Trade-related Government Expenditure and Aid for Trade in Recipient-Countries

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Abstract

This article examines how the Aid for Trade (AfT) supplied by donors to recipient-countries (to help them promote trade) is influenced by recipient-countries' level of trade-related government expenditure. The empirical analysis uses an unbalanced panel dataset comprising 65 countries over the period 2005–2016, and the two-step system Generalised Methods of Moments estimator. Results suggest that donor-countries tend to allocate higher AfT flows to recipients that increase public expenditure in favour of the trade sector, with a view to promoting this sector. This outcome applies to the sub-samples of Least Developed Countries (LDCs) and countries that are not classified as LDCs.

JEL Classification: F35, F10, H50
Keywords: Aid for Trade; Trade-related government expenditure

1. Introduction

In the light of the difficulties faced by developing countries to better integrate into the multilateral trading system, the Members of the World Trade Organisation (WTO) launched the Aid-for-Trade (AfT) Initiative in 2005, at the WTO Hong Kong Ministerial Conference. By reconciling trade and development, this initiative aims to mobilise additional development financial resources to address the supply-side capacity and trade related infrastructure constraints that developing countries and the Least Developed Countries[2] (LDCs) face in their participation in the global trading system. Since the launch of this initiative, many studies have been carried out by researchers and scholars on its effectiveness. At the same time, a few studies (e.g. Gamberoni and Newfarmer 2009; Tadasse and Fayissa 2009; Gamberoni and Newfarmer 2014; Lee *et al* 2015; Gnangnon 2016a, 2016b, 2017) have investigated the factors, including macroeconomic, that govern the supply of AfT by donors.

However, in the literature on the determinants of AfT inflows, little attention has been paid to how the public expenditure that a country allocates to the trade sector influences the total amount of AfT flows that this country receives from donors.[3] In fact, while AfT is expected to provide developing countries

with financial means to address supply-side capacity and trade-related infrastructure constraints, it should not be overlooked that governments also devote part of their public financial resources to address these impediments to trade development. The current paper aims to fill this gap in the strand of the literature on the macroeconomic determinants of AfT, by exploring the effect of trade-related government expenditure by a recipient-country on the amount of AfT amount that this country receives from donor-countries.

From a theoretical perspective, we argue on the one hand that, in order to help promote trade, donors may be willing to supply higher AfT to developing countries that allocate low levels of public expenditure to the trade sector. In this case, AfT would be substitutable for trade-related government expenditure. On the other hand, donors could decide to supply higher AfT to developing countries that endeavour to increase their trade-related expenditure. The rationale for this behaviour by donors could be to encourage those developing countries that make an effort to increase their public spending on the trade sector in order to promote their trade, in particular exports. In such a case, AfT would be complementary to trade-related government expenditure. It is noteworthy that in contrast to development aid for budget support, AfT inflows are project-targeting and are therefore not fungible.

Overall, we examine empirically the relationship between AfT and trade-related government expenditure. The dataset used in the analysis is unbalanced and contains 65 AfT-recipient countries over the period 2005–2016. Based on the two-step system Generalised Methods of Moments approach, the empirical analysis shows that trade-related government expenditure exerts a positive and significant impact on AfT flows. This outcome applies to both the sub-samples of LDCs and Non-LDCs (countries in the full sample that are not classified as LDCs), although the magnitude of the positive effect of trade-related government expenditure on AfT flows is lower in LDCs than in Non-LDCs.

The rest of the analysis is structured as follows. Section 2 discusses the measure of trade-related government expenditure and AfT, and presents some data analysis concerning these variables. Section 3 presents the model specification that allows for an examination of the impact of trade-related government expenditure on AfT. Section 4 discusses the econometric strategy to perform the empirical analysis. Section 5 interprets the empirical results, and Section 6 concludes.

2. Data Analysis

The main problem that we face in addressing empirically this issue is to define what constitutes trade-related government expenditure, and then to collect data on this category of expenditure. The Organisation of Economic Cooperation and Development (OECD) has classified AfT in three major categories. These include AfT related to economic infrastructure, which encompasses transport and storage, communications, and energy generation and supply; AfT dedicated

to building productive capacity, which includes banking and financial services, business and other services, agriculture, forestry, fishing, industry, mineral resources and mining, and tourism; and AfT related to trade policy and regulations, which comprises trade policy and regulations, and trade-related adjustment interventions. Therefore, to define the components (items) of government expenditure dedicated to trade promotion, we draw on the categorisation of AfT proposed by the OECD and consider three major items in the overall public expenditure that would constitute trade-related government expenditure. These are:

- public expenditure related to economic infrastructure, which encompasses public spending on transport and storage, communications, and energy generation and supply;
- public expenditure for building productive capacity, which covers public expenditure for banking and financial services, business and other services, agriculture, forestry, fishing, industry, mineral resources and mining, and tourism; and
- public expenditure relating to trade policy and regulations, which comprises spending devoted to trade policy and regulations, and trade-related adjustment.

Based on this definition of trade-related public expenditure, we need data on each of these three major items of public expenditure to compute the indicator of trade-related expenditure and carry out the empirical analysis. To the best of our knowledge, there are two official databases that provide disaggregated data on public spending, and categories that would serve the purpose of this study. These are the database of the International Food Policy Research Institute (IFPRI)[4] and the International Monetary Fund (IMF) database on government spending categories (see Appendix 1 for more details). The IMF Database provides data on expenditure on agriculture, fishing, forestry, and hunting (percentage of GDP); expenditure on mining, manufacturing, and construction (percentage of GDP); expenditure on transport (percentage of GDP); expenditure on communication (percentage of GDP); and expenditure on fuel and energy (percentage of GDP). The IFPRI database provides data only on the items public expenditure transport and communication (percentage of GDP), agriculture expenditure (percentage of GDP), and "mining expenditure (percentage of GDP).

Even though data contained in these two databases does not cover all items highlighted above, the IMF database covers many of them (other than public expenditure for trade policies and regulations), compared with the IFPRI database. In addition, the IMF data cover the period 2005–2016, whereas the IFPRI data only cover the period up to 2012 (i.e., the period 1980–2012). As AfT data start only from 2002, one could expect that our panel dataset would cover a period starting from 2002. However, as the IMF database has a much wider coverage of expenditure items than the IFPRI database, and also provides

recent data (including from 2005), we rely on data from the IMF Database to perform the empirical exercise. As a consequence, our AfT data are restricted to the period 2005–2016.

