

# Aid for Trade Effectiveness: Complementarities with Economic Integration

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## Abstract

Developing countries are increasingly using regional integration as a main policy lever when pursuing a trade-led growth strategy, and today, 'deep' preferential trade agreements go beyond trade policy negotiations and cover trade facilitation issues. Since aid for trade (AFT) has been recognized as a powerful instrument for increasing developing countries' trade capacity by targeting internal trade costs, this paper tests whether complementarities exist between this type of aid and economic integration using a gravity model on panel data for the period 1995 to 2005. Results indicate that AFT, when combined with economic integration, has been effective in increasing trade flows. Both South-South and North-South trade flows have benefited and the combination of the two instruments has been particularly effective in expanding the South's exports to the North. Finally, when breaking down AFT into categories, assistance to trade-related institutions seems to generate the strongest complementarities with economic integration.

**Key words:** Aid for Trade, Gravity Model, Preferential Trade Agreement, Integration, Trade Facilitation

**JEL classification:** F1, O190, O240

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## 1. Introduction

The current impasse in multilateral negotiations at the Doha Round has motivated countries - whether developed or developing- to use regionalism as an instrument to pursue trade liberalization. This has led to a proliferation of reciprocal Preferential Trade Agreements (PTAs). As of middle-2012, almost 300 PTAs have been notified to the World Trade Organization (WTO) with countries usually participating in several agreements. Part of this success is explained by the attractiveness of such agreements compared to multilateral ones: a smaller number of players, a possibility to deepen market access in the sectors with the highest pay-offs and a short-term advantage in terms of preferential margins.

However, for most developing countries an increase in trade no longer depends on tariff reductions (WTO, 2011) and the Least Developed Countries (LDCs) already benefit from duty-free access to major markets. Now traders face other at-the-border and beyond-the- border trade costs, such as burdensome procedures, transit bottlenecks and absence of certification agencies. These trade-facilitation-related constraints are recognized to have significant impacts on trade volumes (Limao and Venables, 2001; Wilson *et al.*, 2003, 2005; Portugal-Perez and Wilson, 2012). Estimates indicate that addressing those issues are likely to have higher pay-offs in terms of trade than a reduction in trade-policy barriers (Anderson and van Wincoop, 2004; Hoekman and Nicita, 2011). Thus, seeking to increase market access is no longer likely to be an important reason for further regionalization.

Indeed, negotiations in modern PTAs tend to go wider and deeper over time, covering WTO+ type issues not sufficiently addressed by the multilateral system, such as technical barriers to trade and trade facilitation; or behind the border WTO-X type issues such as investment and competition policy (Chauffour and Maur, 2011; WTO, 2011; Baldwin, 2011) not addressed in the multilateral negotiations. This deeper agenda reflects the increasing acceptance of important gains from regional coordination and cooperation on those issues (Maur, 2011); and as mentioned by Hoekman (2011) "if PTAs are to be development-friendly, they must focus on complementing liberalization in trade goods with behind-the-border regulatory reforms that are supported through development assistance instruments [...]".

In fact, PTAs (particularly North-South) are increasingly linking trade-related assistance packages to trade negotiations. For instance, it has been argued that the European Union (EU) uses its aid package within Economic Partnership Agreements or other Association Agreements to encourage developing countries to make further concessions on negotiations in the trade pillar. However, there is some justification for tying AfT with PTAs beyond buying goodwill: some North-South PTAs have harmonization clauses which are costly to comply with and the EU is providing assistance to help developing countries' exporters meet these new requirements. For instance, looking at provisions on standards, Budetta and Piermantini (2009) find that among 58 PTAs, 22 have provisions relating to technical assistance.

Despite the ongoing debate on aid effectiveness following the “Paris Declaration”, as discussed by Cadot et al. (2013), there is still little quantitative evidence on AfT effectiveness and particularly none when it comes to an examination of the any potential complementarities between trade-related aid to countries and their participation in PTAs. Regarding PTAs’ impact on trade, the evidence is usually based on gravity models (see Hoekman and Ozden, (2005), Cardamone (2007) and Head and Mayer (2013) for selective surveys). Performing a meta-analysis over 75 gravity-based studies that evaluate the effect of reciprocal PTAs on trade, Cipollina and Salvatici (2010) find robust evidence supporting the idea that PTAs do increase trade, but they argue that estimates vary a lot across studies depending on model specification, on sample selection, and especially on estimation methods. As claimed by Cardamone (2007) and confirmed by Head and Mayer (2013), papers tend to disregard one or more issues related to the endogeneity of PTAs, the presence of zero trade flows, heteroscedasticity concerns and the persistence of trade, all of which lead to biased estimates.

Performing a theory-consistent estimation of the ‘structural gravity’ model such as the one formulated by Anderson and Van Wincoop (2003) has been a major challenge. Monte-Carlo experiments by Head and Mayer (2013) suggest that some estimators commonly used to deal with multilateral resistance terms often lead to biased estimates of PTAs impact on trade. In a theory-consistent estimation, Baier and Bergstrand (2007) include country-year and bilateral fixed effects and allow for a phasing-in effect of agreements on a sample of 96 countries over the period 1960-2000 to test if free trade agreements had a positive impact on trade. Their results suggest that on average after 10 years, these agreements double members’ trade. After correcting for the endogeneity of regional trade agreement variables with bilateral specific random effects on a sample of 130 countries between 1962 and 1996, Carrère (2006) also finds that these PTAs did increase intra-members trade, though sometimes at the expense of trade with the rest of the world.

