	Timor-Leste	Mozambique
44	Malawi	Togo	Namibia
45	Mali	Uganda	Niger
46	Mauritania	Vanuatu	Nigeria
47	Mexico	Yemen	Palau
48	Moldova	Zambia	Papua New Guinea
49	Mongolia		Rwanda
50	Morocco		Samoa
51	Mozambique		Sao Tome and Principe

52	Myanmar	Senegal
53	Namibia	Seychelles
54	Nepal	Sierra Leone
55	Nicaragua	Solomon Islands
56	Niger	Somalia
57	Nigeria	South Africa
58	Pakistan	St. Kitts and Nevis
59	Paraguay	St. Lucia
60	Peru	St. Vincent and the Grenadines
61	Philippines	Sudan
62	Rwanda	Suriname
63	Senegal	Swaziland
64	Serbia and Montenegro	Tanzania
65	South Africa	Timor-Leste
66	Sri Lanka	Togo
67	Sudan	Tonga
68	Syria	Trinidad and Tobago
69	Tajikistan	Uganda
70	Tanzania	Vanuatu
71	Thailand	Zambia
72	Tunisia	Zimbabwe
73	Turkey	
74	Uganda	
75	Ukraine	
76	Vietnam	
77	Zambia	