Aid and its impact on the donor's export industry – The Dutch case

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Aid and its Impact on the Donor's Export Industry – The Dutch Case

Abstract

This paper models the link between Dutch development aid and Dutch exports to 142 recipient countries over the period from 1964 to 2011. Given that Dutch aid policy drastically changed in 1999, the model is estimated separately for the 1964-1999 and the 2000-2011 periods. Dynamic gravity models applied to aggregate exports are estimated controlling for the reverse causality of aid. The findings indicate that there is a positive and significant long-run impact of Dutch bilateral aid on Dutch exports which is mainly driven by the effect in the first period of analysis. The return to aid ranges from $0.26 to $0.40 for each 1$ of aid disbursed, primarily in the 1964-1999 period. The return to aid is not statistically significant in the 2000 to 2011 period, in which only 33 countries with a bilateral development relationship with the Netherlands (15 countries after 2010) continued to receive substantial amounts of aid.

Key Words: development aid, exports, Netherlands, GMM, gravity model

JEL Classification: F10

1. Introduction

The aim of Dutch development aid is to benefit developing countries; it is targeted not only towards relieving hunger, eliminating malnutrition, reducing poverty, and eradicating diseases, but also at 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, as a result of development aid, Dutch producers are able to increase their exports to aid recipient countries.

Dutch development aid has undergone several important changes during recent decades. The most important of these changes are the reduction in the number of recipient countries,

currently focusing on only 15 countries, and the specialization in a reduced number of key areas, such as sexual and reproductive health and rights, and water and food security.

The volume of aid has increased in the last four decades, making the Netherlands one of the few donor countries who have fulfilled (or even surpassed) the goal of 0.7% of the desired aid-to-gross national income (GNI) ratio. In 2010, however, the budget for development cooperation was reduced from 0.8% to 0.7% of GNI under the new minority coalition government formed by the Liberal Party and the Christian Democrats, and general budget support was discontinued. The budget cuts also entailed the closure of several embassies responsible for channelling Dutch bilateral aid. Policy observers also saw a change in the focus of Dutch development aid from a purely development orientation to one representing a stronger stake for Dutch business in development projects.

The objective of this study is twofold. First, to examine how Dutch bilateral development aid affects Dutch exporters at an aggregate level; second, to compute the return on Dutch bilateral aid. To this end, we perform an empirical study on how aid affects donors' bilateral exports. The original contribution of this study stems not only from the focus on Dutch exports but also from the application of sophisticated econometric techniques that control for endogeneity, heterogeneity and autocorrelation. Using these techniques, we are able to obtain unbiased and consistent aid-export elasticities.

The current study is organized as follows: Section 2 introduces the reader to the related literature on the effect of aid on donors' trade. Section 3 presents the theoretical underpinnings for the aid-export link and the augmented gravity model on which the estimations are based. Section 4 describes the data, sources and the concept of aid being used. In Section 5 we present the main results utilizing panel fixed effects and generalized method of moments (GMM) estimation techniques. Finally, Section 6 puts our results into perspective.

2. Literature Review

Of the studies that investigate the impact of aid on donors' bilateral exports, Nilsson (1997) was the first author to focus on European donors. In particular, he 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, which for the average donor, translates into an increase of US$2.6 in 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 ranged from 0.062 for fixed-effects (FE) to 0.195 (for pooled ordinary least squares (OLS) specifications), respectively. These elasticities translate into average returns on donors' aid of around US$2.29 (OLS) and US$0.73 (FE) of exports per dollar of aid[i]. The return for the Netherlands was a US$0.52 increase in Dutch exports for each dollar of aid given. More recently, Pettersson and Johansson (2013) found that aid increased bilateral trade flows for both donors and recipients. They found a positive link between aid and donors' exports, and an even stronger relationship between aid in the form of technical assistance and exports in both directions. This supported their interpretation that market knowledge through interpersonal relations is an important driver of exports. However, these results were obtained without controlling for unobservable heterogeneity related to each bilateral relationship, and so this could bias the estimates, as pointed out in Nowak-Lehmann et al. (2013). Finally, Martínez-Zarzoso et al. (2015a), also in a multi-country setting, found that, in general, donors' bilateral aid has positively affected their exports to developing countries. These results point to sizeable beneficial effects of bilateral aid on donor's exports and to non-negligible effects of multilateral aid in the short term.