This paper’s contribution is to assess in a theory-consistent setting whether complementarities between trade-related assistance and PTAs with different degrees of intensity in economic integration increase developing countries’ trade. This question seems particularly relevant for trade facilitation issues, as PTAs generally generate binding arrangements and create special institutions to ensure enforcement of commitments while AfT provides the human and capital investment needed to yield such provisions. This paper tests whether AfT effectiveness in terms of trade performance increases when there is economic integration between partners.

This paper is organized as follow. Section 2 presents the estimation strategy for the gravity model and the data. Section 3 gives results for the whole sample, then for the South-South and North-South sub-samples. Section 4 turns to results when AfT is divided into three categories: trade-related institutions, trade-related infrastructure and building productive capacity. Section 5 concludes.

## 2. Econometric model and results

### 2.1. Data

The empirical strategy is dictated by working with an unbalanced panel of 185 countries with annual data over the period 1995-2005. Aid flows were compiled from the OECD Creditor Reporting System (CRS) database, which allows studying the distribution of the ODA by sector, donor and recipient country.

Following the definition from the Task Force that deals with the CRS, AfT is measured as the sum of three aid categories<sup>1</sup>: (i) technical assistance for trade policy and regulations, proxy for trade-related institutions; (ii) trade-related infrastructure; and (iii) productive capacity building, proxy for assistance to productive sectors. Aid commitments were preferred over disbursements that are not routinely reported by multilateral donors but which are important contributors of AfT. Finally, aid flows received by a country are summed across all donors<sup>2</sup>. So defined, trade-related assistance is an important source of revenue for developing countries as it represents around 33% of total programmable aid. On average between 1995 and 2005 AfT related to infrastructure regroups more than 50% of AfT flows (60 million USD) while aid to productive capacity building represents about a third (35 million USD). Technical assistance for trade policy and regulations is equal to 10% of total AfT (10 million USD) (see table A.1.).

The degree of economic integration of a pair of countries is approximated by an ordered discrete variable ranging from 0 -no existing Economic Integration Agreement (EIA)- to 6 -Economic Union<sup>3</sup>. This indicator allows approximating a deepening in economic integration, proxy for tighter commitments in trade facilitation issues. As shown in table A.2., world trade is increasingly covered by EIAs, going from 30% to 40% of total trade between 1995 and 2005 and taking progressively deeper forms.

The dependent variable is the total bilateral exports from country  $i$  to country  $j$  in year  $t$ , and data comes from BACI, a trade data base constructed at CEPII<sup>4</sup>. Usual gravity variables to approximate trade costs also come from the same source<sup>5</sup>. Finally, GDP data was retrieved from the World Bank's World Development Indicators.

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<sup>1</sup> The trade-related adjustment (iv) category was not included as it didn't exist before 2007.

<sup>2</sup> I am interested on the aggregate impact of AfT and want to avoid potential tied-aid bilateral effects.

<sup>3</sup> The variable was constructed by Scott Baier and Jeffrey Bergstrand: 0 is no existing Economic Integration Agreement, 1 is a One-Way Preferential Trade Agreement, 2 is a Two-Way Preferential Trade Agreement, 3 is a Free Trade Agreement, 4 a Customs Union, 5 a Common Market and 6 an Economic Union. Data is available at Jeffrey Bergstrand's website: <http://kellogg.nd.edu/faculty/fellows/bergstrand.shtml>.

<sup>4</sup> An original procedure is applied to reconcile export and import values from the United Nations' COMTRADE database; trade values are FOB.

<sup>5</sup> The following trade costs  $Distance_{ij}$ ,  $Contiguity_{ij}$ ,  $Language_{ij}$ ,  $Colonial\_Rel_{ij}$ ,  $Common\_Colonizer_{ij}$  and  $Landlocked_{ij}$  come from the CEPII database available at <http://www.cepii.fr/anglaisgraph/bdd/distances.htm>

## 2.2. A Structural Gravity Model and estimation strategy

As shown by Novy (2011) and Head and Mayer (2013) a 'structural gravity' model is implied by a range of theoretical frameworks including Ricardian models, monopolistic competition models and firm heterogeneity models. This model allows me to identify the deviation from 'normal' bilateral trade of countries having signed a trade agreement and having received AfT. Motivated by the potential complementarities between these two instruments, three questions arise: Does AfT increase trade? Do EIAs increase trade? Does AfT have an additional positive impact on trade, conditional on the existence of a EIA? As the first two questions are already covered by the previous literature, I focus on the third: the additional impact of AfT flows on developing countries' exports and imports when combined with economic integration.