The sum of the aforementioned expenditure items in the IMF database represents the overall trade-related expenditure, denoted 'EXPTRADEGDP'. Trade-related expenditure is ultimately used to produce domestic goods and services, thus we have converted this variable into real values (real trade-related expenditure, in constant 2010 US dollars, denoted 'EXPTRADECST') by multiplying it by real GDP (constant 2010 US dollars) (extracted from the World Development Indicators – WDI – from the World Bank) (see also Herzer 2011; and Nagel *et al* 2015, who have proceeded in a similar way in their studies).

We use, as measure of AfT flows, total real AfT (in constant US 2016 dollars) extracted from the OECD database (see Appendix 1 for more details). This measure of AfT flows is preferred to, for example, the share of total AfT flows in GDP (calculated as total AfT flows in current US dollars divided by GDP, in current US dollars) because the former is not sensitive to GDP changes. We denote 'AfTCST1' the total real AfT flows. The empirical analysis therefore consists of analysing the relationship between 'EXPTRADECST' and 'AfTCST1'.

Furthermore, as the trade-related expenditure variable does not contain expenditure on trade policies and regulations, whereas the AfT variable does, we also use in the analysis another AfT variable measured by the total real AfT flows, from which we exclude AfT related to trade policies and regulations (expressed in constant US 2016 dollars). This variable is denoted 'AfTCST2'. Overall, and as noted above, the analysis is conducted using an unbalanced panel dataset containing 65 AfT recipient-countries (for which data on trade-related expenditure is available) over the period 2005–2016.

We present in Figure 1 the correlation patterns (scatter plot) between EXPTRADECST and AfTCST1 (both variables are presented in logs to limit their high skewness). These graphs show the full sample, the sub-sample of LDCs, and the sub-sample of Non-LDCs. The three graphs contained in Figure 1 suggest positive correlation patterns between EXPTRADECST and AfTCST1, although the positive correlation coefficient seems to be higher for Non-LDCs than for LDCs.

Figures 2 to 4 illustrate the evolution of EXPTRADECST and AfTCST1 over the period 2005–2016, again for the full sample and the sub-samples LDCs and Non-LDCs. The three figures show an upward trend for real AfT flows, although these flows have declined from 2015 to 2016. At the same time, real trade-related government expenditure has fluctuated over the entire period, for all three samples. In particular, the patterns observed in Figures 2 and 4 are quite similar: real trade-related expenditure has substantially increased from 2006 to 2007, and subsequently declined (severely) over 2007–2012 (this may be partially due to the 2008 financial crisis). It has then increased again from 2012 to 2013, fluctuated over the rest of the period, and declined significantly between 2015 and 2016. For LDCs (see Figure 3), the evolution of real trade-

Figure 1: Cross-plot between 'EXPTRADECST' (in logs) and 'AfTCST1' (in logs)