Moving to single country studies, the German case has been investigated in Nowak-Lehmann D. et al. (2009) and Martínez-Zarzoso et al. (2009), with both papers finding that German exporters benefit from German bilateral aid. In particular, US$1.00 of German aid increases German exports by between US$1.00 and US$ 1.50 on average (this effect was based on a positive, significant impact of aid ranging between 0.08 and 0.13, meaning that a 10% increase in aid translates into an 8-13% increase in exports). A very recent study by Martinez-Zarzoso et al. (2016), which uses more modern techniques and more recent data, suggests that the impact of aid on German exports is still positive and significant but slightly lower than US$1.00. More specifically, one dollar of aid generates US$0.83 of exports according to the latest figures. However, it can be shown that the effect of aid varies with the economic sector analyzed, for instance machinery, electrical and transport equipment have statistically significant and above-average aid-export elasticities.

The Danish case has also been recently investigated in Hansen and Rand (2014). The authors obtain an average return of aid in terms of exports that is lower than the figures obtained for Germany, when using a comparable model specification and estimation technique. More specifically, US$1.00 of Danish aid increases Danish exports by around US$0.30 on average for all countries, in the long run (when using a GMM estimator that considers aid and exports as endogenous variables). The authors also use an alternative specification of the gravity model in which bilateral aid enters as the share of GDP in the recipient country as if it "inflates" the GDP coefficient. A theoretical justification of the introduction of aid as a transfer in the gravity model of trade has been recently developed by Kruse and Martinez-Zarzoso and (2016). The term added is ln (1+aid/GDP). In this specification, the return to aid of Danish exports is smaller than in the first one (around US$ 0.08) and presents a lower variation across recipients. We will also use this alternative specification in this paper.

Among the studies that deviate from the gravity model framework, some have used Granger causality tests to investigate the direction of the causality. 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% of the country pairs, aid Granger-caused trade in 13% of the cases and bi-directional causality was found in 8% 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. Martínez-Zarzoso et al. (2016) ran Granger causality tests within a gravity model framework and found 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 appropriate techniques should be used to address the endogeneity issue of all right-hand-side variables and suggest GMM methods and 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 carried out in the 1990s (Arvin and Baum (1997) and Arvin and Choudhry (1997)), untied aid has roughly the same impact in terms of promoting donor exports[ii] as tied aid due to recipient countries' goodwill and/or parallel trade agreements and trade concessions on donor exports. Therefore, several authors have concluded 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, Martínez-Zarzoso et al (2015) found that tying status is positively correlated to the effect of aid on donor exports over time (correlation = 0.75), with an even stronger correlation when the percentage of aid tied is higher than 30%; moreover, from 2000 onwards, untying is associated with a decrease in the effect of aid on donor exports.

3. Augmented Gravity Model of Trade

Recipient countries perceive aid as additional income that will eventually lead to an increase in demand in general, and of imports in particular, a phenomenon known as the income effect of aid. However, the income effect is smaller than it could potentially be because usually only part of the aid transfer is spent on domestic and foreign goods. There are several factors that contribute to reducing this income effect: First, a certain percentage of the aid received might never reach its destination due to corruption in the form of capital flight (Lambsdorff, 2002; Kasper, 2006). Second, a relatively large proportion of aid received might also be assigned to costs associated with administering and allocating the aid (Easterly and Williamson, 2011), while bad governance (Kaufmann, 2009) might lead to other inefficiencies (time delays, lost investment opportunities) in channelling aid to the beneficiaries. Third, some portion of the aid might never reach[iii] the recipient country but instead may be spent in the donor country, for example, to pay technical assistance providers. A certain percentage of the aid might also be saved and therefore not spent on imports.

In addition, there are other channels through which aid can directly influence imports from donor countries. For instance, there might be an export effect when a considerable share of donor aid is tied to imports from the donor country. There may also be habit-formation effects, whereby donor-funded exports for aid-related projects might make recipient countries more inclined to buy goods from the donor. Finally, the aid relationship promotes a trade relationship by creating "goodwill" towards donor exporters. Indeed, when donor countries combine aid missions and aid negotiations with trade missions, the aid relationship can "open the door" for donor exporters.

In order to study the impact of foreign aid on exports, we focus on net Official Development Assistance (ODA) and on two types of aid within this category: 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 recipient countries' import capacity (through relieving bottlenecks, such as the savings- and the foreign exchange gap), we would expect both indicators of aid to boost 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 promote imports from the other donors (see Martínez-Zarzoso et al. 2015).

We study the aid-export relationship within the framework of the gravity model, which has been developed and improved 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), and the AvW model has also been extended to applications explicitly involving developed and less developed countries by Nelson and Juhasz Silva (2012).