A theory-consistent estimation of the structural gravity model (Head and Mayer, 2013) is pursued with the following log-linear form:

$$\ln X_{ijt} = \beta_0 + \beta_1 INT_{ijt} + \beta_2 \ln(AFT_{it}) * INT_{ijt} + \beta_3 \ln(AFT_{jt}) * INT_{ijt} + \Omega' C_{ijt} + \gamma_{it} + \gamma_{jt} + n_t + \varepsilon_{ijt} \quad (1)$$

where  $X_{ijt}$  represents country  $i$  exports to  $j$  in current thousand US\$ at year  $t$ . Aid for Trade commitments are expressed in current thousand US\$ and  $\ln(1 + AFT_{i(j)t})$  is used because some countries (e.g. industrialized economies) do not receive such assistance. Multilateral resistance terms are controlled for with exporter-time  $\gamma_{it}$  and importer-time  $\gamma_{jt}$  specific effects (as recommended by Head and Mayer, 2013; Baldwin and Taglioni, 2006; and Feenstra, 2004),  $n_t$  is a vector of year specific effects and  $\varepsilon_{ijt}$  is a random error term satisfying usual assumptions. Distance and other usual gravity variables are included in ( $C_{ijt}$ ). A Least Square Dummy Variables (LSDV) estimator with errors clustered by pair is retained<sup>6</sup>. Even though this formulation makes it impossible to measure the direct impact of AfT on bilateral trade flows, its additional impact through economic integration can still be tested.

Thus, the two coefficients of interest are  $(\beta_2, \beta_3)$  which measure the interaction of  $\ln(AFT_{it})$  and  $\ln(AFT_{jt})$  with integration ( $INT_{ijt}$ ). This allows to test if AfT received by the exporter ( $\beta_2$ ) and the importer ( $\beta_3$ ) increase intra-members' trade when there is an EIA; and vice versa, if a deepening in economic integration increases intra-members trade when AfT is received by the members. Thus, I expect a positive sign on these two coefficients. Indeed, complementarities may appear if further integration translates into a higher absorption capacity of foreign assistance because of better coordination, cooperation and implementation of trade facilitation reforms between members. Non-significant estimates would suggest that reforms benefit all partners equally, regardless of their membership to a common EIA. Finally, considering the extensive

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<sup>6</sup> Identical results are obtained with the two-way fixed effects methodology developed by Guimaraes and Portugal (2010).

evidence on PTAs' effectiveness based on gravity models (Cipollina and Salvatici, 2010), the coefficient  $\beta_1$  on integration ( $INT_{ijt}$ ) is expected to be positive and significant in specifications measuring the direct impact<sup>7</sup> of EIAs on bilateral trade flows.

The sample has 19% of country pairs with zero trade flows. Using a Poisson Pseudo Maximum Likelihood estimator or any other non-linear regression model to deal with heteroscedasticity and zero trade values is problematic as interactive variables' estimates (e.g. AfT combined with EIAs) cannot be directly interpreted (Ai and Norton (2003)). Unfortunately, a correction is only available for Probit and Logit models (Norton et al.(2004)) and computing partial derivatives by hand is unfeasible due to the large dimension of the panel. Hence, I estimate linear regression models on positive values of trade and as advocated by Anderson and van Wincoop (2003, 2004), I use economic size-adjusted trade as an alternative dependent variable in order to attenuate a potential heteroskedasticity bias.

### 3. Results

Results are discussed in two steps: first average effects of AfT combined with regionalization in the entire sample and in North-South and South-South samples are reported in Tables 1 and 2. Then, the three main categories of AfT are assessed sequentially in Table 3: assistance to trade-related institutions, assistance to trade-related infrastructure and aid to capacity building.

#### 3.1. Aid for Trade: complementarities with economic integration

Estimates in Table 1 suggest that the level of integration captured by ( $INT_{ijt}$ ) is significantly and robustly associated with the intensity of bilateral trade (columns 1 to 4) even if the magnitude decreases after controlling for multilateral resistance terms using LSDV (column 3) and for further unobserved bilateral trade costs constant in time using a Within estimator (column 4). These results are in line with the extensive evidence that support a positive impact of PTAs on trade using gravity models (Head and Mayer, 2013; Cipollina and Salvatici, 2010).

AfT received by the exporter and by the importer also have a positive and highly significant impact on trade flows, both directly using OLS (column 2) and indirectly through complementarities with economic integration using LSDV (column 5). A Within estimator to reduce further the potential bias due to omitted bilateral trade costs is not suitable here due to the short time span of the panel (Baldwin and Taglioni, 2006). Indeed, most of the trade agreement effect would not be captured as 87% of the pairs have a constant level of integration throughout the sample period and we need these for testing the association between AfT and bilateral trade when there is a trade agreement, whether a deepening in integration has occurred or not during the period. However, results from column (4) which controls best for endogeneity with country-pair dummies tend to confirm that the significance of interactive terms is not driven by endogeneity issues affecting the EIA variable.

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<sup>7</sup> The direct impact will be tested in specifications without interactive terms.

As for estimates from traditional gravity variables, results are in line with the meta-analysis of structural gravity models (Head and Mayer, 2013)<sup>8</sup>.

In sum, taking a theory-consistent estimation of the gravity model where AfT and EIA are interacted as the baseline specification (column 5), results suggest that trade-related aid and economic integration do complement each other in enhancing intra-members trade. Furthermore, the complementarity seems stronger from the exporter side. An increase in the AfT received by the exporter (importer) will favor exports to (imports from) intra-members of the same EIA more than the ones directed to (from) the rest of the world. Moreover, for a country receiving AfT, the deeper the level of integration with his partner the stronger is the AfT impact.

Within the North-South sample (column 6)<sup>9</sup>, exports from developing countries to northern partners are higher when AfT is combined with preferential market access, suggesting that complementarities arise between these two instruments. Indeed, AfT may help southern exporters to cope with new technical regulations and product standards imposed by harmonization clauses contained in some North-South EIAs. One example is the Pesticide Initiative Program financed by the European Commission with the objective to help African-Caribbean-Pacific exporters of fresh fruits and vegetables to comply with European traceability and food-safety requirements (Jaud and Cadot, 2012).

