Dutch exports and Dutch bilateral aid

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Abstract

This paper investigates the link between Dutch development aid and Dutch exports to the recipient countries over the period 1973 to 2009. As Dutch aid policy drastically changed in 1999, the impact of Dutch bilateral aid is examined separately for the 1973-1998 and the 1999-2009 periods. A static and a dynamic gravity model of trade are estimated using up-to-date panel data and time series techniques.

Using advanced panel data methods and a sample of 130 recipients, the findings indicate that in the long run Dutch aid is associated with an increase in the value of exports of goods that is slightly higher than the aid flow for the period 1988-2009. The estimated coefficient varies over time, but shows an effect that is consistently positive after 1999. The paper also distinguishes among recipient countries and finds that the return on aid measured by Dutch exports is higher for aid to countries considered "strategic aid recipients" by the Dutch government. We do not find evidence that aid given by other donors reduces Dutch exports.

Using time series methods, which fully control for endogeneity and autocorrelation, we do find a positive a significant impact of Dutch bilateral aid on Dutch exports in the 1999-2009 period and this effect is robust to different estimation techniques. In contrast, no significant aid-export relationship could be established in the period (1973-1998). Analysing the effect of aid for the 1999-2009 period at a sectoral level, it transpires that chemicals, electrical and transport equipment and nec. manufacturing are the drivers for this positive effect, whereas agriculture and food production show insignificant aid coefficients. In line with this, the highest (but still small) employment effects are produced in chemicals, electrical machinery and transport equipment and nec. manufacturing. Total additional employment due to Dutch bilateral aid is around 13,000 jobs which produced additional exports worth about 1.31 billion (on average in the 1999-2009 period).

We also show that Dutch bilateral aid is influenced by Dutch exports and therefore endogenous. This is a further indication that the estimation techniques employed, which control for endogeneity and autocorrelation, are indeed called for. Based on long-run time-series techniques we can show that other donors' aid does not crowd out Dutch exports, on the contrary, if anything it is beneficial to Dutch exports.

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1. Introduction

Dutch development aid aims to be beneficial to developing countries. It is targeted not only towards relieving hunger and eliminating malnutrition, reducing poverty, and eradicating diseases but also to building economic and social infrastructure to increase production and competitiveness. Nevertheless, for decision makers in the Dutch Parliament and Government it is important that the Netherlands benefits from giving aid, or more specifically, that, fuelled by development aid, Dutch producers are able to increase their exports to aid recipient countries.

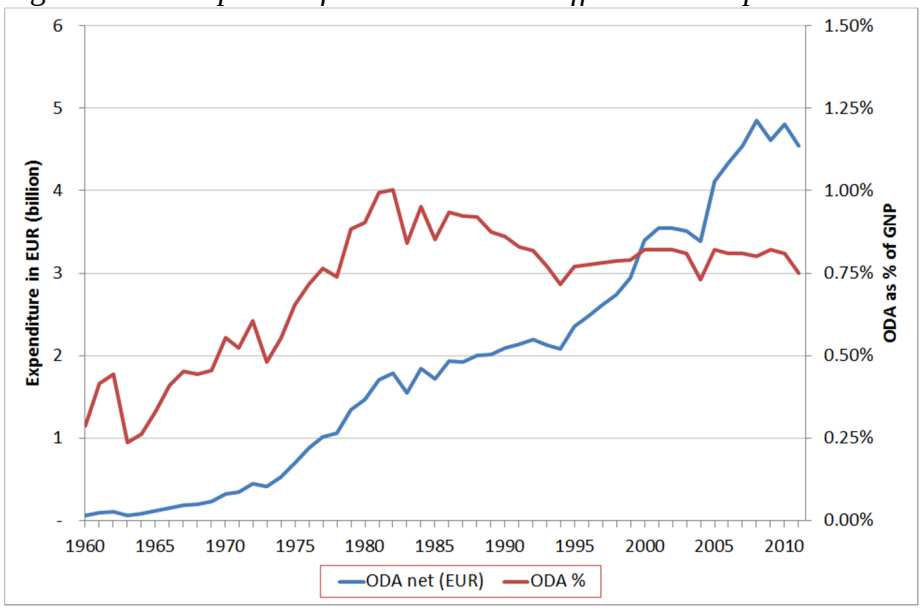
Dutch development aid has undergone several developments. The most important is of which are the reduction in the numbers of recipient countries - nowadays focusing on 15 countries; and the specialization on a few key areas, such as sexual and reproductive health and rights, water and food security. Aid has increased in terms of volume in the last four decades, making the Netherlands one of the few donor countries who have fulfilled (or even over-fulfilled) the 0.70 percent goal of the desired aid-to-GDP ratio. Whereas in the 1970s Dutch aid was mostly tied, implying that a large part of the budget had to be spent on Dutch goods and machinery, in the early 1980s Minister De Koning partially untied Dutch aid and Schoo (1982-1986) focused on poverty reduction and economic independence to enhance the effectiveness of aid. In the 1990s the main focus continued to be on aid effectiveness and aid was seen as an instrument to bring developing countries onto a development path. It was only in the late 1990s that Herfkens abolished tied aid for the least developed countries, cut technical assistance and thus significantly reformed Dutch aid policy[1]. At the beginning of 2010 the Dutch Scientific Council for Government Policy published a report on Dutch development cooperation (WRR). While the report was highly debated in academic and other professional circles, it was well received in the political arena. The authors of the report

[1] The year 1999 therefore stands for a structural break in the criteria for Dutch aid allocation.

sensed changes in the thinking about aid and advised the government to focus more on areas where the Netherlands was supposed to have a 'comparative advantage'.

That same year, the new minority coalition government of the Liberal Party and Christian Democrats, tolerated by the right wing 'Party for the Freedom' reduced the budget for development cooperation from 0.8% to 0.7% of the GDP. Effectively, the reduction was higher as in the future other expenditure would also be financed from the budget for development cooperation. The total reduction was EUR 900 million. The Netherlands would discontinue general budget support and stick to a reduction of the number of partner countries from 33 to 15. The budget cuts also involved the closure of several embassies. More or less in line with the WRR report, Knapen phased out support to the social sectors, focusing more on economic sectors. The coalition wanted Dutch enterprises to benefit more from development cooperation and therefore Dutch business would get a stronger stake in the implementation of development programs and projects.

Figure 1: *Development of the Netherlands Official Development Assistance*



Note: In 2004 India repaid its debt, leading to a low net ODA figure of 0.73%. This low percentage was compensated in the following years.

Table 1: *Evolution over time of regular bilateral development cooperation by region (number of countries; 1960-2010)*

	1960	1970	1980	1990	2000	2010
Asia	3	6	6	7	9	5
Africa	6	6	12	16	17	10
Latin America	3	2	9	11	5	
Europe					2	
Total	12	14	27	34	33	15

Source: Van der Wiel and Van Norren (2012).

As we perform an empirical study on how aid affects donors' exports, it is worthwhile looking at the related literature on the aid-donors' export nexus. Among the studies that investigate the impact of aid on a donor country's exports, Nilsson (1997) analyzed the link between aid and exports for European Union donors to 108 recipients over the period 1975 to 1992. He estimated a static specification of the gravity model of trade and found an elasticity of exports with respect to aid of 0.23 that translates, for the average donor, into a US$2.6 increase of exports for each dollar of aid given. In particular, the return on foreign aid for the Netherlands was a US$1.09 increase in Dutch exports for each dollar of aid given. Also using a gravity framework, Wagner (2003) investigated the effect of aid on trade for twenty donors to 109 recipient countries for the period 1970 to 1990. The estimated trade elasticities with respect to aid were in the range of 0.062 for fixed-effects (FE) to 0.195 (for pooled OLS specifications), respectively. These elasticities translate into average returns on donors' aid of around $2.29 (OLS) and $0.73 (FE) of exports per dollar of aid[2]. More recently, Pettersson and Johansson (2012) find that aid increases bilateral trade flows in both directions. The authors analyse the effects of various foreign development assistance variables on the

[2] It is now standard to use fixed effects estimations to control for recipient country heterogeneity. Therefore, average returns of aid slightly below EUR 1.00 can be considered reasonable estimates.

recipient as well as donor country exports and find a particularly strong relation between aid in the form of technical assistance and exports in both directions, supporting their interpretation that market knowledge through interpersonal relations is an important driver for exports. However, the authors failed to control for unobservable heterogeneity related to each bilateral relationship and this may bias the estimates, as pointed out by Nowak-Lehmann et al. (2013). According to Nowak-Lehmann D. et al.,(2009) and Martinez-Zarzoso et al. (2009) German exporters also benefit from German bilateral aid. In particular, US$1 of German aid increases German exports by between US$ 1-$1.5 on average(. This effect was based on a positive, significant impact (elasticity) of aid at a range of about 0.08 to 0.13, implying that a 10% increase in aid translates into an 8% to 13% increase in exports. A very recent study by Martinez-Zarzoso et al. (2013b), which uses more modern techniques and more recent data that runs up to 2012 suggests that the impact of aid on German exports is still positive and significant but slightly lower than 1.00. One dollar of aid is generating 0.83 dollars of exports according to the latest figures. However, it can be shown that the effect of aid varies with the economic sector analyzed, e.g. machinery, electrical and transport equipment have statistically significant and higher than average aid-export elasticities.

Among the studies that deviate from the gravity model framework some have used Granger causality tests to investigate the direction of the causality. One such study by Arvin, Cater, and Choudhry (2000) focused on the relation between untied assistance and exports using German data for the period 1973 to 1995. They find that untied aid disbursements generate goodwill for the donor, providing some support for an export-promotion hypothesis. Also using Granger causality tests, Lloyd, McGillivray, Morrissey, and Osei (2000) examined data on aid and trade flows for a sample of four European donors and 26 African recipients over the period from1969 to 1995. They found evidence showing that trade Granger-caused aid in 14 percent of the country pairs, aid Granger-caused trade in 13 percent of the cases and

bi-directional causality was found in 8 percent of the pairs. Along the same lines, Osei, Morrissey, and Lloyd (2004) extended the analysis to more countries and also found that 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. Martinez-Zarzoso et al. (2013b) run Granger causality tests within a gravity model framework and find evidence for a bi-directional relationship between donor exports and bilateral aid, which implies that both series have to be considered as endogenous variables in the German case. Thus, they conclude that the endogeneity issue of all right hand side variables has to be dealt with using adequate techniques, suggesting the leads and lags approach, also known as the dynamic ordinary least squares (DOLS) approach (Wooldridge, 2009).

A number of authors have evaluated the relationship between bilateral aid and bilateral exports with a special focus on the tying status of aid. According to two studies made in the 1990s - Arvin and Baum (1997) and Arvin and Choudhry (1997), aid without tying is roughly as export-promoting as tied aid due to the effects of the recipient countries' goodwill and/or parallel trade agreements and trade concessions on donor's exports and hence several authors conclude that a formal tying of aid does not seem to provide additional benefits in terms of donor export levels (Jepma, 1991; Arvin and Baum, 1997; Arvin and Choudhry, 1997). However, Martinez-Zarzoso et al (2013a) find that the tying status is positively correlated to the aid effect on donors exports over time (corre=0.75), with an even stronger correlation when the percentage of aid tied is higher than 30 percent.

From the side of the recipients tying noticeably reduces the benefit of aid (Jepma, 1991; Wagner, 2003; World Bank, 1998), for this reason, in 2001 the OECD-DAC recommended a progressive reduction of tying practices. Most donors had indeed

significantly reduced the amount of aid tied and this is associated with a decrease in the effect of aid on donors exports after 2000 (Martinez-Zarzoso et al, 2013a).

Aid could also have a trade promoting effect and can act as a "door opener" for a given bilateral relationship (donor-recipient). In this context the effect of aid could be compared with the export-promoting effect of trade missions, state visits or the activity of embassies and consulates (Moons and Bergeijk, 2011). The existing literature, nicely summarized in Moons and Bergeijk's (2011) meta-study[3], shows that the presence of embassies and state visits has a stronger effect on trade and FDI than the presence of consulates, export promotion agencies and trade missions. They also found that single country studies will in general show lower significance. Veenstra et al., (2011) find a small effect of 0.5 to 0.9 per cent additional exports when increasing the number of embassies and consulates by 10 per cent. Creusen and Lejour (2013) focused on the effect of government trade missions and the presence of government support offices in middle income countries on Dutch firms' exports. The authors found that trade visits and trade missions raise significantly the export probability to a market. In particular, one additional trade mission would increase the export probability by nearly 0.1% point. While this provides a useful frame of reference for comparison, a direct comparison between these studies and the literature on the aid-donor export link is difficult for two reasons. First, these studies on the export promotion success of trade missions, consulates, export credit, embassies and the like do not usually provide clear and comparable estimates of the costs of these activities, but just focus on the outcomes of these activities. Second, and more seriously, in contrast to direct export-promotion activities just discussed, the impact of aid on Dutch export is basically a bi-product of the aid activities, but not its main aim. Thus if an aid relationship generates similar export effects as other export-promotion activities, this should be seen in a much more favorable light since this

[3] The study includes 29 studies published in the period 1986-2011.

effect comes on top of the intended effect of the aid, i.e. its effect on growth and poverty reduction in recipient countries.

The current study is organized as follows: Section 2 presents the theoretical underpinnings for the aid-export link and the augmented gravity model on which the estimations are based. Section 3 contains the description of data sources and the concept of aid that is being used. In Section 4 we summarize the estimations and results utilizing advanced panel data techniques and in Section 5 we explain the cointegration based estimation techniques and the results obtained. Section 6 draws conclusions concerning the econometric techniques and pathways for aid policy.

2. Aid-export link: conceptual framework

2.1 Augmented gravity model of trade and model specification issues

Recipient countries perceive aid as additional income that will eventually lead to an increase in demand in general and of imports in particular. This is known as the income effect of aid. However, due to a number of factors only part of the aid transfer will actually be spent on domestic and foreign goods. First, a certain percentage of the aid received might never reach its destination due to corruption in the form of capital flight (Graf Lambsdorff, 2002; Kasper, 2006). Second, a relatively large part of aid received might also be used to administer and allocate the aid (Easterly and Williamson, 2010) and bad governance (Kaufmann, 2009) might lead to other inefficiencies (time delays, lost investment opportunities) in channelling aid to the beneficiaries. In addition, a certain part of the aid might never become effective in the recipient country but might be spent in the donor country instead, for example to pay the providers of technical assistance. This latter problem has to do with the way in which official development assistance has been defined. E.g. not only money spent by the donor on refugees

from developing countries, political asylum seekers or students from developing countries studying in the donor country, but also the salaries of donor country consultants, research on developing countries in the donor country etc. are all counted as aid. Last but not least, a certain percentage of the aid might also be saved and might therefore not be spent on imports.

Basically, the above-mentioned theoretical considerations indicate that development aid could lead to an increase in the donor's exports through the income channel (income in the recipient country rises). Besides, there are a few other channels through which aid could lead to increased imports from donor countries. First, there might be an export effect triggered by the fact that a considerable share of donor aid has been tied to imports from the donor country. Second, 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. Finally, 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 aid negotiations with trade missions, the aid relationship might "open the door" for donor exporters. In this specific case aid my help Dutch firms to enter export markets in the countries receiving aid (Creusen and Lejour, 2013). The effect then could only be shown in the extensive margin of trade (new product exported or new destinations for existing products)[4].

In order to study the impact of foreign aid on exports, we will focus on net Official Development Assistance (ODA) and within this category on two types of aid, namely bilateral net ODA (aid) from the Netherlands (NDL) to a recipient country *j (BAID)* and the sum of bilateral aid given by all donors (except the Netherlands) to *j* (BAIDREST). There are two main reasons that justify the use of these two aid categories. On the one hand, to the extent that aid improves the capacity of recipient countries to import (through relieving bottlenecks,

[4] We leave this issue for further research. In this paper we focus on the effect of development aid on total trade, without distinguishing between extensive and intensive margin of trade.

such as the savings- and the foreign exchange gap), we would expect both indicators of aid to speed up overall exports from the Netherlands. On the other hand, BAID is also intended to measure the extent to which aid promotes bilateral relations between country pairs (the Netherlands and j); in this case, bilateral aid would promote not just overall exports but specifically exports from the Netherlands to recipient *j*. In addition, *BAIDREST* is added to investigate whether aid given by other donors influences an existing bilateral trade relationship between the Netherlands and *j*. While aid from other donors may lead to additional income that can be spent on imports from all *j* donors (especially if aid is untied), it might also precisely promote imports from the other donors (see Martínez-Zarzoso et al. 2013a).

We study the aid-export relationship within the framework of the gravity model, which has been developed in the past three decades by Anderson (1979), Bergstrand (1985, and 1989), Helpman (1987), Deardorff (1998), Feenstra et al. (2001), Anderson and van Wincoop 2003, Feenstra (2004) and Haveman and Hummels (2004). Using the gravity model of trade we are able to evaluate and quantify the impact of aid on exports controlling for a variety of factors related to trade frictions, the business cycle, level of development etc. Anderson and van Wincoop (AvW) (2003) contributed to this literature by modelling multilateral trade costs (the so-called multilateral resistance). The AvW model has recently been extended to applications explicitly involving developed and less developed countries by Nelson and Juhasz Silva (2012). They present an extension of AvW to the asymmetric north-south case and derive some implications related to the effect of aid on trade.

The gravity model has been broadly 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 Dutch exports, we add bilateral aid from the Netherlands as a "trade facilitator" factor, aid from other DAC countries

as a "trade-deterrent" factor and also bilateral exchange rates[5]. In our specific empirical application we focus exclusively on exports from the Netherlands over time to all its trading partners. Therefore, we will specify a one-side gravity model to explain bilateral exports, in which recipients are indexed by *j* and years by *t*.

The model reads as follows:

$$\ln X_{jkt} = \beta_0 + \chi_t + \alpha_j + \beta_1 \ln(YR_{jt} * YNDL_t) + \beta_2 \ln BAID_{jt} + \beta_3 \ln BAIDREST_{jt} + \beta_4 \ln EXRN_{jt} + \beta_5 FTA_{jt} + \varepsilon_{jkt} \quad (1)$$

where:

ln denotes variables in natural logs;

X_{jkt} are sector's kexports from the Netherlands to country *j* in period *t* in current US$;

YR_{jt} indicates the recipient country's GDP in period *t* at current US$;

$YNDL_t$ stands for Dutch GDP in period *t* in current US$;

$BAID_{jt}$ is bilateral official net development aid (disbursement) from the Netherlands to country *j* in current US$;

$BAIDREST_{jt}$ is other DAC donors' official net development aid disbursed (except the Netherlands) to country *j* in current US$;

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

[5] 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.

FTA_{jt} takes the value of 1 when the Netherlands has a free trade agreement in force with the destination country, *j*, in period *t*.

χ_t are time fixed effects that control for omitted variables common to all trade flows but which vary over time and could be considered as a proxy for the business cycle or Dutch trade policies that are common for all recipients..

α_j are recipient specific fixed effects that proxy for time-invariant recipient country characteristics or a time-invariant bonding between the Netherlands and the recipient country (multilateral resistance factors modelled by Anderson and Van Wincoop, 2003). When these effects are included, the influence of the dummies that vary only with the "*j*" dimension, such as distance, colonial ties or common language, cannot be directly estimated. Therefore, these variables are not included in the regression equation.

Equation (1) will be estimated using different econometric approaches. First, in section 4 we apply up-to-date panel data techniques for different time periods and country groups, including two-way fixed effects, difference and system generalized method of moments (GMM) estimations. GMM methods for dynamic panels have been proposed by Arellano and Bond (2001) and Blundell and Bond (2008) among others. Second, we use time-series techniques in Section 5 for a smaller sample of countries for which enough observations over time are available. In this context, we examine the time series properties and estimate a cointegrating long-run relationship using the leads and lags approach that is also known as the Panel Dynamic Ordinary Least Squares procedure (PDOLS). PDOLS has been proposed by Kao and Chiang (2000) and Mark and Sul (2003) as a means of estimating long-run relationships between cointegrating variables.

As bilateral aid (and other explanatory variables) might be endogenous (an increase in exports might increase the donor's willingness to give more aid) and feed-back on each other, the

endogeneity problem has to be tackled. We control for endogeneity in a panel setting by using the abovementioned GMM and PDOLS approaches.

3. Description of data sources and data on aid

3.1 Data sources

Dutch Official Development Aid data are from the OECD Development Database on Aid from DAC Members for the period of 1962 to 2011[6]. We consider net Dutch ODA disbursements in current US$[7], instead of aid commitments, to specific recipient countries 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 donor countries, which enter the analysis in BAIDREST, are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Luxembourg, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. BAIDREST is thus computed as the sum of the above-mentioned net bilateral aid disbursements to each destination.

Bilateral exports are obtained from the UN COMTRADE[8]. Data on income and population variables are drawn from the World Bank (World Development Indicators Database, 2012). Bilateral exchange rates are from the IMF statistics, which have been

[6] The original sample with data for the period of 1962-2011 had to be reduced as the early years (1962-1972) were characterized by an inconsistent Dutch development agenda and the latest years (2010-2011) were characterized by a very dramatic shift in the aid policy with significant cuts in the aid budget (Ministry of foreign Affairs, 3 June 2013).
[7] This amount comprises total grants and concessional loans granted (according to DAC criteria for concessional loans).
[8] Online database: http://comtrade.un.org/db/.

corrected for the introduction of the euro and currency reforms in the recipient countries[9]. Recipient country currency is in the numerator and donor country currency (1 EUR) stands in the denominator. Distances between capitals have been computed as great-circle distances using data on straight-line distances in kilometres, latitudes and longitudes. They are from the CIA World Fact Book. Trade impeding or promoting factors such as being a former colony and sharing a common language or a common border are taken from the CEPII database[10] and the FTA variable is from De Sousa (2012).

3.2 Net bilateral ODA, our measure of aid

Aid given by Development Assistance Committee (DAC) members is reported as official development aid (ODA) and other official flows (OOF). OOF are other official transactions that do not meet ODA criteria[11] and are therefore disregarded in our analysis. Both bilateral ODA and multilateral ODA, which are contributions to international agencies and organizations, are available. We consider only bilateral ODA as we want to capture what the Netherlands gives to a specific country. Being interested in what recipient countries actually receive in terms of aid we look at aid disbursements and not at commitments.

Net bilateral ODA disbursements, the aid data we will work with, are the sum of grants, capital subscriptions, net loans and other long-term capital provided by the Dutch government (*BAID*) and the other donors' governments (*BAIDREST*). Grants include debt forgiveness and interest subsidies in associated financing packages. Loans and other long-

[9] The IFS and WDI statistics are not adjusted for currency reforms and therefore very problematic. We corrected the data accordingly.
[10] http://www.cepii.fr/anglaisgraph/bdd/fdi.html.
[11] For example, grants to aid recipients for representational or essentially commercial purposes, official bilateral transactions intended to promote development but with 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 and funds in support of private investment are also classified as OOF.

term capital include disbursements of ODA loans and equity investment. Net loans and other long-term capital represent the loans extended minus repayment received and offsetting entries for debt relief. Technical cooperation, development food aid and emergency aid are included in grants and loans.

4. Estimation and results applying panel data techniques

In this section we present the results obtained from estimating the static gravity model as specified in Equation (1) in the previous section, and we also estimate a dynamic version of it for the sample of 130 countries over the period 1973 to 2009. In particular, 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. 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 dynamic specification is given by

$$\ln X_{jkt} = \gamma_0 + \chi_t + \alpha_j + \lambda \ln X_{jk,t-1} + \gamma_1 \ln (YR_{jt} * YNDL_t) + \gamma_2 \ln BAID_{jt} + \gamma_3 \ln BAIDREST_{jt} + \gamma_4 \ln EXRN_{jt} + \gamma_5 FTA_{jt} + \mu_{jkt} \quad (2)$$

where most of the variables are as described above and $X_{jk,t-1}$ is exports of sector k from the Netherlands to country *j* in period *t-1* in current US$.

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). These difficulties can be overcome using panel GMM estimation techniques that control for endogeneity of the explanatory variables and for autocorrelated errors. More specifically, to eliminate the unobserved heterogeneity (α_j), we take first differences of the

variables used in the model and to control for endogeneity we use lagged levels of the endogenous variables (lagged exports and possibly aid) as instruments. The model in first differences produces,

$$\Delta \ln X_{jkt} = \eta_t + \lambda \Delta \ln X_{jk,t-1} + \gamma_1 \Delta \ln (YR_{jt} * YNDL_t) + \gamma_2 \Delta \ln BAID_{jt} + \gamma_3 \Delta \ln BAIDREST_{jt} + \gamma_4 \Delta \ln EXRN_{jt} + \gamma_5 \Delta FTA_{jt} + \Delta \mu_{jkt} \quad (3)$$

In addition we will also use the system GMM estimator proposed by Blundell and Bond (1998), which basically adds orthogonality conditions (instrumental variables) to the difference-GMM method. In particular, lagged levels of the endogenous variables are used as instruments for the equation in first differences, whereas lagged differences are used as instruments for the equation in levels.

According to equations (1), (2) and (3), we are assuming that the relationship between Dutch aid and Dutch exports is linear. This is plausible upon inspection of a scatter plot between both variables (available upon request) 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.

As discussed above, there might be an endogeneity issue referring to aid being 'caused' by exports, rather than the reverse. This is an issue we will take up not only by means of panel GMM but also below, where we report on further robustness and specification checks using time series methods.

Table 2 shows the estimation results using a two-way fixed effects panel data model. The standard errors used are heteroskedasticity- and autocorrelation-consistent (HAC). More specifically, we use Driscoll and Kraay (1998) standard errors. With this method, the error structure is assumed to be heteroskedastic, autocorrelated up to some lag and possibly correlated between the groups (panels). These standard errors are robust to general forms of cross-sectional (spatial) and temporal dependence when the time dimension becomes large. In

addition, we restrict the coefficients of the income variables to be equal, after testing for it and being unable to reject the null hypothesis of equality. We also do so to avoid collinearity problems with the time fixed effects.

Table 2. Static gravity model estimated with 2-way fixed-effects (2WFE) for different periods

VARIABLES	(1) 1973-2009	(2) 1973-1981	(3) 1982-1989	(4) 1989-1998	(5) 1999-2009
Ln BAID	0.0340***	0.0639***	0.0417*	0.0198	0.0349***
	(0.00918)	(0.0220)	(0.0215)	(0.0158)	(0.00880)
Ln BAIDREST	0.0552***	0.111***	0.0293	0.0409*	0.0459**
	(0.0161)	(0.0126)	(0.0221)	(0.0213)	(0.0184)
Ln (YR*YNDL)	0.802***	0.673***	0.480***	0.607***	0.505***
	(0.0384)	(0.0814)	(0.0461)	(0.0748)	(0.0544)
Ln EXRN	-0.0134**	-0.0203	0.0213	0.0169	-0.172***
	(0.00552)	(0.0357)	(0.0145)	(0.0134)	(0.0566)
FTA	0.219***	0.331***	-0.498***	0.00	0.0557
	(0.0517)	(0.102)	(0.0849)	(0.00)	(0.0439)
Constant	-23.02***	-18.21***	-7.733***	-13.83***	-8.238***
	(1.779)	(3.602)	(2.464)	(3.541)	(2.827)
R-Squared	0.631	0.392	0.29	0.148	0.671
Observations	3,173	672	679	936	971
Number of Recip.	130	93	99	120	119

Note: Year and country fixed effects are added to all the regressions. Standard errors are robust to heteroskedasticity, cross-sectional dependence and to first-order autocorrelation. Stata command xtscc. *** p<0.01, ** p<0.05, * p<0.1.

Model (1) in Table 2 presents the results obtained for a sample of 130 recipients of aid; this is the largest sample we can use due to data availability (See Appendix A.1). The coefficient for the target variable, Dutch bilateral aid is positive and statistically significant and shows that a 10 percent increase in bilateral aid leads to an increase in Dutch exports of around 0.3 percent. Using the results in Model (1), we find that, in static terms, the average return on aid for Dutch exports is approximately a 0.29 US dollar increase in exports for each dollar spent. This average is calculated as

$$\beta_{LBAID} = \frac{\partial X}{\partial BAID} * \frac{BAIDG}{X} \Rightarrow \frac{\partial X}{\partial BAID} = \beta_{BAIDG} * \frac{X}{BAID} = 0.034 * \frac{101990000}{12130000} = 0.286$$

As regards the control variables, the estimated coefficient for the official net development aid of other DAC members is positive and statistically significant. This suggests that the Netherlands does also benefit from aid given by other DAC members. In fact, when other DAC-countries give higher amounts of aid, the abovementioned "income effect" seems to dominate the "goodwill" and "habit formation" factors that could have promoted other donors' exports generating an indirect negative effect on Dutch exports.

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 63 percent of the variation of Dutch exports. The coefficient of total income is positive and significant and slightly lower than the theoretical value of unity. The coefficient of the bilateral exchange rate has a negative coefficient and is statistically significant at the 1 percent level in the whole period. The negative sign indicates that depreciation of the Euro (a decrease in the exchange rate) with respect to the recipient currencies would, as to be expected, have a positive effect on Dutch exports. The FTA dummy for membership in preferential trade agreements is positive and significant in column 1, indicating that the Dutch export more to FTA participating countries than to the rest of the countries in the sample.

Models 2 to 6 present similar results for our 130 recipient countries sample but this time for different periods which have been selected according to the changes in aid policies described in Appendix A.3. The estimated coefficient for development aid is positive and statistically significant in three out of the five periods. More specifically, over the period 1973 to 1981 aid shows the highest effect on Dutch exports, with an increase of exports of around 0.6 percent for each 10 percent increase in Dutch aid. Also in the 1980s the effect is higher than average, whereas in the 1990s the effect is not significant and in the 2000s it is similar to the average effect for the whole period.

Table 3 shows the results for different groups of countries. Model (1) is estimated for 12 out of the 15 target countries considered by Knapen (2010-2012)[12]. As regards the effect of Dutch aid on Dutch exports, for these groups the estimated coefficient is close to 0.13, indicating an increase in exports of around 1.3 percent for each 10 percent increase in aid. The effect is lower for the group of 36 countries, which comprises countries targeted by the Dutch Ministry of Foreign Affairs in previous periods, before 2010. In particular, for this group the elasticity is around 0.057. For African countries the effect is slightly higher than for the 36-country group. Only for the group of Latin American and Caribbean countries Model (4) the results show no effect, otherwise for the least developed countries, the effect is positive and significant with an elasticity around 0.08.

Table 3. Static gravity model estimated with 2WFE for different group of countries for the 1973-2009 period

	(1)	(2)	(3)	(4)	(5)
VARIABLES	**G15**	**G36**	**Africa**	**LAC**	**LDC**
Ln BAID	0.129***	0.0568**	0.0623***	-0.0168	0.0820***
	(0.0376)	(0.0227)	(0.0206)	(0.0147)	(0.0262)
Ln BAIDREST	0.232***	0.183***	0.0991**	0.0197	0.164***
	(0.0462)	(0.0416)	(0.0421)	(0.0229)	(0.0538)
Ln (YR*YNDL)	0.606***	0.560***	0.686***	0.683***	0.635***
	(0.0761)	(0.0715)	(0.0605)	(0.0875)	(0.117)
Ln EXRN	-0.0467***	-0.0491***	-0.0282	-0.0105***	-0.0302
	(0.0127)	(0.00659)	(0.0193)	(0.00339)	(0.0224)
FTA	0	0	0.276***	0.471***	0
	(0)	(0)	(0.0797)	(0.125)	(0)
Constant	-18.81***	-14.61***	-18.48***	-16.35***	-18.20***
	(3.612)	(2.879)	(2.766)	(4.139)	(5.096)
R-Squared	0.792	0.638	0.62	0.694	0.542
Observations	384	1,072	1,162	784	1,007
Number of Recip.	12	32	37	25	37

Note: Year and country fixed effects are added to all the regressions. Standard errors are robust to heteroskedasticity, cross-sectional dependence and to first-order autocorrelation. Stata command xtscc.
*** p<0.01, ** p<0.05, * p<0.1.

[12] As listed in the last row of Table A.3. The three countries excluded are Benin, Burundi and the Palestinian Territories, due to lack of data.

It is worth noting that the effect of BAIDREST is almost always positive and statistically significant in tables 2 and 3. Since the simple correlation coefficient between Dutch bilateral aid and bilateral aid from the other donors is around 0.62 is it difficult to disentangle both effects. Therefore, in Table A.6 we present the equivalent to Tables 2 and 3 but with estimations including total bilateral aid (TBAID = aid from all donors to each recipient) instead of two separate regressors (BAID, BAIDREST). The results show that ODA from all donors is positively influencing Dutch bilateral exports, in particular in the 1970s, 1990s and 2000s and for most groups of recipients.

Next, Table 4 shows the results for the dynamic model, as given by Equation (3). The model is estimated on data of five-year averages for two reasons. First, as the panel GMM techniques are adequate for small T and large N. Second, to reduce the effects of temporary shocks and to avoid cyclical effects. The first two columns in Table 4 show the results obtained for the difference and system GMM estimators for the whole period. Given the persistence of the export series, it is more suitable to rely on the system GMM results (column 2), which satisfy the Hansen test of instruments validity and also no autocorrelation of second order. The short run aid coefficient equals 0.060 and it is positive and statistically significant at the 5 percent level, whereas the long run elasticity is 0.10, calculated as (0.060/(1-0.404)]. This implies that in the long term the return on Dutch aid in terms of exports in monetary terms is less than proportional, amounting to US$ 0.84 per one dollar of aid for the whole period and US$ 1.05 for the period 1988-2009

As regards the rest of explanatory variables, lagged exports is statistically significant showing the relevance of dynamics in the model, with a coefficient that indicates persistence over time. Aid given by other exports is negative and significant in the dynamic specification only after 1990, whereas income shows the expected positive elasticity and the coefficient is significant at the 1 percent level. With the system GMM method we are able to estimate the

effect of the time invariant variables, namely geographical distance, landlocked dummy and colonial relationship. We obtain the expected negative effects for the two first variables, whereas colonial links show a significant effect on Dutch exports only for the whole period and at the 5 percent significance level.

Table 4. Dynamic Gravity model estimated for 5-years averages with diff-GMM and system-GMM

	Diff-GMM	**System-GMM**		
	1973-2009	**1973-2009**	**1973-1997**	**1988-2009**
VARIABLES	(1)	(2)	(3)	(4)
Ln BAID	-0.062	0.060**	0.028	0.068**
	(0.060)	(0.028)	(0.027)	(0.031)
Ln BAIDREST	0.029	-0.040*	0.033	-0.060**
	(0.067)	(0.024)	(0.035)	(0.026)
Ln X (t-1)	0.145	0.404***	0.357**	0.520**
	(0.181)	(0.099)	(0.142)	(0.214)
Ln (YR*YNDL)	0.700***	0.445***	0.444***	0.392***
	(0.092)	(0.073)	(0.091)	(0.147)
Ln EXRN	-0.005	0.011	0.009	0.013
	(0.024)	(0.010)	(0.011)	(0.019)
FTA	0.205**	0.063	-0.010	-0.026
	(0.099)	(0.098)	(0.149)	(0.116)
Ln Distance		-0.690***	-0.661***	-0.650***
		(0.154)	(0.199)	(0.220)
Common colony		0.835**	1.102	0.735
		(0.420)	(0.779)	(0.481)
Landlocked dummy		-0.594***	-0.675***	-0.555**
		(0.157)	(0.197)	(0.259)
Observations	502	633	396	330
N of Recip.	122	125	123	101
N of Instrum.	58	75	34	33
Ar(1) prob.	0.07	0.00	0.01	0.02
Ar(2) prob.	0.33	0.40	0.18	0.32
Hansen stat.	58.42	66.47	23.12	21.74
Hansen prob.	0.10	0.24	0.34	0.35

Note: Year fixed effects are added to all the regressions. Standard errors are robust to heteroskedasticity and to first-order autocorrelation. *** p<0.01, ** p<0.05, * p<0.1.

The last two columns of Table 4 show the results for two different periods, 1973-1997 and 1988-2009, each period has five observations over time. Two 5-year periods (1988-92 and 1993-97) are included in both columns in order to be able to compute the tests for

autocorrelation of second order. We find that Dutch aid only significantly affects exports in the second period, when the model is dynamic and bilateral aid is considered endogenous. The average effect is slightly higher than the one found for the whole period. We also did the estimation using 3-year averages and the results were very similar. For consistency we also estimated the system GMM model with total ODA from all donors to each recipient and the coefficient for the whole period was 0.176, statistically significant at the one percent level. This is consistent with our findings above. The main addition of the GMM results is that we added dynamics and that bilateral aid was treated as endogenous.

5. Estimation and results from the time series approach

5.1 Working with time series techniques

Time series techniques allow us to draw conclusions both on the short-run and long-run behaviour between bilateral Dutch aid and Dutch exports to the recipient countries. However working with time series techniques requires complete time series over time. Therefore, we have to reduce our original sample of 130 recipient countries to 93 recipient countries (big cointegration sample).

5.2 Estimation issues from a time series perspective

The estimation techniques used in this section are based on the concept of cointegration, a sample of 93 countries and the period of 1973-2009. In order to work within a cointegration framework, it is necessary to check the time series and cointegration properties of the variables. In our case, we find that all variables in the regression are non-stationary (I(1)], while the error term, which contains all (redundant) omitted variables, is stationary (I(0)], implying that our variables are cointegrated (see Tables A.5. and A.6. in the Appendix). As indicated above, the findings of cointegration are important for two reasons. First, the existence of a stationary error term implies that the relationship is not spurious. Second, as the

cointegration property is invariant to extensions of the information set, estimates will not be significantly affected by the presence of additional variables.

As our data consists of a time span of a maximum of 37 years and a cross-section of a maximum 93 countries, we also test 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 the data suffer from both problems. Given the strong rejection of the null in both tests, the model is estimated by FGLS controlling for autocorrelation and by applying heteroskedasticity corrected standard errors.

In a first step, the long-term model is estimated using Dynamic Ordinary Least Squares (DOLS). The DOLS procedure (used throughout Section 5.2) dates back to Saikkonen (1991) and Stock and Watson (1993) and involves augmenting the cointegrating regression with leads, lags and contemporaneous values of the first differences of the regressors to control for the endogenous feedback effects of all regressors (Wooldridge, 2009, page 642). Thus, an important feature of the DOLS procedure is that it generates unbiased estimates for variables that cointegrate even with endogenous regressors. The panel DOLS regression is given by (see, for example, Kao and Chiang, 2000; Mark and Sul, 2003):

$$\begin{aligned} Ln\,X_{jkt} &= (\chi_t) + \alpha_j + \beta_1 Ln\,YR_{jt} + \beta_2 Ln\,YNDL_t + \beta_3 Ln\,BAID_{jt} + \beta_4 Ln\,BAIDREST_{jt} + \\ &+ \beta_5 Ln\,EXNR_{jt} + \beta_6 FTA_{jt} + \\ &\sum_{p=-1}^{p=+1} \theta_{1p} \Delta Ln\,YR_{jt-p} + \ldots + \sum_{p=-1}^{p=+1} \theta_{lp} \Delta Ln\,EXNR_{jkt-p} + \eta_{jkt} \end{aligned} \tag{3}$$

where θ_{1p} … θ_{lp} are the coefficients of the lead and lag differences that account for endogeneity. j is recipient, p stands for the number of lags or leads, and t is time. Δ stands for the first difference of the variables analyzed.

α_j stands for the autonomous rise or fall in exports from donor countries through time-invariant factors that characterise the recipient country involved. The time effects, χ_t, can only be included if autocorrelation is not controlled for. Therefore, they appear in brackets.

As we find autocorrelation of the disturbances, we control for autocorrelation in the errors by integrating a FGLS procedure into the PDOLS procedure, we estimate the model using a panel dynamic feasible generalised least squares (PDFGLS) procedure. This procedure involves the following steps: After the model has been estimated via PDOLS (the first step), the residuals are saved and the autocorrelation coefficient ρ of the residuals is estimated using $\eta_{jt} = \rho\eta_{jt-1} + v_{jt}$. A new error term is generated $\eta^*_{jt} = \eta_{jt} - \hat{\rho}\eta_{jt-1}$ which has all desirable properties. The estimated $\hat{\rho}$ is then used to transform all right and left-hand side variables into soft or quasi first differences (e.g. $Ln\,X^*_{jkt} = Ln\,X_{jkt} - \hat{\rho}Ln\,X_{jkt-1}$; $LnYR^*_{jt} = LnYR_{jt} - \hat{\rho}LnYR_{jt-1}$; … $Ln\,BAID^*_{jt} = Ln\,BAID_{jt} - \hat{\rho}Ln\,BAID_{jt-1}$; ….) . In the second step, equation (3) is re-estimated by replacing the original variables with the soft differences. Results from the PDFGLS-approach are presented in Table 5.

Table 5. The impact of Dutch bilateral aid on Dutch exports in the cointegration country sample using time series techniques

VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	1973-2009		**1973-1998**		**1999-2009**	
Ln BAID	0.026	0.052	0.034	0.027	0.081***	0.089***
	(0.026)	(0.027)	(0.039)	(0.040)	(0.024)]	(0.021)
Ln BAIDREST	0.051	0.075*	0.066	0.093**	0.010	-0.007
	(0.039)	(0.039)	(0.049)	(0.045)	(0.051)	(0.032)
Ln YNDL	-	0.334***	-	0.333***	-	1.446***
		(0.092)		(0.117)		(0.243)
Ln YR	0.706***	0.704***	0.635***	0.614***	0.144	0.311***
	(0.045)	(0.062)	(0.069)	(0.069)	(0.199)	(0.121)
Ln EXRN	-0.017	-0.022**	-0.020	-0.022*	-0.211	-0.195**
	(0.011)	(0.011)	(0.016)	(0.012)	(0.165)	(0.032)
FTA	0.073***	0.149***	-0.064	-0.110	0.069	0.130**
	(0.028)	(0.050)	(-0.088)]	(0.123)	(0.060)	(0.063)
Time fixed effects	Yes	No	Yes	No	Yes	No
Leads and lags of explanatory vars in first differences	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.819	0.954	0.795	0.948	0.892	0.976
R-Squared adj.	0.807	0.952	0.777	0.944	0.872	0.971
Sum of squared resid	314.747	329.266	244.855	252.668	47.488	46.061
Durbin-Watson stat.	2.129	2.145	2.238	2.056	2.385	2.019
Observations	2310	2310	1662	1662	648	648

Note: standard errors are in parentheses. ***, ** and * stand for 1%, 5% and 10% error level. Recipient fixed effects are added to all regressions. The model is estimated by means of panel dynamic feasible generalized least squares (PDFGLS). This method controls for endogeneity of the regressors and autocorrelation of the disturbances. The table shows that Dutch bilateral aid has an insignificant impact on Dutch exports in the 1973-1998 period, but a positive and significant impact in the 1999-2009 period. A test on a structural beak (chow test) clearly shows that there was a structural break in the year 1999 indicating that the periods of 1973-1998 and 1999-2009 have to be estimated separately.

Table 5 presents results obtained by two different estimation techniques (with and without time-fixed effects) for the three sample periods: the full sample period (1973-2009), the 1973-1998 period and the 1999-2009 period. As the use of time fixed effects prevent us from obtaining the effect of donor income on exports, the results without time fixed effects (columns 2, 4 and 6) are interpreted below.

Table 5 (column 2) reveals that the aid-elasticity coefficient is positive but not statistically significant in the 1973-2009 period. However, this finding does not rule out that over limited periods of time (several years) Dutch bilateral aid is able to impact positively on Dutch exports.

As expected, the Chow test (residual based structural break test) indicates a structural break in 1999 and thus two separate regressions have to be run for the two sub-periods, the 1973-1998 and the 1999-2009 periods. We find an insignificant impact of net bilateral aid on exports in the first period (1973-1998), in which the aid strategy of the Dutch governments was quite diffuse (Table 5, column 4). In the second period (1999-2009) in contrast, Dutch bilateral aid impacts significantly and positively on Dutch exports (Table 5, column 6). [13] In this second period, all coefficients also carry the expected signs. Column 6 shows that other donors' bilateral aid does not crowd out Dutch exports. Its impact is insignificant. Recipient country GDP has a positive, significant impact on Dutch exports pointing to the income or demand effect of aid. Also, an increase in Dutch GDP leads to a significant, positive effect on Dutch exports which is due to the capacity effect. The bilateral exchange rate carries the expected negative sign as it is defined as units of recipient country currency with respect to 1 EUR. An increase (depreciation) of the recipient country's currency thus leads to a decrease of donors' exports to recipient countries. The trade agreement variable contributes positively to exports and its impact is significant in this later period.

[13] This finding is in line with a more focused and more elaborated aid strategy.

Nonetheless, the question often arises whether a PDOLS approach is really necessary as some degrees of freedom are lost or, in other words, whether it is necessary to control for endogeneity. The Granger causality test, which is a test on weak exogeneity, rejects bilateral aid to be exogenous and therefore fully supports the PDOLS (PDFGLS)-estimation strategy (see Technical Appendix for the set up and results of the Granger causality test).

6. Sectoral export and employment effects generated by bilateral Dutch aid

In the preceding section we obtained a robust positive and significant effect of bilateral Dutch aid on Dutch exports (total exports) for the 1999-2009 period.[14] Thus, one might wonder how this positive effect is distributed among sectors, i.e. which sectors profit most and which sectors least or not at all, and finally how these sectoral export effects translate into employment effects.

To this purpose, we collect sectoral export data (at the 2-digit level) from the UN-COMTRADE database using the Standard International Trade Classification (SITC Rev. 2). The 99-SITC sectors are then merged into sixteen sectors according to the International Standard Industrial classification (ISIC)[15] used in the Dutch input-output tables. They contain export as well as employment data (see concordances in Appendix B.4). The ISIC-specific employment (labour) coefficients are computed based on 2008 figures, which reflect the pre-crisis era and should allow us to yield undistorted estimates.

When the elasticities of exports with respect to aid (aid elasticities = beta coefficients) were insignificant, no export and employment effects were calculated and the corresponding values were set to zero (see Table 6 for a summary of the results).

[14] For the 1973-1998 period the results were less clear-cut. They depended on the estimation technique used.
[15] Since there are no exports in the mining and quarrying sector, only computations for 15 sectors are shown.

The computation of the employment effects required the application of input-output analysis (I-O-A) techniques[16]. Additional exports due to aid ($\Delta \exp ort$) had to be transformed into additional gross output ($\Delta output$) given that an increase in final demand requires production of intermediates whose production in turn also requires intermediates (and so forth). The required production of intermediates leads to the multiplier effect of production for final demand (i.e. to produce 1 unit of exports the economy in question has to produce more than 1 unit of gross output to accommodate the production of intermediates). The multiplier is of the form $(I-A)^{-1}$, I denotes the identity (unit) matrix and A contains the input coefficients that result from the input-output tables.

$$\Delta output = (I - A)^{-1} \Delta \exp ort \qquad (4)$$

After having computed the change in gross output that has been triggered by a change in exports, the employment effects of aid can be calculated according to,

$$\Delta jobs = job\_multi * \Delta output \qquad (5)$$

The input-output-analysis rests on several assumptions:

(i) Each sector in the economy produces only one product

(ii) There is no substitution between intermediate inputs

(iii) The production function is linear; we have constant returns to scale; if we double intermediate inputs we double intermediate output

(iv) Final demand is exogenous

(v) Primary inputs are abundant; i.e. labor is abundant and available with the adequate mix of skills

[16] We would like to thank Bart Los (University of Groningen Europe's leading institution in input-output-analysis) for his assistance.

(vi) No stocks; if final demand rises, there are no stocks that could be depleted

Table 6. Export and employment effects generated by Dutch bilateral aid

(based on 2008 data and 2008 input-output-tables)

Sectors	Aid elasticities	Exports	Additional exports due to aid	Additional value added exports due to aid	Additional employment due to aid	Job multiplier
	(beta coefficients)[a]	(billion of US$) [b]	(million US$) [c]	(million US$) [d]	(number of jobs) [e]	(jobs in thousands per 1 billion of output) [f]
Agriculture	0.01	3.29	---	---	15	2.97
Mining	---	---	---	---	1	0.18
Food	-0.00.	4.38	---	---	28	1.48
Textiles	0.08*	1.01	80.80	46.96	258	3.17
Leather	0.19***	0.239	45.41	31.40	172	3.78
Wood	0.15**	0.114	17.10	11.45	81	3.88
Pulp	0.11**	1.14	125.40	85.84	520	3.39
Coke	*-0.06*	8.83	---	---	2	0.11
Chemicals	0.08*	6.91	552.80	271.02	466	0.83
Rubber	*-0.03*	2.15	---	---	4	3.18
Non-metallic metal	0.08*	0.232	18.56	12.27	70	2.65
Basic &fabricated metal	*0.03*	*4.48*	---	---	113	2.69
Machinery	*0.02*	*17.2*	---	---	20	2.92
Elect. Eq.	0.08***	5.01	400.80	219.88	1,136	2.74
Transport eq.	0.15***	3.87	580.50	299.08	1,098	1.87
Manufact. & recycling	0.07***	5.75	402.50	296.67	3,970	9.74
Totals (goods)		**64.61**	**2223.87**	**1274.56**	**7,953**	
Totals (services)					**5,161**	
Total (goods+services)					**13,114**	

Notes: [a]Beta coefficients are estimated by means of the PDFGLS technique. [b]Sectoral exports are computed for 2008. Raw data sources are UN COMTRADE export data and WIOD (World Bank) input-output data from the 2008 NDL_NIOT and NDL_SEA input-output tables. Aid elasticities, job multipliers, additional sectoral exports and additional sectoral employment originate from own calculations. [c] Additional sectoral exports are computed as beta coefficient times sectoral exports. [d] VA shares of exports were provided by Paul Veenendaal (Netherlands Bureau for Economic Policy Analysis [e]Additional sectoral employment is $\Delta jobs = job\_multi * \Delta output$ [f] The job multiplier results from the ratio of sectoral employment (in thousands) divided by sectoral output (in billion of US$) in 2008. Italics are used to denote figures based on statistically insignificant beta coefficients.

Table 6 shows that Dutch bilateral aid generates on average an export value (gross) of about 2,224 million US$ and about 13,000 jobs. The highest export effects (exceeding 100 million US$) are generated in chemicals, electrical and transport equipment, unclassified manufacturing and recycling. The highest employment effects are generated in manufacturing (nec.), transport and electrical equipment. Employment effects in sectors that did not profit directly from aid are due to intermediate production. Also note, that even though no direct export effects for services were calculated, the service sector benefitted from aid through the "production" of intermediates which led to an increase in employment.

It is worth noting that the value added generated through the production of exports (VA exports) is 1,275 million US dollars. This figure is of course smaller than gross exports which amounted to 2,224 million US dollars as imported intermediates have to be substracted.

7. Conclusions

Using advanced panel data techniques we find that Dutch bilateral aid increased Dutch exports over the long term but also over certain periods of time. The positive impact on Dutch exports is especially pronounced and stable in the 1999-2009 period.

Employing panel time series techniques that are based on the concept of cointegration and that allow us to rule out spurious relationships, we can confirm a positive and significant relationship between Dutch aid and Dutch exports in the 1999-2009 period[17], in which the Dutch aid strategy was carried out in a more consistent way. The positive and significant aid coefficient is robust to a number of variations in the estimation technique (use of time fixed effects, control for autocorrelation, control for endogeneity or the use of an error correction model).

[17] We do not find support for a positive and significant aid impact in the 1973-1998 period, except when we rely on a error-correction model which, however, does not control for endogeneity.

Putting the results into perspective and comparing the impact of Dutch aid with the impact of aid from other donor countries (e.g. Germany (Martínez-Zarzoso et al., 2013b) we find Dutch bilateral aid to be moderately export-promoting in the 1999-2009 period. In 2008 exports of about 2.22 billion US dollars were generated which required 13,000 additional jobs to be produced. In particular and similar to Germany, Dutch aid generated the biggest increases in exports of chemicals, electrical equipment and transport equipment thus creating some employment effects there. However compared to Germany, the export effects for the Netherlands due to development aid are moderate, and so are the employment effects[18]. This is due to several distinctive facts when comparing the Dutch and the German aid system and its economy. Regarding the aid system, only about 1/3 of Dutch aid is given bilaterally, while in the German case, 2/3 of aid is bilateral aid; as we only consider the effect of bilateral aid, this reduces the impact.[19] Regarding the economies, four points are worth noting: (1) Germany has much higher aid elasticities in sectors where it exports a lot; (2) Germany has a higher share of commodities in exports (and the Netherlands have a higher share of services); (3) Germany has a higher share of commodity exports going to developing countries; and (4) Dutch labour coefficients are lower than German labour coefficients as the Netherlands uses not only capital-intensive but also very automated production techniques. Factors (1)-(3) lead to much lower Dutch exports even if the size of the Dutch economy is accounted for and factor (4) mainly explains the very moderate employment effect of aid. All in all, the Dutch economy is still benefitting from giving aid: exports increase moderately, especially in the last decade and in the abovementioned sectors.

[18] In 2008/2009 about USD 6-7 billion bilateral German aid triggered about 5-6 billion additional exports resulting in about 64,000 jobs.

[19] Including multilateral aid is difficult as one cannot easily ascribe it to its bilateral contributors.

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Appendix

A.1. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total Dutch exports[a]	3173	101.99	310.14	0.03	6,385.87
Dutch ODA[a]	3173	12.13	23.56	0.01	344.03
ln Dutch exports	3173	16.87	1.97	8.01	22.57
ln Dutch ODA	3173	14.45	2.35	9.21	19.66
ln ODA rest of DAC	3173	18.21	1.71	9.21	23.81
ln Dutch GDP	3173	26.35	0.65	24.92	27.49
ln Recipient GDP	3173	22.52	1.96	17.21	29.23
ln Exchange rate	3173	2.03	4.47	-26.89	10.08
Regional trade agreement dummy	3173	0.04	0.18	0	1

Note: Sample of 130 countries. [a] Million US Dollars at current prices.

A.2. List of 130 aid recipients

Afghanistan[2]	India	Senegal[3]
Albania	Indonesia[2,3]	Seychelles
Antigua and Barbuda	Iran	Sierra Leone
Argentina	Iraq	Singapore
Armenia	Israel	Slovenia
Azerbaijan	Jamaica	Solomon Islands
Bahamas	Jordan	Somalia
Bahrain	Kazakstan	South Africa
Bangladesh[2,3]	Kenya[2,3]	Sri Lanka
Barbados	Kiribati	Sudan[2,3]
Belarus	Korea	Suriname
Belize	Kuwait	Syrian Arab Republic
Bhutan	Kyrgyzstan	Tajikistan

		Tanzania, United
Bolivia[3]	Lao People's Democratic Republic[3]	Rep. Of[3]
Bosnia and Herzegovina	Lebanon	Thailand
Brazil	Liberia	Togo
Cambodia[3]	Libyan Arab Jamahiriya	Tonga
	Macedonia (the former Yugoslav	
Chad	Rep. of)	Trinidad and Tobago
Chile	Madagascar	Tunisia
China	Malawi	Turkey
Colombia[3]	Malaysia	Turkmenistan
Congo[3]	Maldives	Uganda[2,3]
Costa Rica[3]	Mali[2,3]	Ukraine
		United Arab
Croatia	Malta	Emirates
Cuba	Mauritania	Uruguay
Cyprus	Mauritius	Uzbekistan
Cote d'Ivoire	Mexico	Vanuatu
Djibouti	Moldova, Rep.of	Venezuela
Dominica	Mongolia	Viet Nam[3]
Dominican Republic	Morocco	Yemen[2]
Ecuador[3]	Mozambique[2,3]	Zambia[3]
Egypt	Nepal[3]	Zimbabwe[3]
El Salvador[3]	Nicaragua[3]	
Equatorial Guinea	Niger[3]	
Eritrea	Nigeria	
Ethiopia[2,3]	Oman	
Fiji	Pakistan[3]	
Gabon	Panama[3]	
Gambia	Papua New Guinea	
Georgia	Paraguay	
Ghana[2,3]	Peru[3]	
Grenada	Philippines	
Guatemala[3]	Rwanda[2,3]	
Guinea	Saint Kitts and Nevis	
Guinea-Bissau[3]	Saint Lucia	
Guyana	Saint Vincent and the Grenadines	
Haiti	Samoa	
Honduras[3]	Sao Tome and Principe	
Hong Kong	Saudi Arabia	

Note: [2] indicates the 12 countries group and [3] the 32 country group.

A.3. List of strategic partner countries over time

Udink (1967-1971)	Concentration countries: Indonesia, India, Pakistan, Sudan, Tanzania, Kenya, Uganda, Nigeria, Tunisia, Colombia, Peru, Suriname and the Netherlands Antilles.
Pronk (1973-1977)	Concentration countries: Upper Volta, Bangladesh, North Yemen, Tanzania, Sudan, Sri Lanka, India, Pakistan, Kenya, Egypt, Indonesia, Zambia, Colombia, Tunisia, Cuba, Peru, Jamaica, Suriname.
De Koning (1977-1981)	Concentration countries: Bangladesh, Upper Volta, Colombia, Egypt, India, Indonesia, Kenya, Pakistan, Sri Lanka, Sudan, Tanzania en Zambia
Schoo (1982-1986)	Program countries: Bangladesh, Egypt, India, Indonesia, Kenya, North Yemen, Pakistan, Sudan, Sri Lanka en Tanzania
Pronk (1989-1998)	Egypt, Sudan, Ethiopia, Yemen, Kenya, Tanzania, Uganda, Rwanda, Angola, Botswana, Lesotho, Malawi, Swaziland, Mozambique, Zambia, Zimbabwe, Namibia, Burkina Faso, Mali, Gambia, Guinea Bissau, Cape Verde, Mauritania, Niger, Senegal, Chad, Benin, Ghana, Cameroon, India, Pakistan, Bangladesh, Thailand, Cambodia, Vietnam, Laos, Myanmar, Sri Lanka, Nepal, Philippines, China, Suriname, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Jamaica, Bolivia, Colombia, Ecuador, Peru, Chile.
Herfkens (1998-2002)	Bangladesh, Bolivia, Burkina Faso, Eritrea, Ethiopia, Ghana, India, Yemen, Macedonia, Mali, Mozambique, Nicaragua, Sri Lanka, Tanzania, Uganda, Vietnam and Zambia; Egypt, Indonesia, South Africa and the Palestinian Territories. GHP countries: Albania, Armenia, Bosnia and Herzegovina, Cambodia, Colombia, El Salvador, Georgia, Guatemala, Guinea-Bissau, Honduras, Kenya, Moldavia, Namibia, Nepal and Rwanda. Environmental countries: Brazil, China, Ecuador, the Philippines, Cape Verde, Mongolia, Peru and Senegal. Business sector: Cuba, Côte d'Ivoire, Jordan, Nigeria and Thailand.
Van Ardenne (2002-2007)	Afghanistan, Albania, Armenia, Bangladesh, Benin, Bolivia, Bosnia and Herzegovina, Burkina Faso, Colombia, Egypt, Eritrea, Ethiopia, Georgia, Ghana, Guatemala, Indonesia, Yemen, Cape Verde, Kenya, Macedonia, Mali, Moldavia, Mongolia, Mozambique, Nicaragua, Pakistan, the Palestinian Territories, Rwanda, Senegal, Sri Lanka, Suriname, Tanzania, Uganda, Vietnam, Zambia and South Africa.
Koenders (2007-2-10)	MDG countries: Benin, Ethiopia, Bangladesh, Bolivia, Burkina Faso, Ghana, Yemen, Kenya, Mali, Moldavia, Mongolia, Mozambique, Nicaragua, Rwanda, Senegal, Tanzania, Uganda and Zambia; Fragile states: Afghanistan, Burundi, Colombia, Congo (DCR),

	Guatemala, Kosovo, Pakistan, the Palestinian Territories and Sudan; Emerging countries: Egypt, Georgia, Vietnam and Suriname
Knapen (2010-2012)	MDG countries : Benin, Ethiopia, Mali, Mozambique, Uganda, Rwanda Fragile States: Afghanistan, Burundi, Yemen, the Palestinian Territories and Sudan Emerging countries: Bangladesh, Ghana, Indonesia, Kenya

Table A.4. Unit root tests on the variables entering the gravity model

	Obs	Lags	Method	Statistic	Probability**
Exports (LX)	4634	3	ADF - Fisher Chi-square	197.02	0.47
Recipient income (LYR)	3692	4	ADF - Fisher Chi-square	167.89	0.87
Donor income (Dutch GDP (LYNDL))	4591	3	ADF - Fisher Chi-square	176.44	0.84
Dutch bilateral aid (LBAID)	2799	3	ADF - Fisher Chi-square	197.12	0.31
Other donors' bilateral aid (LBAIDREST)	3792	3	ADF - Fisher Chi-square	133.02	0.99
Nominal bilateral exchange rate (LEXRN)	4332	3	ADF - Fisher Chi-square	190.93	0.47

Note: H_0: Unit root (individual unit root process). ** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality. Sample 1962-2011.

Table A.5. Kao's cointegration test (residual based)

Series	Obs	ADF	t-statistic	Probability
LX, LYR, LYNDL, LBAID, LBAIDREST, LEXRN	4900		-17.66	0.00
		Residual variance	0.25	
		HAC variance	0.13	

Note: Null Hypothesis: No cointegration; Trend assumption: No deterministic trend; Automatic lag length selection based on SIC with a max lag of 0; Newey-West automatic bandwidth selection and Bartlett kernel. Cointegration was found for all sectors analyzed together (Table A4) and for each single sector (in this case cointegration tests were run separately for each sector (the results of the cointegration tests are available from the authors upon request).

Table A.6. The short-run impact of total bilateral aid on Dutch exports 1973-2009

VARIABLES	(1) 1973-2009	(2) 1973-1981	(3) 1982-1989	(4) 1989-1998	(5) 1999-2009
Ln TBAID	0.122***	0.172***	0.0435	0.0830***	0.0544***
	[0.0216]	[0.0465]	[0.0288]	[0.0196]	[0.0132]
Ln (YR*YNDL)	0.690***	0.539***	0.569***	0.642***	0.456***
	[0.0429]	[0.0692]	[0.0725]	[0.0635]	[0.0674]
Ln EXRN	-0.0170***	-0.0536	0.0200	0.0323*	-0.134***
	[0.00647]	[0.0381]	[0.0129]	[0.0188]	[0.0318]
FTA	0.194**	0.269***	-0.491***	0.357**	-0.142
	[0.0858]	[0.0601]	[0.0896]	[0.144]	[0.102]
Constant	-18.64***	-12.34***	-11.72***	-16.02***	0
	[2.014]	[2.608]	[3.628]	[2.958]	[0]
R-Squared	0.591	0.386	0.272	0.159	0.565
Observations	3,820	762	800	1,110	1,252
Number of groups	130	98	107	126	121
VARIABLES	(1) G15	(2) G30	(3) Africa	(4) LAC	(5) LDC
Ln TBAID	0.355***	0.345***	0.294***	0.0271	0.181***
	[0.0395]	[0.0593]	[0.0600]	[0.0262]	[0.0457]
Ln (YR*YNDL)	0.562***	0.369***	0.476***	0.681***	0.523***
	[0.0726]	[0.108]	[0.0502]	[0.0733]	[0.0871]
Ln EXRN	-0.0543***	-0.0734***	-0.0893***	-0.00442	-0.0380*
	[0.0142]	[0.0108]	[0.0180]	[0.00342]	[0.0203]
FTA	0	0	0.188**	0.434*	0
	[0]	[0]	[0.0722]	[0.226]	[0]
Constant	-17.14***	-7.974*	-11.56***	-16.54***	-12.57***
	[3.372]	[4.567]	[2.787]	[3.523]	[3.900]
Observations	390	1,108	1,266	863	1,121
Number of groups	12	32	37	25	37

Note: Time and country FE. Estimates efficient for arbitrary heteroskedasticity and autocorrelation. Statistics robust to heteroskedasticity and autocorrelation. Standard errors in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

Appendix B: Technical Appendix

B.1: The correlation between Dutch bilateral aid and other donors' bilateral aid is not a problem, but it results in a loss of observations (see Table B1)

As we observe quite a high correlation between Dutch bilateral aid and bilateral aid from the other donors we run a regression with total bilateral aid and the ratio of Dutch aid to other donors' aid to examine the impact of bilateral aid in general. In Table B.1 we always find a positive and significant impact of bilateral aid disbursements from all donors on Dutch exports. The ratio of Dutch aid to other donors' aid has a positive and significant impact in the second period, but neither in the full sample period nor in the first period (1973-1998). This result is exactly in line with the results in Table 5. Besides, a crowding out effect through other donors' aid is not confirmed.

Table B.1. Robustness check. The role of collinearity between Dutch aid and other donors' aid based on the 93-country sample

PDFGLS	**1973-2009l**	**1973-1998**	**1999-2009**
Ln YD	0.334***	0.0333***	1.446***
	(0.092)	(0.117)	(0.242)
Ln YR	0.704***	0.614***	0.311***
	(0.062)	(0.069)	(0.121)
Ln TOTBAID	0.090***	0.120***	0.081***
	(0.034)	(0.044)	(0.025)
Ratio Dutch aid to other donors' aid	0.015	0.027	0.089***
	(0.027)	(0.040)	(0.021)
Ln EXRN	-0.022**	-0.022*	-0.195**
	(0.011)	(0.012)	(0.100)
FTA	0.0149***	-0.110	0.130**
	(0.051)	(0.122)	(0.063)
R-squared	0.954	0.948	0.976
DW	2.145	2.056	2.019
Actual N	2310	1662	648
Original N	2846	1980	866
Loss of obs due to collinearity	20%	16%	25%

B2. Is bilateral aid endogenous and is the DFGLS estimation technique which fully controls for endogeneity justified?

The Granger causality test is a statistical approach that helps to decide whether, in our case, Dutch bilateral aid is exogenous and thus stands in a uni-directional relationship with Dutch exports or whether it is endogenous and thus stands in a bi-directional relationship with Dutch exports.

Following common practice in panel cointegration studies, our causality test involves estimating a panel vector error-correction model given by

$$\begin{pmatrix} \Delta LX_{jt} \\ \Delta LYR_{jt} \\ \Delta LYNDL_{t} \\ \Delta LBAID_{jt} \\ \Delta LBAIDREST_{jt} \\ \Delta LEXRN_{jt} \\ \end{pmatrix} = \begin{pmatrix} c_{1j} \\ c_{2j} \\ c_{3j} \\ c_{4j} \\ c_{5j} \\ c_{6j} \\ \end{pmatrix} + \sum_{p=1}^{P} \psi_{p} \begin{pmatrix} \Delta LX_{jt-p} \\ \Delta LYR_{jt-p} \\ \Delta LYNDL_{t-p} \\ \Delta LBAID_{jt-p} \\ \Delta LBAIDREST_{jt-p} \\ \Delta LEXRN_{jt-p} \\ \end{pmatrix} + \begin{pmatrix} a_{1} \\ a_{2} \\ a_{3} \\ a_{4} \\ a_{5} \\ a_{6} \\ \end{pmatrix} ECT_{jt-1} + \begin{pmatrix} \varepsilon_{1jt} \\ \varepsilon_{2jt} \\ \varepsilon_{3jt} \\ \varepsilon_{4jt} \\ \varepsilon_{5jt} \\ \varepsilon_{6jt} \\ \end{pmatrix} \qquad (1')$$

where ECT_{jt} are the residuals of the panel DFGLS long-run estimation. That is, to compute the error-correction term, we use the long-run coefficients. A significant error-correction term indicates long-run Granger causality from the independent to the dependent variables, where long-run Granger non-causality and weak exogeneity can be regarded as equivalent.

Table B2. shows that there is clear evidence of a bi-directional link (reverse causality) between Dutch exports and Dutch bilateral aid in all periods. This implies [20] that Dutch exports influence bilateral aid given to recipient countries (the higher the exports the more aid tends to be given). It also shows that it is important to deal with the endogeneity problem (using PDOLS/PDFGLS).

[20] Exports and donor income were found to stand in a *direct* bi-directional relationship. Bilateral aid (LODA) and recipient income (LYR) stand in an *indirect* bi-directional relationship with exports which operates through donor income.

Table B2. The relationship between Dutch exports (dlx) and Dutch bilateral aid (dlbaid). Do bilateral exports feed-back on bilateral aid? Is Dutch bilateral influenced by bilateral exports?

Note: ***, ** and * stand for 1%, 5% and 10% error level. P-values are given.
D stands for first difference. 2 lags were utilised. (-1) stands for a 1-year lag and (-2) stands for a 2-year lag. The Durbin-Watson statistic was always around 2. T-values are in brackets. The variables that are listed in columns are tested for endogeneity, i.e. DLX= F (country characteristics; DLX(-1); DLX(-2); other variables in first differences; ECT) ; DW=Durbin-Watson statistic.

	Granger causality test (test on weak exogeneity of lbaid) based on a panel error-correction model of 93 countries (dependent variable: dloda)					
	1973-2009		1973-1998		1999-2009	
	Coeff.	**p-value**	**Coeff.**	**p-value**	**Coeff.**	**p-value**
dlx(-1)	**0.39****	0.0159	0.24*	0.084	1.18**	0.016
dlx(-2)	0.08	0.142	0.12**	0.042	0.09	0.549
dlyndl(-1)	0.41	0.36	0.71*	0.070	-0.60	0.776
dlyndl(-2)	0.87*	0.06	0.67*	0.085	1.06	0.508
dlyr(-1)	-0.19	0.33	-0.05	0.822	-1.36***	0.003
dlyr(-2)	-0.19	0.16	-0.145	0.29	-0.74**	0.050
dlbaid(-1)	-0.37	0.00	-0.37***	0.00	-0.43***	0.000
dlbaid(-2)	-0.17	0.18	-0.12***	0.003	-0.30**	0.039
dlbaidr(-1)	0.12	0.049	0.16***	0.002	0.00	0.980
dlbaidr(-2)	0.10	0.110	0.08	0.142	0.14	0.428
dlexrn(-1)	-0.09	0.210	-0.12	0.117	-0.46	0.214
dlexrn(-2)	0.06	0.275	0.02	0.706	0.07	0.847
ECT(-1)	-0.31***	0.013	-0.30**	0.048	-1.04*	0.071
R squared	0.14		0.16		0.22	
DW-stat.	1.94		1.92		2.02	
Obs.	2272		1609		663	

A Granger causality test based on the gravity model has been performed on bilateral ODA (lbaid) to test for reverse causality. To this end, Granger causality equations were run in an error correction framework (panel vector error correction model (VECM) with variables in first differences and an ECT (error correction term). The significant error correction term (ECT(-1)) indicates that Dutch exports and Dutch bilateral aid stand in a bi-directional relationship, i.e. they feed back on each other. Looking at the column with the coefficients the significant coefficients in cells with grey shading reveal that Dutch exports do "granger cause" Dutch bilateral aid, thus indicating that aid is endogenous and that the panel dynamic feasible generalized least squares (PDFGLS) is called for.

B3. The short-run and the long-run impact of bilateral aid in an error correction framework

As we might be interested not only in the long-run relationship between Dutch bilateral aid and Dutch exports, we estimate the gravity model in a simple error correction[21] (ECM) version which allows us to draw short-run and long-run conclusions on the impact of Dutch bilateral aid on Dutch exports.

$$\begin{aligned}\Delta LX_{jt} = {} & \mu_j + \beta_1 \Delta LYR_{jt} + \beta_2 \Delta LYNDL_t + \beta_3 \Delta LBAID_{jt} \\ & + \beta_4 \Delta LBAIDREST_j + \beta_5 \Delta LEXRN_{jt} \\ & + \lambda (LX_{jt-1} - b_1 LYR_{jt-1} - b_2 LYNDL_{t-1} - b_3 LBAID_{jt-1} \\ & - b_4 LBAIDREST_{jt-1} - b_5 LEXRN_{jt-1}) + u_{jt}\end{aligned} \tag{5}$$

where

$$\begin{aligned}ECT_{jt-1} = {} & (LX_{jt-1} - b_1 LYR_{jt-1} - b_2 LYNDL_{t-1} - b_3 LBAID_{jt-1} \\ & - b_4 LBAIDREST_{jt-1} - b_5 LEXRN_{jt-1})\end{aligned}$$

Table B3 shows that the coefficients carry the expected signs both in the short term and the long term. The coefficients for the long term obtained by means of the panel dynamic feasible generalized least squares technique (PDFGLS) are basically reproduced by the estimation within an error correction framework (ECM estimation). The ECM-method has the advantage of offering both short-run and long-run coefficients, but the disadvantage not to control for endogeneity of the regressors. Therefore, when one is interested in the long-run impact of aid on exports, the method of choice is the PDFGLS method which produces very reliable and robust results.

[21] The results are confirmed by the more complicated conditional error correction model which is based on equation (4) and requires re-estimations according to Hendry's general-to-specific method.

Table B3. The short-run and long-run impact of Dutch aid on Dutch exports

	Estimations are based on an error correction model (ECM) and 93 countries		
Short-run impact	1973-2009	1973-1998	1999-2009
Donor GDP	0.40*** [0.00]	0.35*** [0.00]	0.77*** [0.00]
Recipient GDP	0.68*** [0.00]	0.61*** [0.00]	0.45** [0.05]
Dutch bilateral aid	0.01 [0.32]	0.02 [0.20]	0.02 [0.20]
Other Dac donors' bilateral aid	0.04** [0.05]	0.03 [0.23]	0.02 [0.11]
Bilateral exchange rate	-0.02 [0.54]	-0.02 [0.59]	-0.24 [0.17]
Trade agreement	0.07 [0.18]	-0.09	0.11 [0.01]
Long-run impact			
Donor GDP	0.30*** [0.00]	0.29*** [0.00]	1.27*** [0.00]
Recipient GDP	0.78*** [0.00]	0.67*** [0.00]	0.39*** [0.00]
Dutch bilateral aid	0.02 [0.27]	0.04* [0.08]	0.04** [0.03]
Other Dac donors' bilateral aid	0.04 [0.18]	0.04 [0.12]	0.03 [0.16]
Bilateral exchange rate	-0.02** [0.03]	-0.02** [0.05]	-0.17** [0.04]
Trade agreement	0.33*** [0.00]	0.05 [0.36]	0.14** [0.04]
R squared	0.30	0.35	0.43
R squared adj.	0.27	0.31	0.34
Sum of squared resid	422.49	330.70	54.25
Durbin-Watson stat.	2.09	2.02	2.04
Obs.	2624	1888	736

Note: p-values are in parentheses. ***, ** and * stand for 1%, 5% and 10% error level.
The results show that Dutch aid does not increase Dutch exports in the short run. As to its long-run effects, Dutch aid increases Dutch exports in the first period (1973-1998) at a 10% significance level and in the second period (1999-2009) Dutch aid has a positive and significant impact even at 5% significance level. Bilateral aid given by other donors does not crowd out Dutch exports. The other coefficients carry the expected signs.

B4. Concordance between SITC and ISIC classification

SITC Rev. 2 (2-digit)	Input-Output Table for 2009, ISIC Rev. 3.1		
00+03+04+05+08+22+29	AtB	Agriculture, Hunting, Forestry and Fishing	1
extraction is not exported	C	Mining and Quarrying	2
01+02+06+07+09+11+12+41+42 +43	15t16	Food, Beverages and Tobacco	3
26+65+84	17t18	Textiles and Textile Products	4
21+61+85	19	Leather, Leather and Footwear	5
24+63	20	Wood and Products of Wood and Cork	6
25+64	21t22	Pulp, Paper, Paper , Printing and Publishing	7
32+33+34+35	23	Coke, Refined Petroleum and Nuclear Fuel	8
27+51+52+53+54+55+56+59	24	Chemicals and Chemical Products	9
23+57+58	25	Rubber and Plastics	10
66	26	Other Non-Metallic Mineral	11
28+67+68+69	27t28	Basic Metals and Fabricated Metal	12
71+72+73+74+75+76	29	Machinery, Nec	13
77+87+88	30t33	Electrical and Optical Equipment	14
78+79	34t35	Transport Equipment	15
81+82+89+93	36t37	Manufacturing, Nec; Recycling	16