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 include bilateral aid from the Netherlands as a "trade facilitator" factor, aid from other Development Assistance Committee (DAC) countries as a "trade-deterrent" factor, and also

bilateral exchange rates[iv]. In our specific empirical application we focus exclusively on exports from the Netherlands over time to all its trading partners. We therefore specify a one-side gravity model to explain bilateral exports, in which recipients are indexed by *j*, and years by *t*.

3.1. Standard empirical specification

The model for aggregate exports is given by,

$$\ln X_{jt} = \beta_0 + \lambda_p + \alpha_j + \beta_1 \ln YR_{jt} + \beta_2 \ln YNDL_t + \beta_3 \ln BAID_{jt} + \beta_4 \ln BAIDREST_{jt} + \beta_5 \ln EXRN_{jt} + \beta_6 FTA_{jt} + \varepsilon_{jt} \quad (1)$$

where:

ln denotes variables in natural logs;

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

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

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

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

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

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

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*.

We introduce period dummies (λ_p) in model (1) to account for all sorts of time-varying changes during the period of 1964 to 2011. The period considered to generate the dummy variables is 3 years. Alternatively yearly time fixed effects χ_t could be included that control

for omitted variables common to all trade flows, but in this case, the coefficient of YNDL cannot be directly estimated and its effect is accounted for by the time dummies.

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. 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 excluded from the regression equation, except for the system GMM approach.

Equation (1) is estimated using different econometric approaches. First, in section 5 we apply panel data techniques, namely fixed effects and GMM estimations for two different time periods. GMM methods for dynamic panels have been proposed by Arellano and Bond (2001) and Blundell and Bond (2008) among others.

3.2 Specification accounting for zero aid flows

To account for the fact that a number of trade flows are zero, we follow Wagner (2003) and model bilateral aid using two variables. The first is specified as the maximum between one and bilateral aid and the second isn a dummy variable that takes the value of one when bilateral aid is not given and zero otherwise (NoBAID). We use this specification for both Dutch aid and aid from other donors (NoBAIDREST) to each recipient. The gravity specification is given by,

$$\begin{aligned}\ln X_{jt} = {} & \gamma_0 + \lambda_{1p} + \alpha_j + \gamma_1 \ln YR_{jt} + \gamma_2 \ln YNDL_t + \gamma_3 \ln(\max(BAID_{jt},1)) + \\ & \gamma_4 \ln(\max(BAIDREST_{jt},1)) + \gamma_5 NoBAID_{jt} + \gamma_6 NoBAIDREST_{jt} + \\ & + \gamma_7 \ln EXRN_{jt} + \gamma_8 FTA_{jt} + \mu_{jt}\end{aligned} \qquad (2)$$

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 above mentioned GMM approach.

Specification (2) is also estimated with time fixed effects. From this specification the monetary return of bilateral aid in terms of bilateral exports can be computed as the estimated coefficient (γ_3) multiplied by the corresponding bilateral exports as a share of bilateral aid.

3.3 Specification disentangling the income and goodwill effects of aid

An alternative specification, as proposed by Hansen and Rand (2014), is estimated in order to account for the fact that aid is a transfer and as such it increases the disposable income in the recipient country.

This specification is more in line with the underlying trade theories and is based on the income generating effect of aid. We compute disposable gross national income (DGNI) by augmenting Gross National Income (GNI) with factor payments to foreigners and government transfers. Hence, disposable income (DGNI) equals,

$$DGNI_{jt} = GNI_{jt} + BAIDREST_{jt} + BAID_{jt} = GNI^{+} + BAID_{jt} = GNI^{+}(1 + \frac{BAID_{jt}}{GNI^{+}}) \quad (3)$$

The proposed gravity specification is given by,

$$\ln X_{jt} = \delta_0 + \chi_t + \phi_j + \delta_1 \ln(GNI^{+}_{jt}) + \delta_2 \ln(1 + BAID_{jt} / GNI^{+}_{jt}) + \\ + \delta_3 \ln EXRN_{jt} + \delta_4 FTA_{jt} + \varpi_{jt} \quad (4)$$

were GNI^{+}_{jt}…is the sum of GNI and BAIDREST.

This specification has two advantages. First, it allows us to test whether bilateral aid only has an income generating effect ($\delta_1=\delta_2$) or instead, there is an additional "goodwill" effect

($\delta_2 > \delta_1$). Moreover, bilateral aid from other donors could have a positive effect on Dutch exports via the income effect or a negative trade diversion effect embodied in the term ($BAID/GNI^{+}$). Second, specification (4) accounts for zero aid flows and does not require any "unnatural" transformation of the aid variables nor the use of "noaid" dummy variables, as it is the case in specification (3). This could be considered as a very good reason for selecting model (4) to compute the monetary return to aid in terms of exports, as argued by Hansen and Rand (2014).