In the South-South sub-sample (column 7) results indicate some complementarities between AfT and economic integration from the exporter side. This may occur, for example, if technical assistance is delivered to members to accompany their negotiations on mutual-recognition of procedures and product standards. Trade assistance might also have a complementary role by facilitating the development of regional standards infrastructure (Maur, 2011). As for the positive and significant value for the depth of integration variable, it might reflect the effects of reductions in bilateral trade policy barriers in South-South bilateral trade.

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<sup>8</sup> These estimates are reported in the supplementary appendix available in the discussion paper version on the FERDI website (table S.1, column 1).

<sup>9</sup> A country is considered to be from the South or the North according to its GDP per capita in current US\$ for each year of the sample (following the World Bank's classification of countries adopted each year).

**Table 1** : Complementarities between Aid for Trade and economic integration

| Ln ( $X_{ij,t}$ )                    | 1995-2005            |                        |                      |                       |                                | North-South                   | South-South                   |
|--------------------------------------|----------------------|------------------------|----------------------|-----------------------|--------------------------------|-------------------------------|-------------------------------|
|                                      | Total sample         |                        |                      |                       |                                |                               |                               |
| Column                               | (1)<br>OLS           | (2)<br>OLS             | (3)<br>LSDV          | (4)<br>Within         | (5)<br>LSDV                    | (6)<br>LSDV                   | (7)<br>LSDV                   |
| Integration_ij                       | 0.244***<br>(0.0169) | 0.211***<br>(0.0176)   | 0.161***<br>(0.0188) | 0.0618***<br>(0.0163) | -0.0122<br>(0.0203)            | 0.0194<br>(0.0394)            | 0.314***<br>(0.0498)          |
| Ln(AfT_i)                            |                      | 0.0242***<br>(0.00817) |                      |                       |                                |                               |                               |
| Ln(AfT_j)                            |                      | 0.0356***<br>(0.00779) |                      |                       |                                |                               |                               |
| <b>Ln(AfT_i)*<br/>Integration_ij</b> |                      |                        |                      |                       | <b>0.0298***</b><br>(0.00292)  | <b>0.0115**</b><br>(0.00568)  | <b>0.0118**</b><br>(0.00499)  |
| <b>Ln(AfT_j)*<br/>Integration_ij</b> |                      |                        |                      |                       | <b>0.00737***</b><br>(0.00280) | <b>0.0123***</b><br>(0.00447) | <b>-0.00841*</b><br>(0.00502) |
| Observations                         | 95,280               | 95,280                 | 105,617              | 105,473               | 105,617                        | 48,021                        | 47,566                        |
| Number of pairs                      | 12,010               | 12,010                 | 13,438               | 13,415                | 13,438                         | 6,326                         | 7,217                         |
| Pair FE                              | No                   | No                     | No                   | Yes                   | No                             | No                            | No                            |
| Exp. *time &<br>Imp.*time FE         | No                   | No                     | Yes                  | Yes                   | Yes                            | Yes                           | Yes                           |
| Time dummy                           | Yes                  | Yes                    | Yes                  | Yes                   | Yes                            | Yes                           | Yes                           |
| R-squared                            | 0.686                | 0.688                  | 0.760                | 0.161                 | 0.762                          | 0.798                         | 0.678                         |

Robust standard errors in brackets (clustered by country pairs). Results for typical gravity variables are reported in table S1. They are consistent with those from meta-analysis. Samples in column (1) and (2) are smaller due to missing observations on GDP variables and in column (4) because pairs with 2 observation or less had to be dropped.

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

**Source:** Author's

Table 2 carries out a sensitivity analysis on the whole sample. First, defining integration as a dummy equal to one if countries share a Free Trade or deeper PTA to allow computing marginal effects, results show a coefficient of 0.46 using a LSDV estimation, which is close to the 0.5 value reported by the meta-analysis on PTAs. Reproducing the within estimation of Baier and Bergstrand (2007) with actual and lagged EIAs, estimates indicate that after 5 years, formation of an agreement increases the level of bilateral trade by 29%, which is more plausible than their 95% predicted increase.<sup>10</sup> Estimates with AfT interactive effects are similar in significance and higher in magnitude than the baseline specification (Table 2, column 1), in line with stronger complementarities happening at deeper levels of integration. According to this specification, 1 US\$ in AfT translates, on average, into 7 US\$ in additional intra-member trade<sup>11</sup>.

Column 2 shows similar results when disbursements are used instead of commitments. Controlling for heteroskedasticity in column 3 by using exports over the product of GDPs also produces results very similar to the baseline. Fourth, checking for lagged effects to capture the possibility that

<sup>10</sup> Results are reported in the supplementary appendix available in the discussion paper version on the FERDI website (table S.1, column 2 to 4).

<sup>11</sup> Average trade and AfT values during the entire period were used to compute these marginal effects.



coordination takes time to bear fruit, actual and 5-year lags for AfT are retained. Results in column 4 suggest that both past and actual trade-related assistance flows influence exports to members relative to non-members. The impact for imports seems to be more immediate, consistent with AfT programs oriented toward import facilitation (such as custom modernization) having a faster impact on trade.