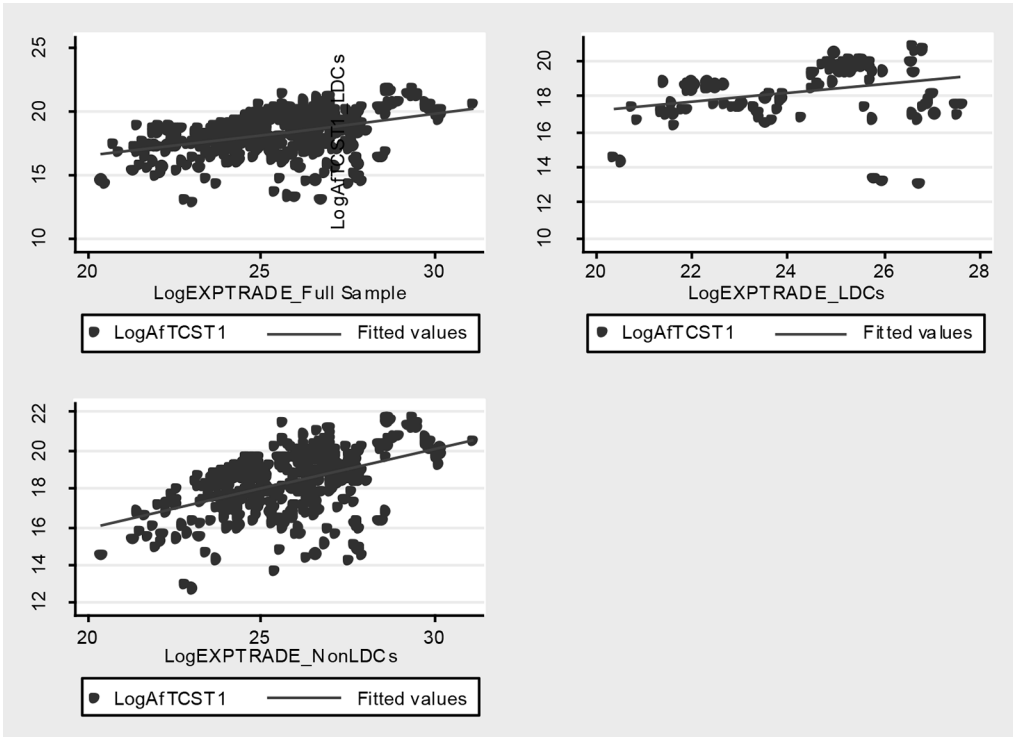


Figure 2: Evolution between 'EXPTRADECST' and 'AfTCST1' over the Full sample

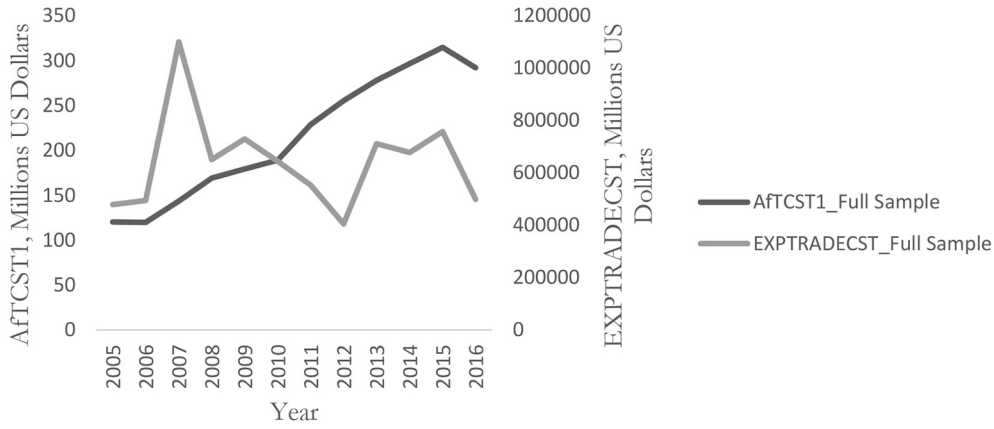


Figure 3: Evolution between 'EXPTRADECST' and 'AfTCST1' over the sub-sample of LDCs

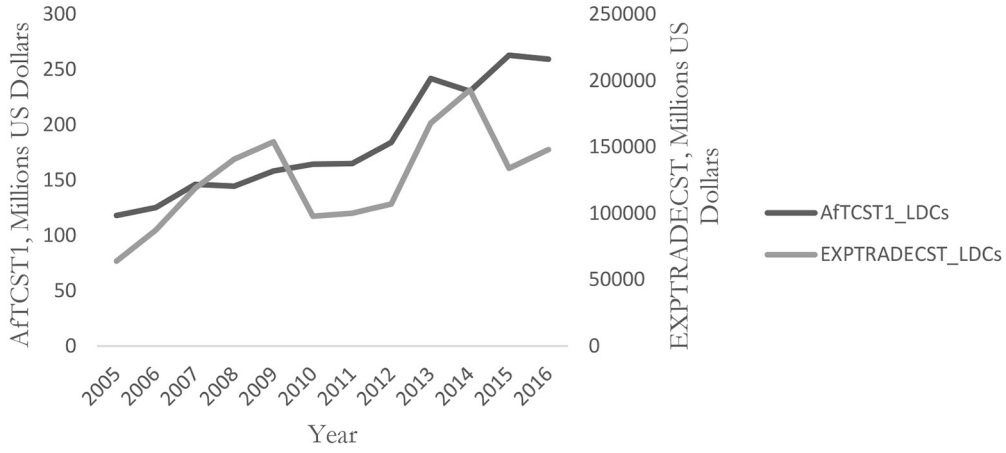
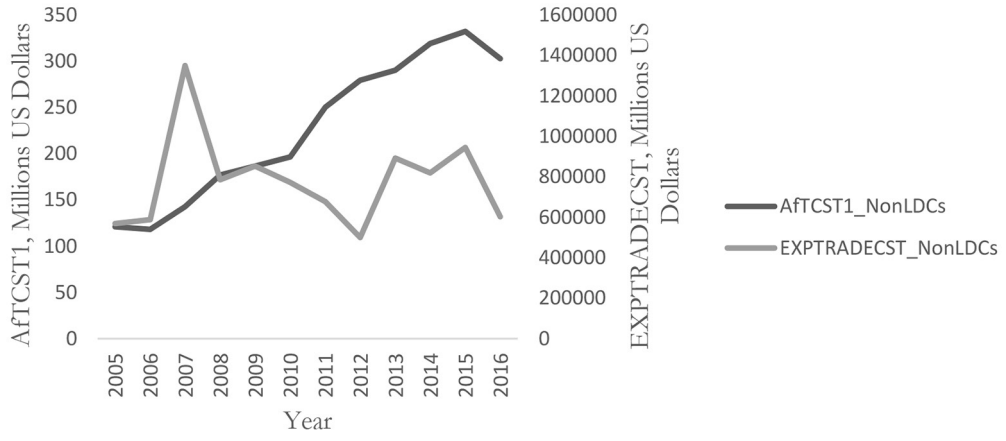


Figure 4: Evolution between 'EXPTRADECST' and 'AfTCST1' over the sub-sample of Non-LDCs



related expenditure has followed closely that of AfT, except for 2014–2016 during which the two variables have diverged.

We now turn to the empirical estimations to check whether they confirm the preliminary analysis concerning the correlation patterns.

3. Model Specification

To investigate the impact of trade-related government expenditure on AfT inflows, we draw on the few previous studies on the macroeconomic determinants of AfT (Gamberoni and Newfarmer 2009; Tadasse and Fayissa 2009; Gamberoni and Newfarmer 2014; Lee *et al* 2015; Gnangnon 2016a, 2016b, 2017) and postulate the following model:

$$\begin{aligned} Log(AfT)_{it} = {} & \alpha_0 + \alpha_1 Log(AfT)_{it-1} + \alpha_2 Log(EXPTRADE)_{it} + \alpha_3 Log(GDPC)_{it} \\ & + \alpha_4 TP_{it} + \alpha_5 Log(INFMORT)_{it} + \alpha_6 Log(POP)_{it} + \alpha_7 INST_{it} \\ & + \alpha_8 DUM_t + \mu_i + \alpha_9 Trend + \omega_{it} \end{aligned} \quad (1)$$

where i represents the index associated with a given AfT-recipient country; t denotes the time-period. α_0 to α_9 are parameters to be estimated. μ_i are countries' fixed effects. The variable 'Trend' represents a trend variable. ω_{it} is a well-behaved error term. The description and source of all variables contained in model (1) are provided in Appendix 1. Appendix 2 presents the list of countries used in the full sample. Appendix 3 contains standard descriptive statistics on variables used in model (1).

The dependent variable 'AfT' is the measure of AfT inflows supplied by donors to recipient-country *i* in year *t*. It could be either 'AfTCST1' or 'AfTCST2'. The one-year lagged value of this variable is introduced in model (1) because many aid projects run over several years. Hence, AfT could exhibit persistence over time (Lee *et al* 2015; Gnangnon 2016b, 2017). The variable 'DUM' has been introduced in model (1) to control for the effect of the 2008 financial crisis on AfT flows. This is a dummy variable that takes the value 1 for years 2008 to 2010, and 0 otherwise. We expect that AfT flows provided by donors to developing countries would decline during the period of the financial crisis. In this case, we would obtain a negative coefficient on this dummy variable relative to AfT flows. However, in light of the commitment made by developed WTO countries to extend higher AfT shares to developing countries, AfT flows might have been protected during the financial crisis. In this scenario, we would expect at least a non-statistically significant effect of the financial crisis on AfT flows, and at best a positive effect of the financial crisis on AfT flows.

The variable 'EXPTRADE' stands for trade-related government expenditure. It is measured by real trade-related expenditure, expressed in constant 2010 US dollars. The expected impact of trade-related government expenditure on AfT has already been discussed in Section 1.

The variable 'GDPC' represents the real per capita income of a given AfT recipient-country and aims to capture the development level of this recipient-country. It is expected that countries with lower development levels would likely receive higher AfT flows compared to more advanced economies, because the former are in highest need of AfT. It is worth noting that in contrast with some studies (e.g. Gounder and Doessel 1994; Lee *et al* 2015), we have not included in model (1) the square term[5] of real per capita income because the regressions with both the 'GDPC' variable and its square term indicate that the

square term of real per capita income does not significantly influence AfT inflows in the sample of 65 countries considered in the analysis.

The literature has also suggested complementing real per capita income with the infant mortality rate (per 1000 live births), denoted 'INFMORT', so as to better capture recipient-countries' well-being (e.g., Trumbull and Wall 1994; Wall 1995; Bandyopadhyay and Wall 2007; Younas 2008; Younas and Bandyopadhyay 2009; Gnangnon 2016a, 2017). Bandyopadhyay and Wall (2007) have pointed out that although economic and physical needs are clearly correlated in the long run, they do not necessarily move in the same direction over shorter periods.

We expect that a rise in the infant mortality rate in AfT-recipient countries would lead to a lower amount of AfT received by these countries, probably to the benefit of higher flows of the non-Aid for Trade component of total foreign aid (denoted 'Non-AfT'; Non-Aid for Trade flows cover the social components of overall development assistance (ODA), including aid for education and health). However, donors could also supply both higher AfT and Non-AfT flows to recipient-countries that experience higher infant mortality rates, on the grounds that the accumulation of human capital is necessary for trade development. In this scenario, AfT would likely rise further to an increase in the infant mortality rates in recipient-countries.

'TP' is the measure of trade policy implemented by a given AfT-recipient country. Trade policy liberalisation in recipient-countries could lead to higher AfT inflows to these countries, as the latter may be in the greatest need for AfT to better integrate into the global trading system (see Lee *et al* 2015). Similarly, recipient-countries that make an effort to undertake domestic trade reforms could receive higher amounts of AfT from donors, as the latter could be willing to assist those recipient-countries who implement such reforms - including through higher trade (including exports), by helping them to address the deficiencies in trade-related infrastructure and build productive capacity. In this case, trade policy liberalisation in recipient-countries would be associated with higher AfT inflows. However, it is still possible that donors assist financially developing countries that experience lower levels of trade policy liberalisation, in order to help them further liberalise their trade regimes. In this case, trade policy liberalisation in developing countries would be associated with higher AfT inflows.

The population size 'POP' has been introduced in model (1) to capture the size of the recipient-countries of AfT flows (e.g. Younas 2008; Lee *et al* 2015; Gnangnon 2016b). According to Younas (2008), the marginal impact of aid decreases as the population increases. In addition, countries with a growing population lack the administrative expertise to absorb large amounts of aid. Furthermore, donors could easily wield political influence over a smaller country than a large country.

'INST' is the index of institutional and governance quality in an AfT-recipient country. Some studies such as Lee *et al* (2015) and Gnangnon (2016a, 2016b,

2017) have emphasised the importance of institutional and governance quality for AfT allocation. Donors would be more willing to provide higher AfT amounts to recipient-countries that endeavour to improve their institutional and governance quality, on the grounds that such aid could be effective in promoting trade in countries with a better institutional and governance quality. In this context, better institutional and governance quality would be positively associated with AfT inflows to recipient-countries. The index of institutional and governance quality has been computed by extracting the first principal component (based on a factor analysis) of six indicators of governance (e.g. Globerman and Shapiro 2002) (see details on this variable in Appendix 1). Lower values of the 'INST' variable reflect lower governance and institutional quality.

It is important to underline that, as mentioned above, the transformation of many variables included in model (1) using the logs, aims to address outlier problems. Nonetheless, as the variable 'TP' contains '0' values (see Appendix 3), it has not been transformed into natural logs. Similarly, the variable 'INST' contains negative and positive values (see Appendix 3), and therefore, has also not been transformed.

4. Econometric Strategy

We first estimate model (1) without the one-year lag of the dependent variable as a regressor, using three estimators. The first estimator is the within fixed effects (denoted FE-DK) with standard errors being corrected with the Driscoll and Kraay (1998) technique to address contemporaneous correlation, autocorrelation, and heteroscedasticity in the dataset. The two other estimators are the random effects estimator, where the standard errors are clustered at the country level, and feasible Generalised least squares. The Hausman test to check the relevance of the fixed effects versus random effects estimators has also been performed.

The results of these different estimations of model (1) are reported in Table 1. However, these results could be biased because the one-year lag of the dependent variable has not been taken into account in the model specification to account for the persistence in AfT (as in the studies cited above concerning the determinants of AfT). Additionally, the trade-related expenditure variable could be endogenous as a result of the simultaneity bias vis-à-vis the dependent variable. In fact, while it is expected that trade-related government expenditure in a given country would influence the amount of AfT flows that this country would receive from donors, it is also possible that the AfT inflows supplied by donors influence the level of public expenditure that governments in recipient-countries would decide to allocate to their trade sectors. The presence of the one-year lag of the dependent variable as a regressor also raises an important endogeneity problem (Nickell bias – see Nickell 1981) in panel datasets like ours (with a small time-period and large cross-sectional dimension; in the current analysis, the time period dimension is T = 12, while the number of cross-sections is N = 65).

Table 1: Effect of Trade-Related Expenditure on total real AfT ('AfTCST1')

	***Estimator*:** FE-SK; RE, and FGLS		
VARIABLES	*FE-DK Log(AfTCST1)* (1)	*RE Log(AfTCST1)* (2)	*FGLS with panel AR(1) Log(AfTCST1)* (3)
Log(EXPTRADECST)	0.117** (0.0551)	0.116 (0.0972)	0.153*** (0.0357)
Log(GDPC)	–0.127 (0.377)	–0.815*** (0.225)	–0.894*** (0.0394)
TP	0.0124** (0.00522)	0.0124* (0.00674)	0.00198 (0.00172)
Log(INFMORT)	0.0849 (0.232)	–0.192 (0.335)	–0.206*** (0.0530)
Log(POP)	0.601 (0.438)	0.386*** (0.105)	0.392*** (0.0348)
INST	–0.00848 (0.123)	0.257** (0.122)	0.368*** (0.0259)
DUM	0.170*** (0.0397)	0.175** (0.0755)	0.102*** (0.0236)
Trend	0.0574*** (0.00737)	0.0656*** (0.0217)	0.0873*** (0.00738)
Constant	–110.1*** (16.72)	–116.4** (45.28)	–159.5*** (14.86)
Observations – Countries	499 – 65	499 – 65	497 – 63
Within R-Squared	0.1670	0.1571	
Between R-Squared		0.6515	
Overall R-Squared		0.5684	
Hausman Test of Fixed Effects versus Random Effects: Chi-square statistic and P-value	10.13 (0.2561)		

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. For the regressions based on Random Effects (see Column [2]), standard errors have been clustered at the country level.

In view of these two major endogeneity concerns, we need an appropriate estimator to obtain reliable estimates from model (1). Given the nature of the panel dataset, the best candidate estimator is the Generalised Methods of Moments (GMM). There are many variants of the GMM approach: the first-difference GMM developed by Arellano and Bond (1991) and the system GMM proposed by Blundell and Bond (1998). The system GMM technique encompasses the one-step system GMM and the two-step system GMM estimators. The two-step system GMM approach involves the estimation of an equation in levels, in addition to an equation in differences (where all regressors are transformed through differencing). In this system of equations, the equation specified in differences uses lagged levels of the regressors as instruments and the equation

in levels uses lagged differences of the regressors as instruments. Compared to the first-difference GMM and the one-step system GMM estimators, the two-step system GMM estimator performs better when cross-sectional variability dominates time variability, when there is strong persistence in the time series under investigation (Blundell and Bond 1998). Additionally, Roodman (2009) has reported that the two-step system GMM also helps avoid magnifying gaps when the panel dataset is unbalanced.

In light of the foregoing, we estimate model (1) (and several of its variants) by means of the two-step system GMM approach ('SGMM'). The validity of this estimator is ascertained by a series of standard tests. These include the Arellano-Bond (AB) test of first-order serial correlation in the error term (denoted AR(1)), and the test of no second-order (denoted AR(2)) in the error term. We additionally report the outcome of the test of the third-order autocorrelation in the error term (denoted AR(3)). The last test is the Sargan test of over-identifying restrictions, which determines the validity of the instruments used in the estimations. Incidentally, we also report the number of instruments used in the regressions, as the GMM estimator may lose power if the number of instruments is higher than the number of countries (Roodman 2009).

The empirical analysis based on the two-step system GMM proceeds as follows:

- First, we estimate model (1) over the full sample, using the variable 'AfTCST1' and 'AfTCST2' as the measure of the dependent variable, and 'EXPTRADECST' as the measure of trade-related expenditure. The results of these estimations are presented in Table 2.
- Second, we examine the differentiated effect of real trade-related expenditure on real AfT variables in LDCs versus Non-LDCs. To do so, we define a dummy variable 'LDC', which takes the value 1 if a country an LDC, and 0, otherwise (see Appendix 2 for the list of LDCs included in the sample). This dummy variable is then interacted with the variable 'EXPTRADECST', and the two variables are introduced in model (1). This new model specification is estimated using alternatively 'AfTCST1' and 'AfTCST2' as the measures of the dependent variable. Table 3 shows the outcome of these estimations.

5. Interpretation of Empirical Results

Results concerning the Hausman test show a p-value of 0.2561, indicating both fixed effects and random effects estimators could be used to estimate model (1). However, as these two estimators are not the primary relevant estimators of the analysis, we expand discussion on which estimator would be preferred in the current analysis over the other.

The estimates in Table 1 show that the increase in real trade related expenditure generate higher total real AfT (see results based on the FE-DK and FGLS reported respectively in columns [1] and [3]). Interestingly, the magnitude

of the estimates in columns [1] and [3] are similar and indicate for the fixed effects estimator (for example) that a 1 per cent change in the real trade-related expenditure is associated with a 0.12 per cent increase in total real AfT flows. Results in column [2] (based on the random effects estimator) of Table 1 suggest, however, that there is no significant effect of trade-related government expenditure on AfT. Control variables display various estimates across the three columns. However, across these three columns, the coefficient associated with the trend variable is always positive and statistically significant at the 1 per cent level, thereby suggesting that total real AfT flows have been on rise over time. Additionally, the coefficient of the dummy capturing the financial crisis is positive and statistically significant at least at the 5 per cent level, thereby indicating that over the sample considered in the analysis, AfT flows have increased during the period of the financial crisis.

Let us now turn to the results in Tables 2 and 3. Before interpreting the estimates reported in these tables, it is important to consider the results related to the diagnostic tests that help check the validity of the two-step system GMM approach. We observe that across the columns of these two tables, the coefficients of the one-year lag of the dependent variable are always positive and statistically significant at the 1 per cent level. These confirm the findings of previous studies that the AfT amount (in real values) received by a recipient-country in year $t-1$ is positively related to the current year's AfT amount received by the same country. In other words, there is a state dependence path in AfT flows. Furthermore, across all columns (see the bottom of these columns), the p-values associated with the AR(1) autocorrelation test amount to zero, whereas for AR(2) and AR(3) autocorrelation tests, the p-values are always higher than 10 per cent. Incidentally, the p-values associated with the Sargan statistics are always higher than 10 per cent, and the number of instruments used in the estimations is always lower than the number of countries. All these results confirm the validity of the two-step system GMM estimator to perform the empirical analysis.

The results in columns [1] and [2] of Table 2 show that real trade-related expenditure exerts a positive and statistically significant effect on 'AfTCST1' and 'AfTCST2'. These signify that real trade-related expenditure is associated with higher total real AfT flows, as well as with a rise in real AfT flows excluding aid related to trade policies and regulations. A 1 per cent increase in real trade-related expenditure is associated with a 0.16 per cent increase in total real AfT flows, and with a 0.28 per cent increase in real AfT flows excluding aid related to trade policies and regulations. Concerning control variables across the two columns of Table 2, we note that real per capita income influences negatively and significantly the AfT variables, which suggests that as countries enjoy a higher development level, they receive lesser AfT flows. Trade policy liberalisation and better institutional and governance quality induce higher real AfT flows. The population size and the infant mortality rate do not exert a significant effect on the two real AfT variables. The latter also

Table 2: Effect of Trade-related Government Expenditure on real AfT ('AfTCST1' and 'AfTCST2')_Over the Full Sample

Estimator: Two-step System GMM		
VARIABLES	*Log(AfTCST1)* *(1)*	*Log(AfTCST2)* *(2)*
One-Year Lag of the Dependent Variable	0.417*** (0.0253)	0.249*** (0.0353)
Log(EXPTRADECST)	0.158*** (0.0601)	0.282*** (0.0699)
Log(GDPC)	–0.627*** (0.104)	–0.989*** (0.169)
TP	0.00144** (0.000730)	0.00227** (0.000973)
Log(INFMORT)	–0.0368 (0.0546)	–0.246 (0.151)
Log(POP)	0.0780 (0.0714)	–0.0492 (0.0983)
INST	0.297*** (0.0355)	0.197*** (0.0594)
DUM	0.120*** (0.0165)	0.0903*** (0.0160)
Trend	0.0307*** (0.00730)	0.0481*** (0.0109)
Constant	–51.01*** (14.68)	–80.64*** (21.05)
Observations – Countries	457 – 65	440 – 64
Number of Instruments	57	59
AR1 (P-Value)	0.0008	0.0014
AR2 (P-Value)	0.2485	0.3647
AR3 (P-Value)	0.3711	0.8505
Sargan (P-Value)	0.3647	0.5452

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. The variable 'Log(EXPTRADECST)' has been considered as endogenous, whereas the variable 'TP' has been considered as predetermined. The other variables have been considered as exogenous. In particular, the variable 'INST' has been considered as exogenous for two reasons: first, it changes little over time; second the use of factor analysis severely mitigates the endogeneity concern that could stem from the reverse causality from the dependent variable to the 'INST' variable. The regression results in column [1] do not take into account outliers, whereas the regression results in column [2] do take account for outliers. 'DUM' is a dummy variable capturing the 2008 financial crisis. It takes the value 1 for the years 2008 to 2010, and 0 otherwise.

exhibit a rising trend over time. Finally, the coefficient of the variable 'DUM' is positive and statistically significant, at least at the 1 per cent level, thereby confirming the findings in Table 1 that AfT flows have increased during the period of the financial crisis.

Table 3: Differentiated effect of Trade-related Government Expenditure on 'AfTCST1' and 'AfTCST2' over LDCs versus Non-LDCs

Estimator: Two-step System GMM		
VARIABLES	*Log(AfTCST1)* *(1)*	*Log(AfTCST2)* *(2)*
One-Year Lag of the Dependent Variable	0.465*** (0.0253)	0.354*** (0.0302)
Log(EXPTRADECST)	0.113** (0.0489)	0.231*** (0.0547)
LDC*Log(EXPTRADECST)	–0.0624 (0.0463)	–0.164*** (0.0615)
LDC	0.930 (1.259)	3.511** (1.722)
Log(GDPC)	–0.599*** (0.0644)	–0.766*** (0.0814)
TP	–4.58e-05 (0.000884)	0.00358*** (0.000824)
Log(INFMORT)	0.0968 (0.0769)	–0.0733 (0.0855)
Log(POP)	0.119** (0.0558)	0.0562 (0.0621)
INST	0.290*** (0.0410)	0.207*** (0.0484)
DUM	0.107*** (0.0196)	0.108*** (0.0156)
Trend	0.0375*** (0.00768)	0.0325*** (0.00946)
Constant	–65.53*** (15.42)	–53.89*** (18.59)
Observations – Countries	457 – 65	440 – 64
Number of Instruments	58	58
AR1 (P-Value)	0.0008	0.0007
AR2 (P-Value)	0.2394	0.2708
AR3 (P-Value)	0.3734	0.9786
Sargan (P-Value)	0.3518	0.3390

Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parentheses. The variables 'Log(EXPTRADECST)' has been considered as endogenous, whereas the variable 'TP' has been considered as predetermined. The other variables have been considered as exogenous. In particular, the variable 'INST' has been considered as exogenous for two reasons: first, it changes little over time; second the use of factor analysis severely mitigates the endogeneity concern that could stem from the reverse causality from the dependent variable to the 'INST' variable. 'DUM' is a dummy variable capturing the 2008 financial crisis. It takes the value 1 for the years 2008 to 2010, and 0 otherwise.

Turning to Table 3, we see in column [1] that the coefficient of 'EXPTRADECST' is positive and statistically significant at the 5 per cent level, whereas the interaction term (related to the interaction variable between the LDC dummy and 'EXPTRADECST') is not statistically significant at the 10 per cent level. Taken together, these two results indicate that real trade-related expenditure influences, in the same way, total real AfT flows in LDCs and Non-LDCs, and the net effect of real trade-related expenditure on total real AfT flows for countries in these two sub-samples amounts to 0.11. In other words, a 1 per cent increase in trade-related expenditure is associated with a 0.11 per cent increase in total real AfT flows in LDCs and Non-LDCs alike.

In column [2] of Table 3, we find that the coefficient of 'EXPTRADECST' is positive and statistically significant at the 1 per cent level, and the interaction term related to the interaction between the LDC dummy and 'EXPTRADECST' is negative and statistically significant at the 1 per cent level. The negative and statistically significant interaction term suggests that the effect of real trade-related expenditure on real AfT (excluding aid allocated for trade policies and regulations) is lower in LDCs than in Non-LDCs. The net effect of real trade-related expenditure on 'AfTCST2' in LDCs is given by the coefficient 0.067 (=0.231–0.164), while for Non-LDCs the coefficient is 0.23. Hence, a 1 per cent increase in real trade-related expenditure is associated with a 0.067 per cent increase in 'AfTCST2' in LDCs, and 0.23 per cent increase in 'AfTCST2' in Non-LDCs.

The results for the control variables suggest that real per capita income exerts a negative and significant effect on real AfT flows (in columns [1] and [2] of Table 3). Trade policy liberalisation exerts a positive and significant impact on 'AfTCST2', whereas it does not significantly (at the 10 per cent level) affect 'AfTCST1'. Across the two columns of Table 3, we find that both institutional and governance quality influence real AfT variables positively and significantly. The infant mortality rate does not appear to affect significantly real AfT variables across the two columns of the table. However, population size is positively and significantly associated with total real AfT flows in column [1], but does not affect significantly real AfT flows excluding aid related to trade policies and regulations. Finally, the two AfT variables exhibit a rising trend over time, and AfT flows have increased during the 2008 financial crisis.

6. Conclusions

This research complements the few existing studies on the macroeconomic determinants of AfT flows, by examining the effect of trade-related government expenditure on the amount of AfT received by recipient-countries, from donors, to promote trade. The empirical analysis covers 65 countries over the period 2005–2016 and, primarily, uses the two-step system GMM estimator. Results suggest that over the full sample of countries, trade-related government expenditure exerts a positive and significant effect on AfT flows. This outcome applies also to the sub-samples of LDCs and Non-LDCs, although the

magnitudes of these positive effects are different for the two sub-samples. These findings, therefore, indicate that donors tend to allocate higher AfT flows to countries that devote higher expenditure to develop their trade sector, probably with a view to encouraging them further to promote trade.

One limitation of this study is relating to the computation of the trade-related government expenditure. The impact of the latter on AfT inflows could be reassessed when data offer greater coverage (including in terms of period and expenditure items) than the one currently available and used in this analysis.

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Appendix 1

Variables – Definitions and sources	
AfTCST1	**Definition:** AfTCST1 is the total Aid for Trade (AfT) Gross Disbursement from the DAC (Donor Assistance Committee Members) vis-à-vis a given recipient-country, expressed in constant 2016 US dollars **Source:** Author's Calculation. For 'AfTGDP1', data on GDP (current US$) comes from the World Development Indicators (WDI) of the World Bank. AfT data are extracted from the OECD/DAC-CRS (Organisation for Economic Cooperation and Development/Donor Assistance Committee)-Credit Reporting System (CRS). Hence, AfT data is computed on the basis the OECD/DAC Creditor Reporting System (CRS) database and cover the following three categories (the CRS Codes are in brackets): ***Economic Infrastructure***: transport and storage (210), communications (220), and energy generation and supply (230); ***Building Productive Capacity***: banking and financial services (240), business and other services (250), agriculture (311), forestry (312), fishing (313), industry (321), mineral resources and mining (322), and tourism (332); and ***Trade policy and regulations***: trade policy and regulations and trade-related adjustment (331).
AfTCST2	**Definition:** AfTCST2 is the total Aid for Trade (AfT) Gross Disbursement from the DAC (Donor Assistance Committee Members) vis-à-vis a given recipient-country, from which we subtract the AfT dedicated to "Trade policy and regulations". It is expressed in constant 2016 US dollars **Source:** Author's calculation.

EXPTRADECST	**Definition:** EXPTRADECST is the real trade-related government expenditure. It has been calculated in constant 2010 US dollars by multiplying EXPTRADEGDP by the real GDP (in constant 2010 US dollars) **Source:** Author's computation based on data sourced from IMF Database for expenditure by functions of Government Expenditure. See data online at: http://data.imf.org/regular.aspx?key=61037799
TP	**Definition:** This variable represents the trade policy in a recipient-country of AfT. It is measured by the score (index) of "Freedom to Trade Internationally", which is an important component of the Economic Freedom Index. "Freedom to Trade Internationally" is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. Its computation is based on two components: trade-weighted average tariff rate and non-tariff barriers (NTBs), the extent of the latter having been determined on the basis of the quantitative and qualitative information available. NTBs include quantity restrictions, price restrictions, regulatory restrictions, investment restrictions, customs restrictions, and direct government interventions. This score is graded on a scale of 0 to 100, with a rise indicating lower trade barriers, i.e., higher trade liberalisation, while a decrease in this index reflects rising trade protectionism. **Source:** Heritage Foundation (see Miller *et al* 2017)
GDPC	**Definition:** GDP per capita (constant 2010 US$) **Source:** World Development Indicators (WDI)
INFMORT	**Definition:** Infant mortality rate (%) **Source:** WDI
POP	**Definition:** Total Population **Source:** WDI
INST	**Definition:** This is the variable capturing institutional quality in a given country. It has been computed by extracting the first principal component (based on factor analysis) of the following six indicators of governance. These indicators are respectively denoted 'PolStab', 'RegQual', 'Rulelaw', 'GovEff', 'VoiceAcc' and 'Cor'. 'PolStab' is the measure of political stability and absence of violence/terrorism. 'RegQual' stands for Regulatory Quality index. 'Rulelaw' represents the Rule of Law index. 'GovEff' is the Government Effectiveness index. 'VoiceAcc' is the index of Voice and Accountability: 'Cor' is the index of corruption. It is worth noting that higher values of the index 'INST' are associated with better governance and institutional quality, while lower values reflect worse governance and institutional quality. **Source:** Data on the components of 'INST' variables has been extracted from World Bank Governance Indicators developed by Kaufmann *et al* (2010) and recently updated

Appendix 2

Descriptive statistics on the variables used in the analysis

Variable	*Observations*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
AfTCST1	763	2.15e+08	3.74e+08	34134	3.24e+09
AfTCST2	732	2.19e+08	3.77e+08	32179	3.23e+09
EXPTRADECST	525	6.41e+11	2.14e+12	7.15e+08	3.34e+13
TP	742	70.385	12.26	0	89.2
GDPC	780	4426.162	3992.583	218.284	20333.94
INFMORT	780	32.127	23.703	2.9	108.1
POP	780	6.76e+07	2.22e+08	82858	1.38e+09
INST	780	–0.976	1.283	–4.242	2.048

Appendix 3

List of countries used in the analysis

Full Sample			*LDCs*
Albania	Equatorial Guinea	Moldova	Angola
Algeria	Eswatini	Mongolia	Bangladesh
Angola	Ethiopia	Mozambique	Bhutan
Argentina	Fiji	Myanmar	Burundi
Armenia	Georgia	Namibia	Central African Republic
Azerbaijan	Guatemala	Nepal	Equatorial Guinea
Bangladesh	India	Nigeria	Ethiopia
Belarus	Iran, Islamic Rep.	Oman	Kiribati
Bhutan	Jamaica	Pakistan	Lesotho
Bolivia	Jordan	Philippines	Liberia
Brazil	Kazakhstan	Samoa	Madagascar
Burundi	Kenya	Serbia	Mozambique
Cabo Verde	Kiribati	Seychelles	Myanmar
Central African Republic	Kyrgyz Republic	Solomon Islands	Nepal
China	Lebanon	South Africa	Solomon Islands
Congo, Rep.	Lesotho	Sri Lanka	Uganda
Costa Rica	Liberia	Thailand	
Cote d'Ivoire	Madagascar	Tunisia	
Croatia	Malaysia	Turkey	
Dominican Republic	Maldives	Uganda	
Egypt, Arab Rep.	Mauritius		
El Salvador	Micronesia, Fed. Sts.		

Endnotes

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2. While no study exists on the impact of AfT on government spending, including expenditure related to the trade sector, studies such as Chatterjee *et al* (2012) have examined the effect of foreign aid on government spending, in particular whether foreign aid crowds out government spending in aid recipient-countries and whether (if at all) the degree of fungibility varies across different categories of aid.

3. The Least Developed Countries is a group of countries designated by the United Nations (in 1971) as the poorest and most vulnerable countries (to natural and external shocks) in the world. Details on LDCs and the list of countries included in this group can be found online at: http://unohrlls.org/about-ldcs/

4. Data can be collected from the IFPRI Database, online at: https://dataverse.harvard.edu/file.xhtml?fileId=2711562&version=2.0

5. The introduction of the square term of the real per capita income variable in model (1) by authors such as Gounder and Doessel (1994) and Lee *et al* (2015), aims to address middle-income bias, or the tendency of foreign aid to rise as the per capita income of a recipient-country rises, and falls as the recipient-country's per capita income reaches a relatively high level.

References

Arellano M and Bond S (1991) 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *Review of Economic Studies*, 58, 277-297.

Bandyopadhyay S and Wall H (2007) 'The determinants of aid in the Post Cold-War era', *Federal Reserve Bank of St. Louis Review*, 89(6), 533-547.

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

Chatterjee S, Giuliano P and Kaya I (2012) 'Where Has All the Money Gone? Foreign Aid and the Composition of Government Spending', *The B.E. Journal of Macroeconomics*, 12(1), Article 26. DOI: 10.1515/1935-1690.2458

Driscoll J C and Kraay A C (1998) 'Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data', *Review of Economics and Statistics*, 80(4), 549-560.

Gamberoni E and Newfarmer R (2009) 'Aid for Trade: Matching Potential Demand and Supply', Policy Research Working Paper 4991, Washington DC: World Bank.

Gamberoni E and Newfarmer R (2014) 'Aid for Trade: Do Those Countries that Need It, Get It?', *The Word Economy*, 37(4), 511-578.

Globerman S and Shapiro D (2002) 'Global foreign direct investment flow: The role of governance infrastructure', *World Development*, 30(11), 1899-1919.

Gnangnon S K (2016a) 'Aid for Trade and trade tax revenues in developing countries', *Economic Analysis and Policy*, 50, 9-22.

Gnangnon S K (2016b) 'Market Access of OECD Donor Countries and Their Supply of Aid for Trade', *Journal of International Commerce, Economics and Policy*, 07(1), 1650004, 38 pages.

Gnangnon S K (2017) 'Multilateral Trade Liberalisation, Export Share in the International Trade Market and Aid for Trade', *Journal of International Commerce, Economics and Policy*, 8(3), 1750014, 35 pages.

Gounder R and Doessel D P (1994) 'Population and Middle-income Biases in Australia's Bilateral Aid: Some Empirical Results', *Development Policy Review*, 12(1), 29-44.

Herzer D (2011) 'The long-run relationship between outward FDI and total factor productivity: Evidence for developing countries', *Journal of Development Studies*, 47, 767-785.

Kaufmann D, Kraay A and Mastruzzi M (2010) 'The Worldwide Governance Indicators Methodology and Analytical Issues', World Bank Policy Research No 5430, Washington DC: World Bank.

Lee H L, Park D and Shin M (2015) 'Do Developing-country WTO Members Receive More Aid for Trade (AfT)?', *The World Economy*, 38(9), 1462-1485.

Miller T, Kim A B, Roberts J M, Riley B and Whiting T (2017) '2017 Index of Economic Freedom, Institute for Economic Freedom', Washington DC: The Heritage Foundation: http://www.heritage.org/index/download

Nagel K, Herzer D and Nunnenkamp P (2015) 'How Does FDI Affect Health?', *International Economic Journal*, 29(4), 655-679.

Nickell S (1981) 'Biases in Dynamic Models with Fixed Effects', *Econometrica*, 49(6), 1417-1426.

Roodman D M (2009) 'A note on the theme of too many instruments', *Oxford Bulletin of Economic and Statistics*, 71(1), 135-158.

Tadasse B and Fayissa B (2009) 'Determinants of the Allocation of US Aid for Trade', Working Paper 200901, Duluth MN: Department of Economics and Finance, University of Minnesota-Duluth.

Trumbull W N and Wall H J (1994) 'Estimating aid allocation criteria with panel data', *Economic Journal*, 104(425), 876-882.

Wall H J (1995) 'The allocation of official development assistance', *Journal of Policy Modeling*, 17(3), 307-314.

Younas J (2008) 'Motivation of Bilateral Aid Allocation: Altruism or Trade Benefits', *European Journal of Political Economy*, 24(3), 661-674.

Younas J and Bandyopadhyay S (2009) 'Do Donors Care About Declining Trade Revenue from Liberalisation? An Analysis of Bilateral Aid Allocation', *Federal Reserve Bank of St. Louis Review*, 91(3), 141-153.