Based on equation (4), the monetary return to bilateral aid in terms of exports is computed as,

$$\frac{\partial X}{\partial BAID} = \delta_2 * \frac{X}{DGNI} \qquad (5)$$

It is clear from equation (5) that the amount of bilateral aid is not required to compute the dollar-to-dollar effect of aid on exports, hence using this specification, the monetary return could also be computed for "hypothetical" aid recipients that have not received aid in the past.

4. Description of Data Sources and Data on Aid

4.1 Data Sources

Dutch Official Development Aid data are taken from the OECD Development Database on Aid from DAC Members for the period 1962 to 2011[v]. We consider net Dutch ODA disbursements in current US$ [vi] to specific recipient countries, 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 donor countries that make up 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 UN COMTRADE [vii]. Data on income and population variables are drawn from the World Bank (World Development Indicators Database, 2012). Bilateral exchange rates are taken from IMF statistics, which have been corrected for the introduction of the euro and currency reforms in the recipient countries[viii]. 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, taken from the CEPII database[ix]. Trade impeding or promoting factors, such as being a former colony and sharing a common language or a common border, are also taken from the CEPII database and the FTA variable is from De Sousa (2012). Table 1 presents the summary statistics of the variables used in the regression analysis.

4.2 Net Bilateral Official Development Aid

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

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-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.

5. Estimation Techniques and Results

5.1 Estimation and results for total exports applying panel fixed-effects and GMM

In order to model dynamics and to account for persistence in trade relations and trade flows, we introduce the lagged dependent variable as an additional regressor. The dynamic specification is given by

$$\ln X_{jt} = \beta_0 + \lambda_p + \alpha_j + \beta_1 \ln YR_{jt} + \beta_2 \ln YNDL_t + \beta_3 \ln BAID_{jt} + \beta_4 \ln BAIDREST_{jt} + \beta_5 \ln EXRN_{jt} + \beta_6 FTA_{jt} + \theta \ln X_{j,t-1} + \varepsilon_{jt} \quad (5)$$

where most of the variables are as described above and $X_{j,t-1}$ represents exports 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 become biased and inconsistent (the coefficient of the lagged dependent variable is biased towards unity, whereas the remaining coefficients are biased towards zero). A panel data estimator based on the within transformation will eliminate the bilateral unobserved heterogeneity, mitigating the endogeneity problem, but still the coefficient of the lagged dependent variable could be slightly biased, even for a moderate to large time dimension in the dataset. 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 lagged aid) as instruments. The model in first differences produces,

$$\Delta \ln X_{jt} = \eta t + \theta \Delta \ln X_{j,t-1} + \gamma_1 \Delta \ln YR_{jt} + \gamma_2 \ln YNDL_t + \gamma_3 \Delta \ln BAID_{jt} + \gamma_4 \Delta \ln BAIDREST_{jt} + \gamma_5 \Delta \ln EXRN_{jt} + \gamma_6 \Delta FTA_{jt} + \Delta \mu_{jt} \quad (6)$$

In addition we also tested the use of the system GMM[1] 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. In the system GMM specification time-invariant variables can also be added as regressors; thus the natural log of distance and the dummies common colony and landlocked status are considered. The first dummy variable takes the value of 1 if there was ever a colonial relationship between countries *i* and *j*, and zero otherwise. Landlocked status takes the value of 1 when a recipient country is landlocked, and zero otherwise.

According to the specified models, we assume that the relationship between Dutch aid and Dutch exports is linear. A scatter plot between both variables (available on request) shows this to be a reasonable assumption, as does 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. We address this issue through panel GMM applied to the alternative specifications that consider zero aid flows (equation 2 above) and the separate income generating effect of aid (equation 4).

[1] Only in some cases sys-GMM passed the specification test, alternatively diff-GMM was used.

Table 2 shows the results for the dynamic models, as given by equations (5) and (6). Columns (1) to (3) show the results obtained with country and time fixed effects and columns (4) to (6) those obtained with System GMM.

The first column in Table 2 shows the results for the dynamic fixed effect model for the whole period whereas columns 2 and 3 show the results obtained for the periods 1964-1999 and 2000-2011. The second part of the table shows the respective outcomes for System GMM.