**Table 2:** Testing the robustness of complementarities between Aid for Trade and economic integration

| Ln ( $X_{ij,t}$ )                            | Baseline<br>specification<br>(T.1, col. 5)<br>(5) | FTA and<br>deeper<br>integration<br>(1) | 1995 – 2005<br>Disbursement<br>(2) | $\frac{X_{ij,t}}{GDP_{i,t} * GDP_{j,t}}$<br>(3) | 5 years<br>lag<br>(4)         | 2000 - 2009<br>Integration<br>(Regolo,<br>2013)<br>(6) |
|--|---|---|------------------------------------|---|-------------------------------|--|
| Column                                       | LSDV  |   |                                    |   |                               |  |
| Integration_ij                               | -0.0122<br>(0.0203)                               | -0.159**<br>(0.0688)                    | -0.00407<br>(0.0204)               | -0.0156<br>(0.0206)                             | 0.00273<br>(0.0305)           | -0.00352<br>(0.00316)                                  |
| <b>Ln(AfT_i)*<br/>Integration_ij</b>         | <b>0.0298***</b><br>(0.00292)                     | <b>0.0977***</b><br>(0.0104)            | <b>0.0312***</b><br>(0.00310)      | <b>0.0276***</b><br>(0.00301)                   | <b>0.0121***</b><br>(0.00370) | <b>0.00144***</b><br>(0.000451)                        |
| <b>Ln(AfT_j)*<br/>Integration_ij</b>         | <b>0.00737***</b><br>(0.00280)                    | <b>0.0495***</b><br>(0.00965)           | <b>0.00625**</b><br>(0.00301)      | <b>0.00932***</b><br>(0.00286)                  | <b>0.00632*</b><br>(0.00332)  | <b>0.00135***</b><br>(0.000441)                        |
| L5_<br>Integration_ij                        |   |   |                                    |   | -0.00496<br>(0.0319)          |  |
| <b>L5_Ln(AfT_i)*<br/>Integration_ij</b>      |   |   |                                    |   | <b>0.0192***</b><br>(0.00437) |  |
| <b>L5_<br/>Ln(AfT_j)*<br/>Integration_ij</b> |   |   |                                    |   | 0.00269<br>(0.00387)          |  |
| Observations                                 | 105,617   | 105,617                                 | 105,617                            | 95,280  | 58,643                        | 29,797   |
| Number of pairs                              | 13,438  | 13,438                                  | 13,438                             | 12,010  | 12,488                        | 3,281  |
| Pair FE                                      | No  | No                                      | No                                 | No  | No                            | No   |
| Exp. *time &<br>Imp.*time FE                 | Yes   | Yes                                     | Yes                                | Yes   | Yes                           | Yes  |
| Time dummy                                   | Yes   | Yes                                     | Yes                                | Yes   | Yes                           | Yes  |
| R-squared                                    | 0.762   | 0.761                                   | 0.761                              | 0.475   | 0.768                         | 0.867  |
| 1 US\$ AfT                                   | 7 US\$ Exp.                                       |   |                                    |   |                               |  |

Robust standard errors in brackets (clustered by country pairs). Results for typical gravity variables are consistent with meta-analysis and can be seen in table S1. The sample in column (3) is smaller due to missing observations on GDP variables and in column (6) due to a smaller coverage of country pairs by the EIA database from Regolo (2013).

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

**Source:** Author's

Finally, column (6) reports estimates from a more recent sample using an alternative integration variable taken from Regolo (2013). That variable has greater granularity to approximate the depth of integration<sup>12</sup>. Column 6 shows that interactive effects still appear positive and significant at 1%, suggesting that results are robust to a change in the period and to a different definition of trade integration.

### 3.2. Aid for Trade effectiveness by category: trade related institutions, trade-related infrastructure and productive capacity building

Each component of the AfT agenda addresses different obstacles to trade, whether they are linked to trade-related institutions, to trade-related infrastructure or to a lack of productive capacity. Table 3 investigates complementarities with EIAs across these three categories on the entire sample.

**Table 3:** Aid for Trade to: Institutions; Infrastructure; Productive capacity building

| Ln ( $X_{ij,t}$ )               | 1995-2005                     |                                |                               |
|---------------------------------|-------------------------------|--------------------------------|-------------------------------|
|                                 | Institutions<br>(1)           | Infrastructure<br>(2)          | Production<br>(3)             |
|                                 | LSDV                          |                                |                               |
| Integration_ij                  | 0.0368*<br>(0.0193)           | 0.0142<br>(0.0203)             | 0.0620***<br>(0.0200)         |
| <b>Ln(AfT_i)*Integration_ij</b> | <b>0.0319***</b><br>(0.00330) | <b>0.0300***</b><br>(0.00306)  | <b>0.0255***</b><br>(0.00279) |
| <b>Ln(AfT_j)*Integration_ij</b> | <b>0.0176***</b><br>(0.00292) | <b>0.00745***</b><br>(0.00285) | <b>0.00558**</b><br>(0.00275) |
| Observations                    | 105,617                       | 105,617                        | 105,617                       |
| Number of pairs                 | 13,438                        | 13,438                         | 13,438                        |
| Pair FE                         | No                            | No                             | No                            |
| Exp. *time & Imp. *time FE      | Yes                           | Yes                            | Yes                           |
| Time dummy                      | Yes                           | Yes                            | Yes                           |
| R-squared                       | 0.761                         | 0.761                          | 0.761                         |

Robust standard errors in brackets (clustered by country pairs).

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Source:** Author's

<sup>12</sup> I thank Julie Regolo for providing her integration indicator. The extent of integration indicator is represented by two variables: a dummy equal to one if the pair of countries share an FTA or deeper PTA and a discrete variable ranging from 0 to 48 based on counting the number of WTO+ and WTO-X provisions legally enforceable in such agreements to capture the depth of integration. As both variables cannot be jointly included in the regression due to multicollinearity, I convert them into one discrete variable ranging from 0 to 49. This alternative variable covers less than 1/3 of the pairs in the previous sample, but it provides an interesting alternative proxy for the deepness of EIAs by adding higher variability between pairs.

#### a) Aid to trade-related institutions

Column 1 estimates show that aid to trade-related institutions, which takes usually the form of technical assistance, is a complement to economic integration. This type of complementarity would occur if AfT finance programs such as training courses on bilateral trade negotiations for government staff or on compliance with rules of origin. For example, the Southern African Development Community program of vaccination, surveillance and control of animal movements across borders to combat highly contagious bovine diseases that received support from donors is a good example of aid to trade-related institutions with a regional approach (Maur, 2011). A one-stop border post at customs serving only EIAs members' trade, as is the case in the East African Community or in the Central American Custom Union, would be another example. The somewhat higher elasticities in column 1 (compared to those in columns 2 and 3) suggest that AfT to trade-related institutions may have the highest pay-off in terms of increasing trade volumes. Computing marginal effects, a 1 US\$ in institutional assistance would translate into 72 US\$ in additional intra-members' trade<sup>13</sup>.

#### b) Aid to trade-related infrastructure

Estimates of complementarity between integration and AfT to trade-related infrastructure are shown in column 2. This type of AfT aims to reduce bottleneck obstacles that increase trade costs related to infrastructure, many of which have a regional dimension, often considered as regional public goods. As expected, results in column 2 suggest complementarities between AfT and economic integration for both directions of trade.

One of the main examples illustrating these potential complementarities are transit corridors, which are of crucial relevance for landlocked countries. As Maur (2011) highlights, the management of transit corridors requires three key ingredients which are, legal arrangements, the provision of physical infrastructure, and the operationalization of the transit itself. As part of EIAs' negotiations, binding arrangements in infrastructure-related trade facilitation provisions could facilitate acceptance of reforms at home and skirt political-economy concerns (usually frequent in those often non-competitive markets) while AfT could cover the physical investment needed.

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<sup>13</sup> To produce these marginal effects, average values for trade and trade-related institutional assistance are used. Estimates retained come from a specification where integration is defined as a dummy equal to one if countries share a FTA or deeper EIA (results available in the supplementary appendix on the FERDI website (table S.2.). These high multiplier estimates do not recognize that high AfT flows would run into diminishing returns in terms of increased bilateral trade.

#### c) Aid to building productive capacity

Finally, column 3 reports results for AfT to building productive capacity, which can enhance trade by increasing exportable production, for example by supporting the birth of a new agricultural supply chain where the country has a comparative advantage. It can also favor imports if assistance is directed towards sectors intensive in foreign intermediate goods consumption. Results indicate that this kind of assistance is a complement to economic integration for both directions of trade.

In the case of AfT received by the exporting country  $i$ , we may think that complementarities will arise when building productive capacity programs intend to help exporters to adopt standards promoted by harmonization clauses in North-South EIAs (e.g. the European Pesticide Program; Jaud and Cadot, 2012). Also, complementarities may appear if AfT finances emerging export sectors where the country has a comparative advantage in EIAs members' markets.

If aid to productive capacity building is received by the importer, complementarities with economic integration may arise if assistance promotes sectors intensive in foreign intermediate goods consumption, where production is intended to be exported to EIAs members' markets. In this case, we might think indeed that rules of origin will promote imports from EIA members more than from the rest of the world. Other complementarities may also take place if AfT supports the development of regional integrated value chains.

#### 4. Conclusions and final thoughts

Using a gravity model over the period 1995 to 2005, this paper shows significant complementarities between AfT and regional economic integration. These results are robust to a correction for the endogeneity of EIAs, to the choice of integration proxy, and to the introduction of lags in AfT commitments. Results suggest that AfT effectiveness in terms of increased bilateral trade is increased when countries share a certain degree of economic integration, with on average 7 US\$ in additional intra-members trade resulting for every 1 US\$ invested. Estimates also suggest that within AfT, assistance to trade-related institutions displays the highest impact. On average, 1 US\$ in institutional assistance translates into 72 US\$ in additional intra-members' trade.

Thus, combining EIAs with trade-related assistance seems a promising development strategy to foster developing countries' trade. From a policy recommendation perspective, the evidence here suggests that the design of trade intervention projects and programs with a regional approach should be encouraged. It also gives support to integration agreements where trade negotiations and aid packages go hand-by-hand.

## Appendix: Summary Indicators and key statistics

**Table A.1.:** Exports and Aid for Trade variables

| Variable                          | Obs.    | Mean      | Std. Dev. | Min | Max       |
|-----------------------------------|---------|-----------|-----------|-----|-----------|
| Bilateral exports (thousand US\$) | 105 617 | 339 340.5 | 3 644 305 | 1   | 2.82e+08  |
| AfT (thousand US\$)               | 105 617 | 105 597.2 | 307 060.9 | 0   | 4 589 134 |
| AfT by category:                  |         |           |           |     |           |
| Institutions                      | 105 617 | 10 461.92 | 68 722.51 | 0   | 1 657 733 |
| Infrastructure                    | 105 617 | 60 222.34 | 215 491.6 | 0   | 3 236 803 |
| Production                        | 105 617 | 34 912.57 | 105 327.4 | 0   | 1 351 560 |

**Source:** Author's calculations

**Table A.2. :** Economic Integration Agreements variable

| Increasing<br>Level of<br>integration | t=1995   |   | t=2000   |   | t=2005   |  |
|---------------------------------------|----------|---|----------|---|----------|--|
|                                       | Nb pairs | Value share<br>in world<br>trade<br>(%) | Nb pairs | Value share<br>in world<br>trade<br>(%) | Nb pairs | Value<br>share in<br>world<br>trade<br>(%) |
| 1                                     | 1471     | 21                                      | 1549     | 18                                      | 2282     | 22   |
| 2                                     | 307      | 4                                       | 338      | 4                                       | 271      | 3  |
| 3                                     | 236      | 4                                       | 448      | 7                                       | 625      | 8  |
| 4                                     | 88       | 1                                       | 104      | 1                                       | 139      | 2  |
| 5                                     | 104      | 2                                       | 59       | 1                                       | 257      | 4  |
| 6                                     | 0        | 0                                       | 75       | 1                                       | 78       | 1  |
| Total pairs                           | 8142     | 32                                      | 9781     | 32                                      | 10597    | 40   |

Level of integration: 1 denotes a One-Way Preferential Trade Agreement, 2 denotes a Two-Way Preferential Trade Agreement, 3 denotes a Free Trade Agreement, 4 denotes a Customs Union, 5 denotes a Common Market and 6 denotes an Economic Union.

**Source:** Author's calculations

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Supplementary Appendix

To

**Aid for Trade Effectiveness: Complementarities with Economic Integration**

By

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July 2013

**Appendix 1: Measuring Aid for Trade**

Following the definition from the Task Force, AfT is measured as the sum of three aid categories<sup>14</sup>:

- The trade policy and regulations category, proxy for trade-related institutions, includes assistance for trade policy and administrative management, trade facilitation, regional trade agreements, multilateral trade negotiations and trade education/training.
- The economic infrastructure category, which is a proxy for trade-related infrastructure includes aid for three sub-categories: transport and storage, communications and energy generation and supply. Projects or programs under this category range from technical cooperation on policy planning for ministries, to heavy construction of roads, power plants or airports.
- The building productive capacity category includes, for example, support devoted to various economic sectors in recipient countries in order to help them exploit their comparative advantage and diversify exports. Taking the agricultural sector as an example, programs can range from technical assistance for policy planning for agriculture ministries to microfinance for small farmers, for instance.

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<sup>14</sup> The trade-related adjustment (iv) category was not included as it didn't exist before 2007.



## Appendix 2. Supplementary tables

**Table S.1:** Full results for specification in Table 1, col. 5 and robustness

| Ln ( $X_{ij,t}$ )          | Main<br>specification<br>Table 1, col. (5) | Direct impact of<br>FTA and deeper<br>integration | Direct impact of<br>FTA and deeper<br>integration | Direct impact of<br>FTA and deeper<br>integration<br>(actual and<br>5 years lag) |
|----------------------------|--|---|---|--|
| Column                     | (1)<br>LSDV                                | (2)<br>LSDV                                       | (3)<br>Within                                     | (4)<br>Within  |
| Ln (dist_ij)               | -1.324***<br>(0.0248)                      | -1.354***<br>(0.0245)                             |   |  |
| Landlocked_ij              | -0.605***<br>(0.0972)                      | -0.658***<br>(0.0977)                             |   |  |
| Contiguity_ij              | 0.549***<br>(0.116)                        | 0.724***<br>(0.121)                               |   |  |
| Common_lang_off_ij         | 0.528***<br>(0.0507)                       | 0.565***<br>(0.0513)                              |   |  |
| Colonial_rel_after1945_ij  | 1.604***<br>(0.147)                        | 1.603***<br>(0.149)                               |   |  |
| Common_colonizer_ij        | 0.795***<br>(0.0663)                       | 0.835***<br>(0.0668)                              |   |  |
| Integration_ij             | -0.0122<br>(0.0203)                        | 0.455***<br>(0.0603)                              | 0.156***<br>(0.0418)                              | 0.121***<br>(0.0459)   |
| <b>Ln(AfT_i)*</b>          | <b>0.0298***</b>                           |   |   |  |
| <b>Integration_ij</b>      | (0.00292)                                  |   |   |  |
| <b>Ln(AfT_j)*</b>          | <b>0.00737***</b>                          |   |   |  |
| <b>Integration_ij</b>      | (0.00280)                                  |   |   |  |
| 5 years Lag Integration_ij |  |   |   | 0.133**<br>(0.0538)  |
| Observations               | 105,617                                    | 105,617   | 105,473   | 58,606   |
| Number of pairs            | 13,438                                     | 13,438  | 13,415  | 12,482   |
| Pair FE                    | No   | No  | Yes   | Yes  |
| Exp. *time & Imp.*time FE  | Yes  | Yes   | Yes   | Yes  |
| Time dummy                 | Yes  | Yes   | Yes   | Yes  |
| R-squared                  | 0.762                                      | 0.759   | 0.161   | 0.134  |

Robust standard errors in brackets (clustered by country pairs).

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Source:** Authors' estimates.

**Table S.2:** Full results for aid to institutions with integration as a dummy 0-1

| $\text{Ln}(X_{ij,t})$  | Aid to<br>Institutions<br>FTA and more<br>LSDV |
|--|--|
| $\text{Ln}(\text{dist}_{ij})$                                    | -1.362***<br>(0.0243)                          |
| $\text{Landlocked}_{ij}$   | -0.624***<br>(0.0964)                          |
| $\text{Contiguity}_{ij}$   | 0.642***<br>(0.118)                            |
| $\text{Common\_lang\_off}_{ij}$                                  | 0.545***<br>(0.0510)                           |
| $\text{Colonial\_rel\_after1945}_{ij}$                           | 1.573***<br>(0.148)                            |
| $\text{Common\_colonizer}_{ij}$                                  | 0.821***<br>(0.0662)                           |
| PTA  | -0.0108<br>(0.0650)                            |
| <b><math>\text{Ln}(\text{Aft}_{ij}) * \text{PTA}_{ij}</math></b> | <b>0.118***</b><br>(0.0121)                    |
| <b><math>\text{Ln}(\text{Aft}_{ij}) * \text{PTA}_{ij}</math></b> | <b>0.0768***</b><br>(0.0108)                   |
| Observations   | 105,617  |
| Number of pairs  | 13,438   |
| Pair FE  | No   |
| Exp. *time & Imp. *time FE                                       | Yes  |
| Time dummy   | Yes  |
| R-squared  | 0.761  |

Robust standard errors in brackets (clustered by country pairs).

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Source:** Authors' estimates

**Table S.3:** List of countries

|                          |                    |                      |
|--------------------------|--------------------|----------------------|
| Afghanistan              | Denmark            | Kenya                |
| Albania                  | Djibouti           | Kiribati             |
| Algeria                  | Dominica           | Korea                |
| Angola                   | Dominican Republic | Kuwait               |
| Antigua And Barbuda      | Ecuador            | Kyrgyzstan           |
| Argentina                | Egypt              | Laos                 |
| Armenia                  | El Salvador        | Latvia               |
| Aruba                    | Equatorial Guinea  | Lebanon              |
| Australia                | Eritrea            | Liberia              |
| Austria                  | Estonia            | Libya                |
| Azerbaijan               | Ethiopia           | Lithuania            |
| Bahamas                  | Fiji               | Macao, China         |
| Bahrain                  | Finland            | Macedonia            |
| Bangladesh               | France             | Madagascar           |
| Barbados                 | Gabon              | Malawi               |
| Belarus                  | Gambia             | Malaysia             |
| Belize                   | Georgia            | Maldives             |
| Benin                    | Germany            | Mali                 |
| Bermuda                  | Ghana              | Malta                |
| Bhutan                   | Greece             | Marshall Islands     |
| Bolivia                  | Greenland          | Mauritania           |
| Bosnia and Herzegovina   | Grenada            | Mauritius            |
| Brazil                   | Guatemala          | Mexico               |
| Brunei Darussalam        | Guinea             | Micronesia           |
| Bulgaria                 | Guinea-Bissau      | Moldova              |
| Burkina Faso             | Guyana             | Mongolia             |
| Burundi                  | Haiti              | Morocco              |
| Cambodia                 | Honduras           | Mozambique           |
| Cameroon                 | Hong Kong          | Myanmar (Burma)      |
| Canada                   | Hungary            | Nepal                |
| Cape Verde               | Iceland            | Netherlands          |
| Cayman Islands           | India              | Netherlands Antilles |
| Central African Republic | Indonesia          | New Caledonia        |
| Chad                     | Iran               | New Zealand          |
| Chile                    | Iraq               | Nicaragua            |
| China                    | Ireland            | Niger                |
| Colombia                 | Israel             | Nigeria              |
| Comoros                  | Italy              | Norway               |
| Costa Rica               | Ivory Coast        | Oman                 |
| Croatia                  | Jamaica            | Pakistan             |
| Cuba                     | Japan              | Palau                |
| Cyprus                   | Jordan             | Panama               |
| Czech Republic           | Kazakhstan         | Papua New Guinea     |

|                                  |                      |
|----------------------------------|----------------------|
| Paraguay                         | Tajikistan           |
| Peru                             | Tanzania             |
| Philippines                      | Thailand             |
| Poland                           | Timor-Leste          |
| Portugal                         | Togo                 |
| Qatar                            | Tonga                |
| Romania                          | Trinidad And Tobago  |
| Russia                           | Tunisia              |
| Rwanda                           | Turkey               |
| Saint Kitts and Nevis            | Turkmenistan         |
| Saint Lucia                      | Uganda               |
| Saint Vincent and the Grenadines | UK                   |
| Samoa                            | Ukraine              |
| San Marino                       | United Arab Emirates |
| São Tomé and Príncipe            | Uruguay              |
| Saudi Arabia                     | USA                  |
| Senegal                          | Uzbekistan           |
| Seychelles                       | Vanuatu              |
| Sierra Leone                     | Venezuela            |
| Singapore                        | Vietnam              |
| Slovak Republic                  | Yemen                |
| Slovenia                         | Zambia               |
| Solomon Islands                  | Zimbabwe             |
| Somalia                          |                      |
| Spain                            |                      |
| Sri Lanka                        |                      |
| Sudan                            |                      |
| Suriname                         |                      |
| