FOREIGN AID AND RECIPIENT EXPORTS

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Abstract

This paper uses the gravity model of trade to investigate the link between foreign aid and exports in recipient countries. Most of the theoretical work emphasizes the negative impact of aid on recipient countries' exports primarily due to exchange rate appreciation, disregarding the positive impact of aid linked to the income effect. The empirical findings, in contrast, indicate that the net impact of aid on recipient countries' exports is positive and that the average return for recipients' exports is about 1.50 US$ for every aid dollar spent. The paper also makes comparisons among different types of aid (bilateral aid from one donor to one specific recipient, bilateral aid from all the other donors to one specific recipient, and multilateral aid flowing to a specific recipient) and finds that at least two types of aid have a positive and significant effect on recipients' exports, thus ruling out a major crowding out effect. It is further found that aid is hardly export-enhancing in Africa.

Key Words: International Trade; Foreign Aid; recipient exports; exchange rate

JEL Classification: F10; F35

Introduction

Both the Doha Development Round and the UN declaration on the Millennium Development Goals (MDGs) emphasize the importance of trade development in developing countries (DCs). The Doha Round, even though at a standstill at the moment, has the objective to lower tariff and non-tariff barriers for developing countries and to cut production- and export-related subsidies in industrialized countries in order to promote DCs' exports and integration into the world trading system. The Millennium Development Goal number eight (MDG8: "Develop a global partnership for development") also strives for a better participation of developing countries in international trade through improved market access to developed countries and an active improvement of production and export capabilities in developing countries by means of official development assistance (ODA), especially Aid for Trade (AfT) measures.[1] AfT received renewed attention through the AfT-initiative in the Sixth Ministerial Conference in Hong Kong in 2005 and from today's point of view it seems to be the key instrument of ODA in the future.

Overall, the Doha Development Round considers the progress of trade liberalization between developed and developing countries, especially the least developed countries (LDCs), and a potential strong boost in DCs' and LDCs' exports, to crucially depend on a noticeable increase in net ODA and AfT disbursements, an adequate allocation of ODA both between and within DCs (giving more aid to the least developed countries (LDCs) and vulnerable countries, such as landlocked and island countries trade with a high concentration of exports) as well as an increase in aid effectiveness. Since concessions from the developing countries to liberalize their imports do depend on an expected increase of their exports, it is of utmost importance to study the impact of ODA and Aid for Trade on LDCs' exports to see whether they are an appropriate means to promote the production of exportables and exports

[1] AfT, which dates back to the Uruguay Round (1986-1994), is an interesting feature of world trade rounds and should be granted to DCs in return for the trade concessions made in trade liberalization agreements.

in developing countries. As we will show in the theoretical part of the study (Section 2), capital inflows in the form of development aid may have positive and negative effects on recipient countries' exports and it is up to empirical investigations to determine which of the effects prevails.

In recent decades, extensive research effort has been devoted to investigating the effects of developmental assistance on the economic performance of the recipient countries and clarifying how aid can be used to promote exports from developing countries, the so-called 'aid for trade' principle (Morrissey, 2006).

In this line, we below apply a 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 modelling 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.

In our own study, we extend the literature by using more extended data, covariates, and more advanced econometric techniques. We build on a sample of 21 donor and 130 recipient countries, utilizing data over the period of 1988 to 2007. In particular, we follow Nilsson (1997) and Wagner (2003) in using an augmented gravity model which is well suited to studying the impact of aid on trade. This model allows controlling for the impact of other influences on trade such as income (which affects production capacity and preferences for variety), population (absorption and economies of scale effects) and distance, in a world where common language, colonial ties, common borders, and aid can also influence trade. We

augment the model by exchange rates and three types of aid—bilateral aid from a specific donor, bilateral aid from the rest of donors and multilateral aid.

We find that the increase in recipients' exports flowing from donors' direct bilateral aid is quite noticeable. We observe an increase in exports, which is worth about US$ 1.50, for every aid dollar received. Interestingly, the evidence indicates that the positive impact of bilateral aid takes time to evolve and become visible, whereas the impact of multilateral aid is minute (around zero), but negative. This could be an indication that multilateral aid does not strengthen trade links between the North and the South.

Section 2 summarizes the transmission channels related to the aid-export link. Section 3 presents a description of the data. Section 4 explains the model specification and discusses the main results. Section 5 presents a number of robustness checks. Finally, Section 6 outlines some conclusions.

2. Theoretical Concepts

Since the empirical evidence on aid on recipient countries exports is meagre and mixed some of the underlying theoretical concepts shall be looked at to gain insights into the possible transmission channels that have to be considered in the empirical analysis.

First, we can think of aid in an inter-temporal aid model (Diajic et al., 2004). In Period One the welfare of the donor will decrease and that of the recipient will increase (assuming that aid is neither swallowed by the government budget nor used to build up international reserves) due to the income effect of aid. In Period Two we can then expect an effect on the real exchange rate. The real exchange rate appreciates in the recipient country and depreciates in the donor country due to the aid inflow thus hurting recipient country's exports and favoring donor's exports. This effect can be reinforced by habit-formation and goodwill effects in the recipient countries leading them to increase their inclination to import from donor countries. In Period Three this pattern will lead to a current account deficit which must be overcome by a reduction of absorption in case of a fixed exchange rate system or a depreciation of the nominal exchange rate in a flexible exchange rate system. All in all, the net effect on recipient country's exports depends on the strength of the income and the real exchange rate effect.

Second, monetary trade theory emphasizes the anti-export bias stemming from net capital inflows in general and from development aid in specific (Rajan and Subramanian, 2005). This anti-export bias is caused by an appreciation of the real exchange rate. In a fixed exchange rate system the real appreciation results from an increase of the monetary base, the money supply and eventually an increase in the prices of non-tradables (price of tradables remain unaltered in the small country case). In a flexible exchange rate system the real appreciation of the exchange rate results from the appreciation of the nominal exchange rate

due to capital inflows in the form of foreign aid. The real appreciation of the exchange rate hurts the producers of export and import substitution goods, but makes the production of non-tradables more profitable. Resources will flow into the non-tradable sector and this sector will expand. As imports become cheaper, imports will rise which will lead to trade deficits. Thus, real appreciation has an anti-export and a pro-import bias. However, spending development aid on imports (preferably on capital goods and intermediates) will partly reverse this appreciation effect. The effect of development aid on the real economy therefore depends on the amount of development aid (capital inflow) and the share that is spent on tradables (imports) and non-tradables (transport, construction, telecommunication, energy). On top of that, the management of the real exchange rate of the central bank in the recipient country plays a crucial role in determining the real exchange rate.

Third, next to the effect the real exchange rate we can also observe effects in the real economy arising from net capital inflows (Hoffmann, 1985). For simplicity the small country case with constant terms of trade will be assumed when studying the impact of aid on the production and trade. Under constant returns to scale a capital inflow in the form of development aid leads to an expansion of the industry that uses capital intensively and a squeeze in the industry that uses labor intensively (Rybczynski-Thoerem, 1955). So the structure of production is altered in favor of the capital- intensive industries (this could be import substitution industries) and to the detriment of the export industries which are more likely to be labor-intensive (production of light manufactures and or agricultural goods)[2]. However, the impact on the structure of trade depends both on the supply-side and demand side effect. While development aid increases income we assume that the additional income is spent equally on both capital- and labor intensive products. This leads to an excess supply of the capital-intensive good and an excess demand for the labor-intensive product. The relative

[2] We would assume that the ores, steel, copper, oil, natural gas industries are capital intensive export industries.

price ratio of tradables to non-tradables declines and the exchange rate appreciates. Given the factor endowment in developing countries (they have a scarcity in capital and abundance in labor) this development hurts labor-intensive exports and is considered as an ultra-import biased trade effect.

In case of increasing returns to scale in the production of tradables and under the small country assumption, we expect the same effects as in the constant returns case but more pronounced. Assuming decreasing returns to scale and the small country case, we expect the same effects as in the constant returns to scale case but less pronounced. So in both cases we expect an anti-export bias assuming that developing country's exports are labor-intensive.

However, development aid will not have detrimental effects on the production and trade structure if the labor force outgrows capital accumulation. In this case labor gets relatively cheaper and capital gets more expensive. The wage-return to capital rate ratio declines and the production process becomes more labor-intensive. If comparative advantage is based on an abundance of labor and a scarcity of capital then this will strengthen labor-intensive exports industries and promote recipient country's exports.

To summarize, economic theory indicates that development aid is associated with three different effects that can occur in theory: first, an income effect that will lead to an expansion of consumption and investment in the recipient country. Eventually productive capacity will also increase in the sector of exportables and the additional supply of exportables will be absorbed by the export markets.[3] Second, the income effect will also increase the demand for non-tradables thus leading to an appreciation of the exchange rate if this is not impeded by a strategic exchange rate management of the recipient country's central bank. Third, development aid will lead to an expansion of the capital-intensive sectors in the

[3] The developing country is considered a small country that is unable to influence the price in the world market and foreign demand is considered as perfectly elastic.

recipient countries' economies and therefore change the structure of production if this development is not outweighed by a strong population/ labor force growth.

3. Description of the Data

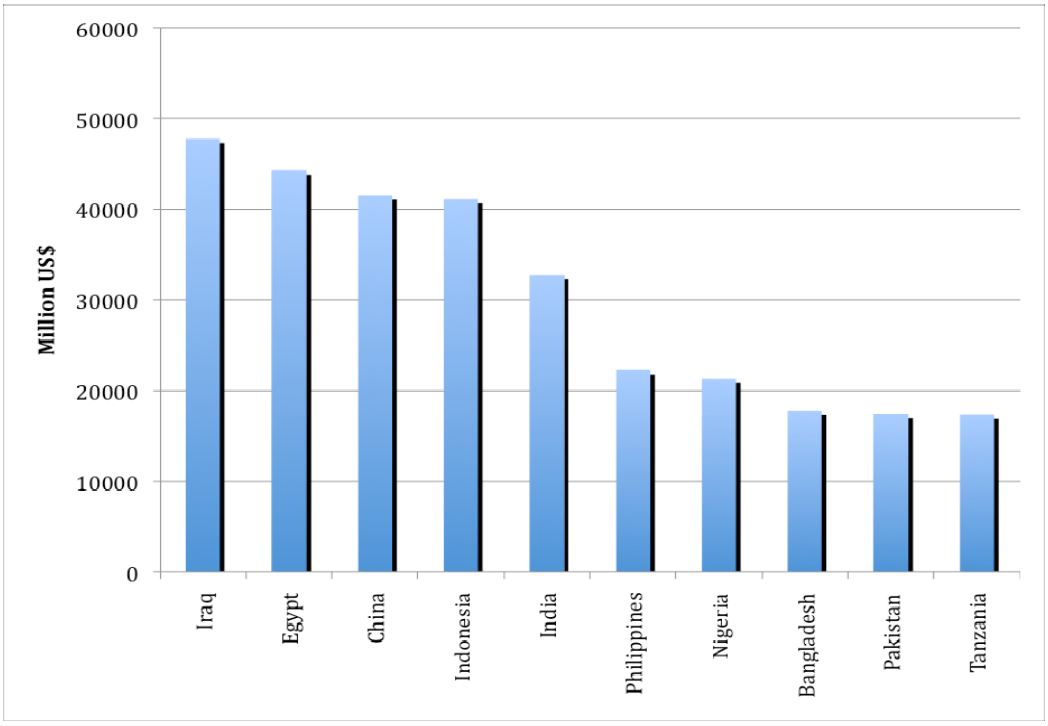
3.1 Development Aid

The Development Assistance Committee (DAC) is the section of the OECD which deals with development co-operation matters of its 22 members (donors). The aid given by its members is reported as official development aid (ODA) and other official flows (OOF). The data contains the bilateral transactions as well the multilateral contributions. The first ones are undertaken by a donor country directly with an aid recipient and the last ones are contributions of international agencies and organizations. The recipients include not only countries and territories but also multilateral organizations that are also ODA eligible.

The **total net ODA Disbursements** is the sum of grants, capital subscriptions, total net loans and other long-term capital. The grants include debt forgiveness and interest subsidies in associated financing packages. The capital subscriptions to multilateral organizations are made in the form of notes and similar instruments unconditionally encashable at sight by the recipient institutions. Loans and other long-term capital include the total disbursements of ODA loans and equity investment. This section includes the rescheduled capitalized interest only on rescheduled ODA, principal interest on other official flows rescheduled as ODA, the repayments of loan, principles and proceeds from sales of equity investments and the offsetting entries for debt relief, which are the principal amounts of forgiven ODA claims. Thus, the total net loans and other long term capital represent the loans extended minus repayment received and offsetting entries for debt relief. Technical co-operation, development food aid and the emergency aid are included in grants and gross loans.

Figure 1 shows the five largest recipients in the 1980-2007 period. Iraq is the largest recipient followed by Egypt, China and Indonesia.

Figure 1. Ten largest recipients of Net ODA (1988-2007)

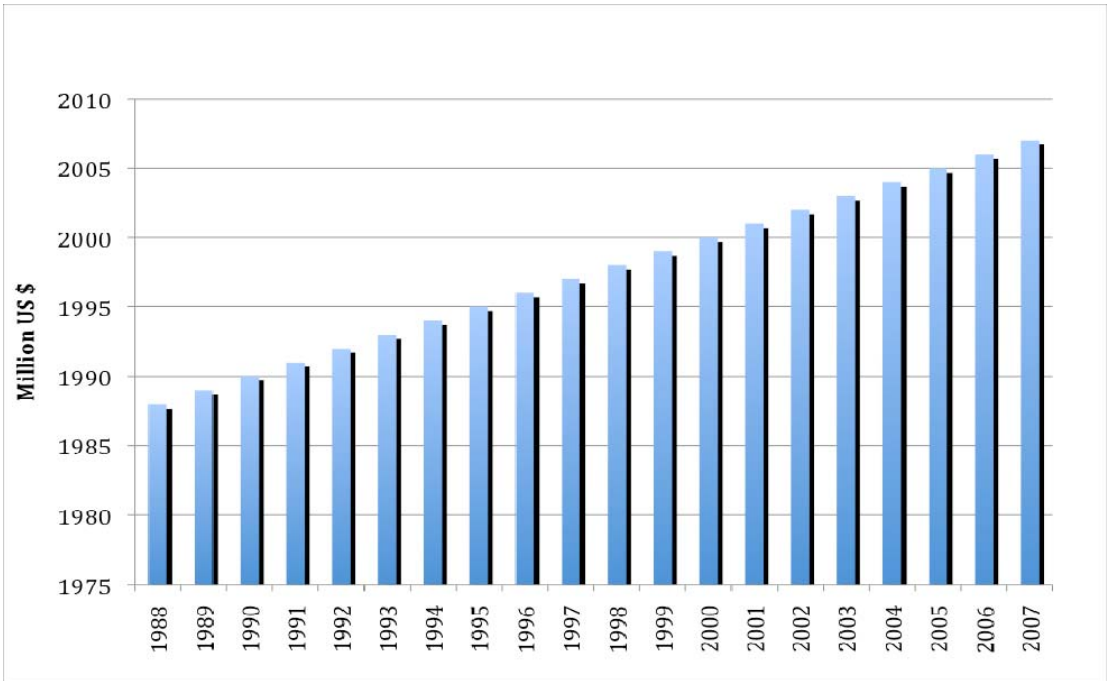


Source: OECD

Figure 2 shows that net ODA disbursement have steadily increased over the 1988-2007 period. The signing of the UN-Declaration of the Millennium Development goals in 2000 certainly helped to push up net ODA disbursements.

Table 1 shows the ODA-GDP ratio of the biggest recipients of ODA in selected years. Figure 3 illustrates that countries involved in conflicts or civil wars (Congo, Rwanda, Mozambique, Bosnia-Herzegovina, Sierra Leone, Afghanistan) or countries plagued by natural disasters (Nicaragua) received huge amounts of ODA in the 1988-2007 period.

Figure 2. Net ODA disbursements by Year 1988-2007 (Million USD)

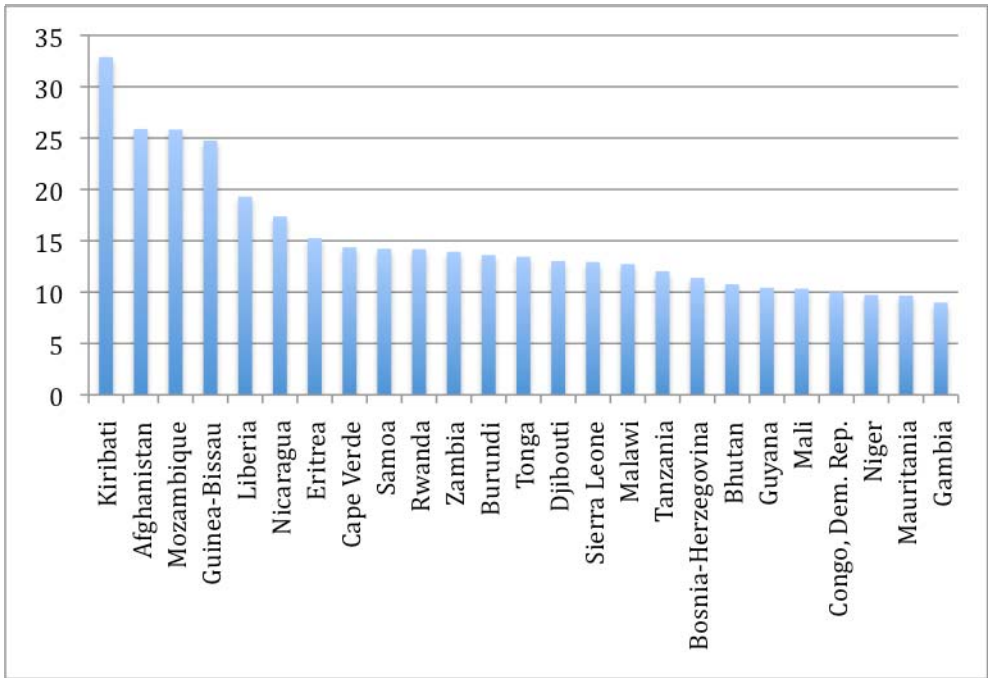


Source: OECD

Table 1. ODA as percentage of recipient´s GDP. Highest 20 observed ratios between 1988 and 2007 in selected years

Country	Year	ODA as % of GDP
Congo, Dem. Rep.	2003	90.9
Liberia	1996	71.4
Rwanda	1994	65.2
Kiribati	1992	64.8
Nicaragua	1991	63.5
Mozambique	1992	56.0
Guinea-Bissau	1994	52.4
Guyana	1991	46.3
Bosnia-Herzegovina	1995	39.3
Burundi	2004	32.6
Afghanistan	2005	31.6
Eritrea	2003	31.1
Albania	1991	28.3
Sierra Leone	1993	27.1
Haiti	1994	26.4
Samoa	1993	25.3
Zambia	1992	24.8
Egypt	1991	24.5
Congo, Rep.	2005	23.8
Cape Verde	1990	22.4

Figure 3. Net ODA as percentage of recipient countries GDP between 1988 and 2007 on average



Since 2005 **Aid for Trade** which is part of ODA (usually around 20 per cent of ODA) has received more attention and is seen as the key factor that is supposed to contribute to the trade development in recipient countries. Aid for Trade consists of three spending categories/groups (1) technical assistance to trade[4], (2) trade-related infrastructure and (3) capacity building through the promotion of capabilities in all trade-related sectors (agriculture, manufacturing, energy, telecommunications), but figures on Aid for Trade have only been imputed and compiled since 2002.

[4] Capabilities of DCs in trade negotiations have to be strengthened and structural adjustment has to be buffered by aid for trade disbursements.

Table 2. Trade for Aid. Commitments and disbursements by income group and aid category

Year	Groups	Least Developed	Other Low Income	Lower Middle Income	Upper Middle Income	MADCT, Total
Commitments ODA by Income Groups, 2007						
2007	1	70.77	31.51	182.16	17.52	0
2007	2	5010.9	2698.64	4461.57	644.07	0.58
2007	3	2770.41	1506.85	4067.22	967.55	0.69
Disbursements ODA by Income Groups, 2007						
2007	1	145.72	33.38	137.7	36.51	0
2007	2	1725.79	900.2	4533.44	750.48	0.58
2007	3	1845.21	766.72	2880.06	927.4	0.68

Source: OECD

In the year 2007 (and also for earlier years) we observe that commitments usually exceeded disbursements in categories (groups) 2 and 3. Table 2 also shows that the lower middle income countries received the bulk of Aid for Trade (AfT).

OOF are other official sector transactions which do not meet ODA criteria[5] and are therefore disregarded in our analysis.

The multilateral contributions of international agencies and organizations (also part of ODA) can be imputed back to the funders of those bodies. The OECD uses a specific methodology that we briefly explain. The approach will vary depending on whether the intention is to show the share of the receipts of a given recipient attributable to a particular donor, or the share of a given donor's outflows that can be assigned to an individual recipient. As DAC statistics are primarily designed to measure donor effort, the second approach is the one taken in DAC statistical presentations. First, the percentage of each multilateral agency's total annual gross disbursements that each recipient country receives is

[5] For example, grants to aid recipients for representational or essentially commercial purposes, official bilateral transactions intended to promote development but having a grant element of less than 25 per cent or official bilateral transactions, whatever their grant element, that are primarily export-facilitating in purpose ("official direct export credits"). Net acquisitions by governments and central monetary institutions of securities issued by multilateral development banks at market terms, subsidies (grants) to the private sector to soften its credits to aid recipients, funds in support of private investment are also classified as OOF.

calculated. This calculation is carried out only in respect of agencies' disbursements of grants or concessional (ODA) loans from core resources. Then, the recipient percentages derived in the first step are multiplied by a donor's contribution in the same year to the core resources of the agency concerned to arrive at the imputed flow from that donor to each recipient. (Example: In a given year, WFP provides 10% of its disbursements from core resources to Sudan. Donor A contributes USD 50 million to WFP core resources in the same year. Donor A's imputed multilateral ODA to Sudan through WFP is 0.1*50million = USD 5 million). This calculation is repeated for each multilateral agency. The results from the second step for all agencies are summed to obtain the total imputed multilateral aid from each donor to each recipient country.

In practice, imputed multilateral percentages are calculated for about 20 agencies per year. These account for about 90% of donors' multilateral ODA. Core contributions to the remaining agencies, for which the OECD does not have outflow data, are not imputed back to donors, so that imputed multilateral ODA remains slightly lower than donors' total contributions to multilateral aid. Total imputed multilateral flows in combination with bilateral ODA are assumed to provide the most complete picture possible of the total ODA effort the donor makes in respect of individual recipient countries. At present, there is no regular imputation of multilateral ODA flows by sector or other aid parameters, though this has been done occasionally in the context of sectoral studies (e.g. on aid to the water sector, to basic social services, or in support of HIV/AIDS control). Finally, it is worth noting that any methodology for imputing multilateral flows can only be an approximation also because multilateral flows in a given year are not exactly imputable to donors' contributions in that year.

3.2 Data Sources

The used data sets are the following ones: Official Development Aid data are from the OECD Development Database on Aid from DAC Members. We consider net ODA disbursements in current US$[6], 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.

The original member countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Bilateral exports are obtained from the OECD database. Data on income and population variables are drawn from the World Bank (World Development Indicators Database, 2009). 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.

[6] The gross amount comprises total grants and loans extended (according to DAC).

4. Model specification and main results

4.1 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 trade impediment and facilitation variables. Dummy variables, such as trade agreements, common language, or a common border, are generally used to proxy for these factors. The gravity model has been widely used 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 donors' exports, we augment the traditional model with bilateral aid (ODA). Among the variables facilitating trade we add bilateral and imputed multilateral aid. The augmented gravity model is specified as

$$X_{ijt} = \alpha_0 \; YD_{it}^{\alpha_1} YR_{jt}^{\alpha_2} YHD_{it}^{\alpha_3} YHR_{jt}^{\alpha_4} DIST_{ij}^{\alpha_5} BAID_{ijt}^{\alpha_6} BAIDI_{jt}^{\alpha_7} MAID_{ijt}^{\alpha_8} \; F_{ij}^{\alpha_9} \; u_{ijt} \tag{1}$$

where X_{ijt} are the exports from donor i to recipient j in period t in current US$; YD_i (YR_j) indicates the GDPs[7] of the exporter (importer), YHD_i (YHR_j) are exporter (importer) GDPs per capita, $DIST_{ij}$ is geographical distances between countries i and j, and F_{ij} denotes other factors impeding or facilitating trade (e.g., trade agreements, common language, or a common border). $BAID_{ij}$ is bilateral net official development aid from donor i to country j in current

[7] We utilize GDP and not GNP in order to avoid a double-counting of income received by third countries (international transfer payments, such as aid).

US$; $BAIDI_j$ is bilateral net ODA from all the other donors (excluding i) to recipient j and $MAID_{ij}$ is imputed multilateral development aid from donor i to country j in current US$;

Usually the model is estimated in log-linear form. Taking logarithms in Equation 1 and introducing time variation and bilateral exchange rates[8], the basic specification of the gravity model is

$$LX_{ijt} = \gamma_0 + \phi_t + \delta_{ij} + \alpha_1 LYD_{it} + \alpha_2 LYR_{jt} + \alpha_3 LYHD_{it} + \alpha_4 LYHR_{jt} + \alpha_5 LDIST_{ij} + \alpha_6 LBAID_{ijt} + \alpha_7 LBAIDI_{jt} + \alpha_8 LMAID_{ijt} + \alpha_9 LXCHR_{ijt} + \eta_{ijt} \quad (2)$$

where:

L denotes variables in natural logs, $XCHR_{ijt}$ denotes nominal bilateral exchanged rates in units of local currency of country i (donor) per unit of currency in country j (recipient) in year t (indexed so that XCHR=100 in base year 2000) and the other explanatory variables are described above.

ϕ_t are specific time effects that control for omitted variables common to all trade flows but which vary over time. δ_{ij} are trading-partner fixed effects that proxy for multilateral resistance factors. When these effects are included, the influence of the variables that are time invariant cannot be directly estimated. This is the case for distance; therefore its effect is subsumed in the country dummies. Since the variable of interest is development aid, the income and population coefficients are restricted to be equal in the single-donor estimations.

The model will be estimated for all recipients by restricting the coefficients of the right hand side variables to be equal for each recipient.

As an additional control variable we use aid from other donors (different from donor i) to recipient j ($LBAIDI_{ijt}$). The rational of adding this variable is to control for cross-

[8] When the gravity model is estimated using panel data it is recommended to add bilateral exchange rates also as a control variable (Carrere, 2006).

correlation effets due to the fact that other donors' aid could promote their own imports from recipient j and may have a negative effect on donor's i imports.

4.2. Main Results

The basic model 2 is altered and estimated for data on 21 donors' exports and development aid (ODA) to 130 recipient countries during the period from 1988 to 2007. The model is run without time dummies since the latter interfere when controlling for serial autocorrelation.

In a first step, the model is estimated as a long-run model (eq. 3) following the dynamic OLS procedure (DOLS) proposed by Stock and Watson (1993) controlling for endogeneity of the explanatory variables. As we also control for autocorrelation and heteroskedasticity of the error terms, we eventually estimate the model by means of panel dynamic feasible generalized least squares (DFGLS).

$$LX_{ijt} = \gamma_0 + \delta_{ij} + \alpha_1 LYD_{it} + \alpha_2 LYR_{jt} + \alpha_3 LYHD_{it} + \alpha_4 LYHR_{jt} +$$

$$\alpha_5 BAID_{ijt} + \alpha_6 LBAIDI_{jt} + \alpha_7 LMAID_{ijt} + \alpha_8 XCHR_{ijt} + \alpha_9 LDIST_{ij} + \beta' dummies_{ij}$$

$$+ \sum_{p=-2}^{p=+2} \Delta LYD_{ijt-p} + ... + \sum_{p=-2}^{p=+2} \Delta LXCHR_{ijt-p} + \eta_{ijt} \qquad (3)$$

In a second step, the model is estimated as an autoregressive distributed lag (ADL) model (eq. 4) (Greene, 2000). This model gives us both short- and long-term coefficients and controls for autocorrelation and heteroskedasticity and is estimated via panel FGLS.

$$\Delta LX_{ijt} = \gamma_0 + \delta_{ij} + \lambda LX_{ijt-1} + \alpha_1 LYD_{it-1} + \alpha_2 LYR_{jt-1} + \alpha_3 LYHD_{it-1} +$$

$$\alpha_4 LYHR_{jt-1} + \alpha_5 LBAID_{ijt-1} + \alpha_6 LBAIDI_{ijt-1} + \alpha_7 LMAID_{ijt-1} + \alpha_8 LXCHR_{ijt-1}$$

$$+ \alpha_9 LDIST_{ij} + \beta' dummies_{ij} + \sum_{p=1}^{p=2} \Delta LX_{ijt-p} + \sum_{p=0}^{p=2} \Delta LYD_{ijt-p} + ...$$

$$+ \sum_{p=-2}^{p=2} \Delta LXCHR_{ijt-p} + \eta_{ijt} \qquad (4)$$

Table 3 reports the main estimation results that are relevant in the long run. The long-run model does not describe the stage of transition and therefore does not contain lags of the covariates in levels since all adjustments have come to an end in the long term. However, it controls for endogeneity of the right hand side variables by inserting leads and lags of the explanatory variables in first differences.[9]

We start by reporting the plain OLS results (column 1) which indicate quite a high, positive impact of bilateral aid on recipient exports (a one dollar increase in bilateral aid increases recipient exports by US$ 1.64)[10]. These results have to be taken with caution as they disregard heteroskedasticity and autocorrelation of the error terms and are therefore inefficient if both problems occur.

Since our data consists on a time span of a maximum of 20 years and a cross-section of 130 countries, we tested for the presence of autocorrelation and heteroskedasticity. The results of the Wooldridge test for autocorrelation in panel data and the LR test for heteroskedasticity indicate that both problems are present in the data. Hence, given the strong rejection of the null in both tests, the model is estimated by means of dynamic feasible generalized least square (DFGLS). The second column shows the DFGLS results. Individual (country-pair) effects are assumed to be random and are considered as unobservable

[9] It requires the series to be non-stationary and cointegrated in the long-run. Both the panel ADF-unit root test and Kao's cointegration tests supported these premises.

[10] The monetary impact of bilateral aid is calculated according to the following formula:
Coefficient $_{BAID}$= MEAN of X/MEAN of BAID, i.e. 0.134*271000000/22100000 = US $ 1.64

heterogeneous effects across trading partners. They are assumed not to vary over time. Those effects are also a proxy for the so-called "multilateral resistance" factors modelled by Anderson and van Wincoop (2003). We rely on the DFGLS estimates with random effects, since they are more efficient than the fixed effect estimates (the within estimates). The DFGLS estimations in which we control for heteroskedasticity and autocorrelation of the error terms remain therefore our estimation method of choice.

With respect to the variable of interest, bilateral aid (LBAID), controlling for autocorrelation via DFGLS does change and slightly reduce the positive impact of the aid variables on recipients' export trade (compare column 2 to the OLS results in column 1). A one dollar increase in bilateral aid increases recipient exports by US$ 1.50[11]). From now on we will relate to the results estimated by DFGLS and depicted in column 2.

Bilateral aid given by other donors (LBAIDI) also has a positive effect on the exports of a specific donor-recipient pair and therefore does not reduce the effect of bilateral aid in a specific recipient country. Multilateral aid given by international organizations (LMAID) does impact slightly negatively on recipient countries exports. So altogether, there is no observable crowding out effect from these two alternative sources of aid. This suggests that recipients' exports are not influenced by aid given by other DAC members. We could have expected, however, a negative relationship: when other donors give higher amounts of aid, the "goodwill" and "habit formation" factors mentioned above could decrease recipients' exports generating an indirect negative effect on a specific recipient's exports.

Most of the other variables present the expected sign and are statistically significant. The coefficients of donors' and recipients' income are positive and significant and around the theoretical value of unity. The coefficient of donors' income per capita is negative and statistically significant at the 1 percent level in most specifications, whereas the coefficient of

[11] The monetary impact of bilateral aid is calculated according to the following formula:
Coefficient $_{BAID}$= MEAN of X/MEAN of BAID, i.e. 0.122*271000000/22100000 = US $ 1.50.

Table 3. Development aid and recipients' exports (long-run model)

	OLS-benchmark (inconsistent and inefficient)	Dynamic Feasible Generalized Least Squares (DFGLS)
LYD	1.005***	0.995***
	55,742	140.756
LYR	1.149***	1.196***
	85,014	169.071
LYHD	-1.456***	-1.199***
	-12,886	-31.238
LYHR	0.298***	0.282***
	10,719	18.616
LBAID	0.134***	0.122***
	15,290	28.721
LBAIDI	0.075***	0.033***
	3,894	2.821
LMAID	0	-0.001**
	-0.721	-2.08
LXCHR	0.068***	0.005
	3,695	0.379
LDIST	-0.612***	-0.622***
	-26,631	-40.565
CONTIG	0.506*	2.302***
	1,654	7.113
COMLANG	0.863***	1.087***
	14,302	45.157
COLONY	0.896***	0.791***
	12,675	17.19
_cons	-22.762***	-25.651***
	-18,182	-50.905
	year dummies (yes)	leads and lags (yes)
R-squared	0.607	
N	18779	12391
Ll	-40540.84	
Rmse	2,097,515	
LBI		

Note: Year dummies are not reported in OLS. Leads and lags are not reported in DFGLS

recipients' income per capita is positive and statistically significant at the 1 percent level in all specifications. The effect of distance is negative as expected. The bilateral nominal exchange rate has the expected sign. An increase (appreciation of the recipient country's

currency) reduces recipient countries' exports to the respective donor country. The dummy variables contingency, common language and former colony all have the expected positive sign. The year dummies (not reported in the OLS-results of Table 3) are all positive and significant and increasing over the years, thus implying a strengthened integration of developing countries into the world trading system in the last twenty years.

Table 4 shows the regression results of the dynamic models which contain the transition. Column 1 contains the results of regression formulated as an autoregressive distributed lad model ADL(2, 2) model which starts out with two lags of the dependent and the independent variables. By applying Hendry's general- to-specific method we derive the model as depicted in column 1. This model is estimated by panel FGLS. The alternative dynamic model used is a partial adjustment model (with a lagged dependent variable) and is estimated by GMM (see column 3). The results show that second order autocorrelation was present in GMM, thus making our instruments questionable.

Table 4. Development aid and recipients' exports in the short-to-medium run

	Short to Medium Run ADL-Model (FGLS)			Partial Adjustment Model (GMM)	
	Without time dummies	With time dummies			b/t
L.LX	0.610***	0.622***		L.LX	0.542***
	391,562	161,352			8,042
L2.LX	0.286***	0.282***		LYD	0.429***
	99,439	76,243			4,837
LYD	0.640***	0.087***		LYR	0.514***
	25,769	21,719			6,664
L.LYD	-0.379***	0		LYHD	-0.468*
	-11,910	.			-1,882
L2.LYD	-0.164***	0		LYHR	0.087*
	-8,086	.			1,712
LYR	0.225***	0.197***		LBAID	0.059
	10,255	8,989			1,044
L.LYR	-0.122***	-0.101***		LBAIDI	0.018
	-5,567	-4,659			0.545

LYHD	0.767***	0.330***	LMAID	-0.000	
	11,181	4,798		-0.484	
L.LYHD	-1.074***	0	LXCHR	0.028	
	-11,182	.		1,406	
L2.LYHD	0.149*	-0.493***	LDIST	-0.282***	
	1,923	-7,321		-5,251	
LYHR	0.588***	0.410***	CONTIG	0.206	
	9,300	10,319		0.690	
L.LYHR	-0.151*	0	COMLANG	0.351***	
	-1,814	.		3,540	
L2.LYHR	-0.397***	-0.382***	COLONY	0.399***	
	-7,611	-9,676		2,803	
LBAID	0.006***	0.008***	y2	0.133	
	2,922	3,557		0.650	
L.LBAID	0.008***	0.009***	y3	0.084	
	3,419	3,754		0.440	
L2.LBAID	0.006***	0.002	y4	0.002	
	2,758	0.973		0.010	
LBAIDI	-0.012**	-0.009	y5	-0.006	
	-2,438	-1,583		-0.032	
L2.LBAIDI	0.036***	0.029***	y6	-0.063	
	7,467	5,341		-0.370	
LXCHR	-0.025**	-0.030**	y7	0.076	
	-1,984	-2,546		0.481	
L.LXCHR	0.056***	0.096***	y8	0.106	
	3,199	5,394		0.749	
L2.LXCHR	-0.035***	-0.043***	y9	-0.035	
	-3,646	-4,441		-0.260	
LDIST	-0.070***	-0.072***	y10	0.046	
	-15,175	-14,966		0.365	
COMLANG	0.067***	0.068***	y11	0.029	
	6,235	6,150		0.236	
COLONY	0.076***	0.065***	y12	0.055	
	6,468	4,986		0.508	
y3		0.031**	y13	0.159	
		2,469		1,615	
y5		0.019	y14	0.067	
		1,593		0.693	
y6		-0.037***	y15	0.085	
		-2,663		1,042	
y7		0.077***	y16	0.059	
		5,197		0.923	
y8		0.140***	y17	0.077	
		9,150		1,563	
y9		0.003	y18	0.034	

		0.182		0.822
y10		-0.002	y19	0.035
		-0.115		1,186
y11		-0.017	_cons	-10.806***
		-1,157		-3,004
y12		-0.028*		
		-1,896		
y13		0.022		
		1,471		
y14		-0.058***		
		-3,756		
y15		0.007		
		0.465		
y16		0.114***		
		7,818		
y17		0.176***		
		11,830		
y18		0.117***		
		8,031		
y19		0.118***		
		8,839		
y20		0.114***		
		7,067		
_cons	-1.876***	-1.517***	R-squared	
	-10,758	-7,798	N	16754
R-squared			ll	
N	13685	13685	rmse	
ll			LBI	
rmse				
LBI				

Arellano-Bond test for AR(1) in first differences: z = -8.63 Pr > z = 0.000

Arellano-Bond test for AR(2) in first differences: z = 3.87 Pr > z = 0.000

Sargan test of overid. restrictions: chi2(140) = 263.29 Prob > chi2 = 0.000. (Not robust, but not weakened by many instruments.)

From the short-to medium run model (Table 4) we can infer that the effect of bilateral aid is non-linear (it has been tested non-linear)[12] and of an inverse u-shape, i.e. it increases, reaches a maximum after one period and then decreases again. The impact of bilateral aid

[12] This has been tested by plugging in the squared terms of aid, which showed the expected sign and proved significant. The non-linear impact of aid is reflected in the short-run coefficients of bilateral aid in columns 2 and 3.

takes up to two years to evolve. We observe that current, one- and two period lagged bilateral aid all contribute to current recipients' exports. The short-to medium run impact of a one dollar rise in aid is around US$ 0.25, which is about one sixth of the long-run effect.[13]

5. Robustness Checks

Finally, we checked the robustness of the results by employing imports from donor countries as dependent variable (mirror statistics). The regression results basically did not change and stayed robust. We controlled for endogeneity of the explanatory variables via dynamic ordinary least squares, which is the approach of Stock and Watson (1993). The Heckman approach, which was used to check for sample selection bias, gave inconclusive results, depending on the selection variables chosen. At times it indicated no sample selection bias, in other specifications there clearly was a sample selection bias. This issue has to be settled in further research.[14]

We further tested whether the results were similar across different regions of the world. Our hypothesis that Africa would fare worse than Latin America or Asia found support in the data. In Table 5 we only report the long-run coefficient of bilateral aid from donor i to recipient j and the average impact of this type of bilateral aid on recipient exports. In Africa aid's impact on African exports into donor countries is extremely low. One dollar of aid increases African exports by US$ 0.16, whereas exports increase by US$ 3.22 in Asia and by US$ 2.98 in Latin America and the Caribbean for each dollar received as aid. The long-run coefficient of bilateral aid for the Eastern European and Central Asian countries was negative, but not significant.

[13] The monetary impact of bilateral aid is calculated according to the following formula:
Coefficient $_{LBAID}$= MEAN of X/MEAN of BAID, i.e. 0.02*271000000/22100000 = US $ 0.245.
[14] Results are available upon request.

Table 5. Different impact of bilateral aid in different regions of the world

	Developing countries	Africa	Asia	Latin America & Caribbean
Coefficient (β_{LBAID})	0.122***	0.03***	0.139***	0.274***
Mean of exports ($\overline{X}$) in millions of US$	271	114	874	135
Mean of bilateral aid ($\overline{BAID}$) in millions of US$	22.1	21.9	37.7	12.4
Impact of aid in terms of US$ (rounded)	US$ 1.50	US$ 0.16	US$ 3.22	US$ 2.98

Note: Impact of aid was calculated as: $\beta_{LBAID} * \overline{X} / \overline{BAID}$ **.** Exports and aid are in current US$.

6. Conclusions

The empirical analysis showed that development aid has a positive and significant impact on recipient countries exports in Asia and Latin America and the Caribbean, whereas aid's impact on exports is hardly noticeable in Africa. In the successful countries, the income effect of aid seems to translate into more consumption and investment thereby expanding the productive capacity not only in the overall economy but also in the export industry of the recipient countries. This effect evolves slowly so that the specification with aid in lags reflects the adjustment over time. Furthermore, we could not detect crowding out effects between different types of bilateral and multilateral aid. The exchange rate also seemed to influence recipient countries exports in the expected way, i.e. an appreciation of the recipient country's bilateral exchange rate led to a decrease in its exports. In future research it remains to be determined whether development aid actually leads to an appreciation of the exchange rate in the recipient

country and if so, to what extent. Overall, it seems that the income (capacity) effect outweighs the Dutch disease effect of development aid, which has been emphasized in earlier studies.

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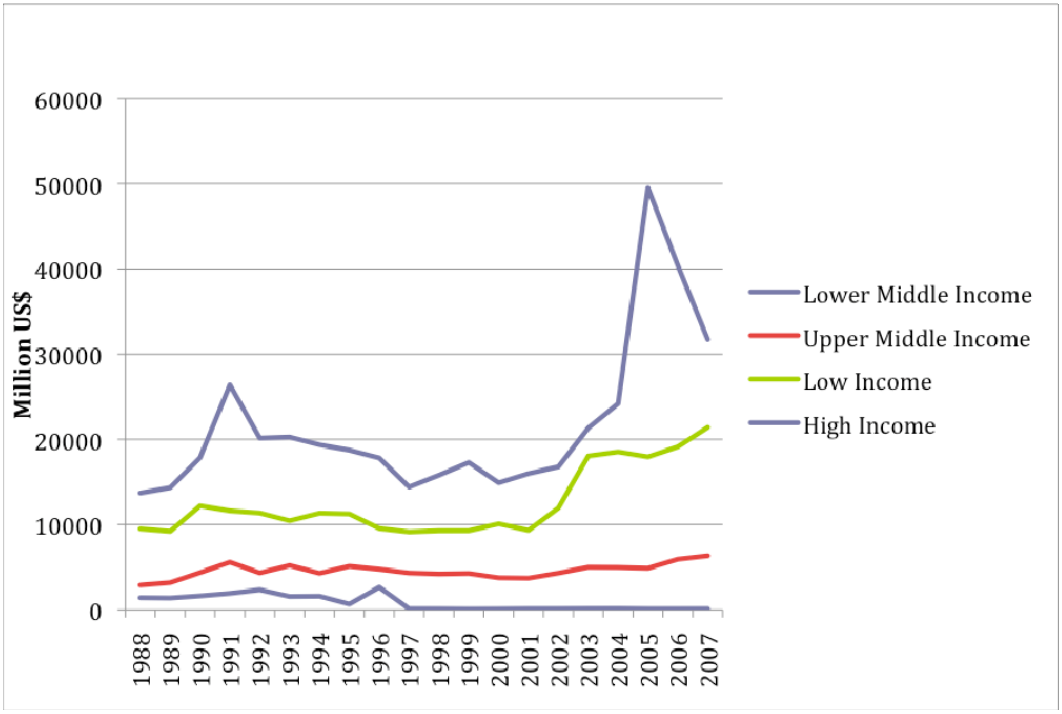
APPENDIX

Table A1. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
BAID	35003	2.21E+07	1.22E+08	-1.77E+07	1.12E+10
BAIDI	35003	3.85E+08	8.27E+08	-9520000	2.18E+10
MAID	46508	4.94E+09	1.43E+10	-5.53E+10	8.17E+11
X	26615	2.71E+08	1.83E+09	1	1.02E+11
M	36843	2.62E+08	1.98E+09	1	1.28E+11
XCHR	47250	118.9089	117.8249	0.0129694	2939.103
YD	51660	1.13E+12	2.05E+12	3.67E+10	1.38E+13
YR	49791	4.82E+10	1.66E+11	2.84E+07	3.38E+12
YHD	51660	24404.99	7330.851	9279.041	53432.5
YHR	47628	4738.044	7054.332	111.5047	64512.3
DIST	51660	7759.54	3791.68	270.6798	18953.23
LBAID	34921	14.49717	2.491744	9.21034	23.14166
LBAIDI	34983	5.083094	1.444329	-4.605338	9.991882
LMAID	46508	4.941066	14.30616	-55.34	816.63
LX	26615	15.54073	3.500141	0	25.34885
LM	36843	15.46038	3.423805	0	25.57454
LXCHR	49476	4.683498	1.122653	-4.345165	14.98787
LYD	51660	26.79275	1.315216	24.32498	30.25216
LYR	49791	22.65125	1.973622	17.16239	28.84957
LYHD	51660	10.05753	0.3025221	9.135513	10.88617
LYHR	47628	7.812596	1.125598	4.714067	11.07461
LDIST	51660	8.811403	0.5898773	5.600936	9.84973

Figure A2. Net ODA disbursements by income group of recipient country. 1988-2007



Source: OECD

Table A3: List of countries

List of recipients (j)	132			List of Donors (i)	21
Afghanistan	Congo, Dem. Rep.	Jamaica	Peru	Australia	
Albania	Congo, Rep.	Jordan	Philippines	Austria	
Algeria	Costa Rica	Kazakstan	Qatar	Belgium	
Angola	Cote d'Ivoire	Kenya	Rwanda	Canada	
Argentina	Croatia	Kiribati	Samoa	Denmark	
Armenia	Cuba	Korea	Saudi Arabia	Finland	
Aruba	Djibouti	Kuwait	Senegal	France	
Azerbaijan	Dominica	Laos Dem. Rep.	Seychelles	Germany	
Bahamas	Dominican Republic	Lebanon	Sierra Leone	Greece	
Bahrain	Ecuador	Lesotho	Somalia	Ireland	
Bangladesh	Egypt	Liberia	South Africa	Italy	
Barbados	El Salvador	Libya	Sri Lanka	Japan	
Belarus	Eritrea	Madagascar	Sudan	Netherlands	
Belize	Estonia	Malawi	Suriname	New Zealand	
Benin	Ethiopia	Malaysia	Swaziland	Norway	
Bermuda	Fiji	Mali	Syria	Portugal	
Bhutan	Gabon	Mauritania	Taiwan	Spain	
Bolivia	Gambia	Mauritius	Tanzania	Sweden	
Bosnia and Herzegovina	Georgia	Mexico	Thailand	Switzerland	
Botswana	Ghana	Moldova	Timor-Leste	United States	
Brazil	Grenada	Mongolia	Togo	United Kingdon	
Brunei	Guatemala	Morocco	Tonga		
Burkina Faso	Guinea	Mozambique	Trinidad and Tobago		
Burundi	Guinea-Bissau	Myanmar	Tunisia		
Cambodia	Guyana	Namibia	Turkey		
Cameroon	Haiti	Nepal	Uganda		
Cape Verde	Honduras	Nicaragua	United Arab Emirates		
Central African Republic	Hungary	Niger	Uruguay		
Chad	India	Nigeria	Venezuela		
Chile	Indonesia	Oman	Vietnam		