The impact of bilateral aid lies in a range of 0.016 and 0.025 in the short run. Given the persistence of the export series, it is more appropriate to rely on the dynamic models and to fully account for the possible endogeneity of bilateral aid using the system GMM results (column 4-6), which satisfy the Hansen test of instrument validity and also show no second order autocorrelation. The short-run aid coefficient equals 0.029 and it is positive and statistically significant at the 5% level, whereas the long-run elasticity is 0.044, calculated as (0.029/(1-0.326)).

As regards the rest of the explanatory variables, the income variables show the expected positive coefficient and the magnitude is close to the theoretical value of one (0.50) for the coefficient of the recipient income, whereas the coefficient of the Dutch income is 0.02 in column 4). The coefficient of 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 donors is negative and significant in the dynamic specification in the overall and in the first period (1964-1999) which drives the results, whereas the exchange rate variable is not statistically significant in any of the specifications.

With the system GMM method we are able to estimate the effect of the time-invariant variables, namely geographical distance, landlocked status and colonial relationship. We obtain the expected negative effects for the two first variables, whereas colonial links show a

significant positive effect on Dutch exports. These results are significant and the 1% level and hold for all periods.

Using the results of system GMM (Table 2, col. (4)), and the corresponding long-run elasticity, we see that aid has a positive and significant impact on Dutch exports. The average return on aid for Dutch exports is approximately a US$0.40 increase in exports for each dollar spent[xi]. This implies that in the long term and over the whole period, the monetary return on Dutch aid in terms of exports is less than proportional. The return to aid in the period 1964-1999 amounts to US$ 0.38 per one dollar of aid. The impact of Dutch aid on Dutch exports is non-significant in the second period (2000-2011) as it was the objective of Dutch aid policy to reduce the number of recipient countries from thirty-three to fifteen countries. This implies that only 15 out of 119 countries in the sample continued to receive substantial amounts of aid.

However, in the results in Table 2 zero aid flows are not taken into account in the estimations. Table 3 presents the results obtained when we estimated the model based on equation (2) controlling for zero aid flows. The fixed-effects estimation shows that bilateral aid has also a positive and significant impact in the range of 0.010 and 0.014 in the short run (col. 1 and 2). The impact of bilateral aid in the long run is slightly larger and in a range of 0.028 and 0.036. This implies that a 10% increase in bilateral aid increases Dutch exports by 0.30 to 0.36%. Bilateral aid of the other donors mainly has a non-statistically significant impact on Dutch exports. Aid has a non-significant impact on Dutch exports in the second period (2000-2011). These results are confirmed by the Diff-GMM estimations. Aid (considering zero aid flows) has a positive and significant impact in the first period (1964-1999) and an insignificant impact in the second period (2000-2011). The return to aid for the whole period is US$ 0.36 and US$ 0.26 for the first period (1964-1999).

Next, as an alternative that also takes zero aid flows into account, the model based on equation (4) is estimated. It has also the advantage of identifying the income-generating and

the goodwill-generating effect of bilateral aid separately. Results are shown in Table 4. We obtain quite plausible coefficients for the income-generating effect, with a magnitude around 0.27 in the short run (column 1) and a magnitude of 0.72 in the long-run. We also find also positive and significant goodwill-generating effects. When the model is estimated using Diff-GMM, the income-generating effect is 0.50 in the short run and 0.65 in the long run. The goodwill generating effect of bilateral aid shows an estimated coefficient of 6.5, which implies that a 1% increase in the ratio of bilateral aid to GNI^{+} increases Dutch exports by 6.5% in the short-run and by 9.2% in the long run. The monetary return to aid of exports is around 0.3 US$ for each 1$ of exports and remains stable with the FE and the GMM specification. Moreover, both estimation approaches indicate that the goodwill effect was mainly present in the first period when the Dutch ministry for International Development disbursed aid to a multitude of countries. In the second period when the number of recipient countries was limited first to some 33 countries and later on to 15 countries the goodwill effect of aid disappeared.

All in all the results obtained by either System-GMM or Diff-GMM should be given priority as they take reverse causality of aid into account and also control for endogeneity of the other control variables.

6. Conclusions

This study evaluates the link between bilateral exports and foreign aid for an individual donor, the Netherlands, to investigate whether bilateral aid implies, as a side effect, increased Dutch exports to the recipient countries. This increase could be explained by a positive income effect in the recipient country and/or by a reduction in trade costs associated with the flow of aid.

The empirical estimations are based on an augmented gravity model of trade in which foreign aid is specified in two flavours. In the first, foreign aid is captured as a part of the trade costs component, as has usually been done in the gravity literature. In the second method foreign

aid is captured as a transfer that essentially inflates income in the recipient country. The second specification has several advantages, it permit us to separate the pure income effect from the trade cost reducing effect or "goodwill effect" of aid, it also accounts for the heterogeneous effects across recipients and avoids the problem of zero aid flows attached to the estimation of a log-linear model.

Employing advanced panel data techniques, which account for the dynamics of the relationship and the potential problems of reverse causality, we find a positive and significant relationship between Dutch aid and Dutch exports over the 1964-2011 period. The results are mainly driven by the 1964-1998 period, in which the Netherlands disbursed aid to a larger number of countries. The positive and significant aid coefficient is robust to a number of variations in the specification (controlling for zero aid flows, separating the income effect of aid from the goodwill effect) and estimation techniques (use of country-fixed and time-fixed effects, controlling for endogeneity via GMM). We observe that when Dutch aid policy began to strictly target aid to very few countries and to a few sectors (water, health, food security) in the later period (1999-2011), the good-will effect of aid on Dutch exports disappeared.

With respect to the two competing specifications, we find that modelling aid as a transfer provides a lower average monetary return to aid in terms of exports, which is around 0.02-0.3 US$ for each 1$ of exports that remains stable across specifications (dynamic FE and diff-GMM). However, when aid is modelled as a part of trade costs, the monetary return varies across specifications and is considerably higher in magnitude (0.26-0.53 US$ for each 1US$ of aid). We find that the economic effects are remarkably small, which is not surprising, given that the Dutch importers that are also recipients of Dutch aid, are in general poor and far away from the Netherlands. In any case, it is worth mentioning that the overall average effect hides a wide variation across recipients, which mainly depends on the ratio of aid with respect to the recipient GDP. 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.,

2016) or Denmark (Hansen and Rand (2016)), we find Dutch bilateral aid to be only slightly export-promoting in the 1964-2011 period, quite far from the German estimate of 1.4 US$ and closer to the Danish estimate of 0.30 US$. This is probably due to several distinctive differences when comparing the Dutch and the German aid system and their economies. In regards to the aid system, only about one-third of Dutch aid is given bilaterally, while in the German case, two-thirds is bilateral aid; as we only consider the effect of bilateral aid, this reduces the impact.[xii]

Going forward, future research should focus on a more comprehensive comparison of the differences in export elasticities with respect to aid between EU countries, using the "transfer" motivated specification while also examining sectoral export effects. A second aspect that is outside the scope of this paper will be to investigate the heterogeneity of the elasticities across developing countries and across productive sectors.

[i] 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.

[ii] On the recipient side, tying noticeably reduces the benefit of aid (Jepma, 1991; Wagner, 2003; World Bank, 1998), and for this reason in 2001, the OECD-DAC recommended a progressive reduction of tying practices.

[iii] The official definition of aid from the OECD (DAC) includes 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 and so on.

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

[v] The original sample with data for the period 1962-2011 had to be reduced as the early years (1962-1963) were characterized by an inconsistent Dutch development agenda. See the Appendix for a list of countries (Tables A.1 and A.2).

[vi] This amount comprises total grants and concessional loans granted (according to DAC criteria for concessional loans).

[vii] Online database: http://comtrade.un.org/db/.

[viii] The IFS and WDI statistics are not adjusted for currency reforms and therefore very problematic. We corrected the data accordingly.

[ix] http://www.cepii.fr/anglaisgraph/bdd/fdi.html.

[x] 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% or official bilateral transactions, regardless of the grant element, that primarily serve an export-facilitating 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.

[xi] This average is calculated as:

$$\beta_{LBAID} = \frac{\partial X}{\partial BAID} * \frac{BAID}{X} \Rightarrow \frac{\partial X}{\partial BAID} = \beta_{BAIDG} * \frac{X}{BAID} = 0.047 * \frac{101.99}{12.13} = 0.39$$

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

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Tables

Table 1. Summary Statistics

Variable notation and description	Obs	Mean	Std. Dev.	Min	Max
X = Total Dutch Exports[a]	5,147	151.5118	518.9134	0.0008	9445.181
BAID = Dutch ODA[a]	4,935	8.095	20.746	-315.790	344.030
ln X = ln Dutch Exports	5,147	16.778	2.286	6.712	22.969
ln BAID = ln Dutch ODA	3,545	14.330	2.378	9.210	19.656
ln BAIDREST = ln ODA rest of DAC	4,554	17.754	1.920	9.210	23.808
ln YNDL = ln Dutch GDP	5,147	26.136	1.040	23.489	27.493
ln YR = ln Recipient GDP	5,147	22.378	2.124	16.19876	29.411
ln EXRN = ln Exchange rate	5,147	1.557	4.667	-29.693	10.137
FTA = Regional Trade Agreement Dummy	5,147	0.057	0.231	0	1
Ln Distance	5,139	8.721	0.573	5.763	9.715
Colony Dummy	5,139	0.029	0.168	0	1
Landlocked Dummy	5,139	0.165	0.371	0	1

Note: Sample of 142 countries, listed in Table A.2. [a] Million US Dollars at current prices. ODA denotes Official Development Aid. DAC denotes Development Assistance Committee.

Table 2. Dynamic Gravity Model

	CTFE[a]			System-GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	1964-2011	1964-1999	2000-2011	1964-2011	1964-1999	2000-2011
ln Dutch ODA	0.0164**	0.0248**	0.0115	0.0299**	0.0427**	0.0264
	[0.00758]	[0.0111]	[0.0119]	[0.0147]	[0.0210]	[0.0199]
ln ODA rest of DAC	0.0195	0.0261*	0.0448**	-0.0401**	-0.0447**	-0.0273
	[0.0141]	[0.0157]	[0.0213]	[0.0197]	[0.0225]	[0.0290]
ln Dutch Exports (lagged)	0.538***	0.477***	0.405***	0.326***	0.317***	0.508***
	[0.0279]	[0.0305]	[0.0562]	[0.0743]	[0.0864]	[0.0647]
ln Dutch GDP	0.180***	0.169***	0.707***	0.0157	0.00326	0.284
	[0.0560]	[0.0645]	[0.159]	[0.0611]	[0.0689]	[0.227]
ln Recipient GDP	0.379***	0.425***	0.259***	0.497***	0.490***	0.366***
	[0.0376]	[0.0415]	[0.0873]	[0.0676]	[0.0755]	[0.0582]
ln Exchange rate	-0.00505	-0.00855	-0.0819	0.00180	0.00420	-0.00433
	[0.00569]	[0.00527]	[0.0836]	[0.00781]	[0.00891]	[0.0147]
Ln Distance				-0.821***	-0.827***	-0.513***
				[0.131]	[0.158]	[0.135]
Colony Dummy				1.067***	1.063***	0.572**
				[0.264]	[0.277]	[0.249]
Landlocked Dummy				-0.587***	-0.624***	-0.359***
				[0.132]	[0.166]	[0.112]
Regional Trade Agreement Dummy	0.111**	0.0254	0.0696	0.0119	-0.123	0.0585
	[0.0494]	[0.0315]	[0.0678]	[0.0933]	[0.0869]	[0.0867]
Long-run effect of Dutch ODA	0.0355**	0.0474**	-	0.0444**	0.0625**	-
$ return of Dutch ODA in the long run	0.32	0.29	-	0.40	0.38	-
Period dummies	yes	yes	yes	yes	yes	yes
Observations	3,449	2,488	961	3,449	2,488	961
R-squared	0.804	0.713	0.737			
N of recipients	130	127	119	130	127	119
N of Instruments				122	96	121
AR1 test prob.				0.000	0.006	6.81e-06
AR2 test prob.				0.118	0.130	0.852
Hansen Test prob.				0.421	0.211	0.391

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. [a]CTFE: estimations based on country- and time fixed effects. Period dummies (every 3 years) are included in all specifications. The list of 130 recipients can be found in Table A.1 in the Appendix. ODA denotes Official Development Aid. DAC denotes Development Assistance Committee.

Table 3. The Impact of Dutch Bilateral Aid on Dutch Exports Including Zero Aid Flows

	CTFE[a]			Diff-GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	1964-2011	1964-1999	2000-2011	1964-2011	1964-1999	2000-2011
ln Dutch ODA (max)	0.0104**	0.0140**	0.00316	0.0130	0.0208*	-0.00487
	[0.00429]	[0.00682]	[0.00480]	[0.0104]	[0.0138]	[0.00543]
ln ODA rest of DAC (max)	0.00273	0.00119	0.00643	0.00323	0.00112	0.00988*
	[0.00256]	[0.00339]	[0.00430]	[0.00307]	[0.00255]	[0.00571]
ln Dutch Exports (lagged)	0.635***	0.608***	0.354***	0.322***	0.279***	0.130*
	[0.0456]	[0.0586]	[0.0639]	[0.0554]	[0.0832]	[0.0717]
ln Recipient GDP	0.274***	0.305***	0.335***	0.415***	0.401***	0.553***
	[0.0553]	[0.0567]	[0.103]	[0.0786]	[0.0782]	[0.112]
ln Dutch GDP	0.0874**	0.0902	0.622***	0.308***	0.273***	0.464**
	[0.0437]	[0.0583]	[0.212]	[0.0940]	[0.0907]	[0.214]
ln Exchange Rate	-0.00512	-0.00712	-0.0677	0.0190	0.0136	0.0162
	[0.00474]	[0.00444]	[0.0972]	[0.0322]	[0.0265]	[0.0889]
Regional Trade Agreement Dummy	0.0997**	0.183**	0.0147	0.117*	-0.0368	0.0693
	[0.0428]	[0.0760]	[0.0712]	[0.0645]	[0.119]	[0.0700]
No Dutch ODA Dummy	0.0563	0.0546	0.00724	0.235*	0.394**	-0.0681
	[0.0476]	[0.0685]	[0.0777]	[0.122]	[0.156]	[0.0887]
No ODA rest of DAC Dummy	0.00616	-0.153	0.0284	-0.0650	-0.174	0.0887
	[0.0750]	[0.144]	[0.0812]	[0.137]	[0.139]	[0.157]
Long-run effect of ln Dutch ODA (max)	0.0285**	0.0357**	-	-	0.0288*	-
$ Return in the long run	0.53	0.32	-	0.36	0.26	-
Period dummies	yes	yes	yes	yes	yes	yes
Observations	5,147	3,602	1,545	4,987	3,456	1,531
R-squared	0.823	0.756	0.610			
N of recipients	142	139	142	142	139	142
N of instruments				165	128	165
AR1 test prob.				0.000	0.000	0.000994
AR2 test prob.				0.0431	0.0500	0.362
Hansen Test prob.				0.615	0.273	0.857

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. [a]CTFE: estimation based on country- and time fixed effects. The list of 142 recipients can be found in Table A.2 in the Appendix. ODA denotes Official Development Aid. DAC denotes Development Assistance Committee.

Table 4. The Impact of Dutch Bilateral Aid on Dutch Exports. Theoretically Based Specification Accounting for the Income Effect and the Goodwill Effects of Aid

	CTFE[a]			Diff-GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	1964-2011	1964-1999	2000-2011	1964-2011	1964-1999	2000-2011
ln Dutch ODA (goodwill aid effect)	3.411**	3.046**	6.194	6.492**	5.516***	-2.618
	[1.565]	[1.320]	[5.796]	[2.877]	[2.002]	[6.176]
ln Dutch ODA (income effect)	0.267***	0.275***	0.361***	0.496***	0.502***	0.467***
	[0.0679]	[0.0727]	[0.0996]	[0.0962]	[0.107]	[0.109]
ln Dutch Exports (lagged)	0.631***	0.610***	0.349***	0.226***	0.156**	0.0573
	[0.0518]	[0.0675]	[0.0636]	[0.0591]	[0.0730]	[0.0780]
ln Dutch GDP	0.119***	0.143***	0.602***	0.216**	0.177**	0.735***
	[0.0422]	[0.0509]	[0.203]	[0.0839]	[0.0891]	[0.221]
ln Exchange Rate	-0.00425	-0.00660	-0.0521	0.0251	0.0327	-0.142
	[0.00448]	[0.00405]	[0.0939]	[0.0280]	[0.0264]	[0.0908]
Regional Trade Agreement Dummy	0.0861**	0.159**	0.0227	0.0391	0.0446	0.0819
	[0.0434]	[0.0709]	[0.0692]	[0.0482]	[0.0532]	[0.0526]
Long-run effect of Dutch ODA(goodwill effect)	9.243**	7.810**	-	8.387**	6.535***	-
$ Return in the long-run[b]	0.03	0.02	-	0.03	0.02	-
Period dummies	yes	yes	yes	yes	yes	yes
Observations	4,919	3,388	1,531	4,764	3,246	1,518
R-squared	0.823	0.757	0.606			
N of recipients	142	134	142	142	134	142
N of Instruments				115	89	115
AR1 test prob.				0.000	0.000	0.0026
AR2 test prob.				0.241	0.322	0.252
Hansen Test prob.				0.142	0.254	0.197

Note: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. [a]CTFE: estimations based on country- and time fixed effects. [b]The $ return shows the goodwill effect related to Dutch ODA in the recipient countries. The list of 142 recipients can be found in Table A.2 in the Appendix. ODA denotes Official Development Aid.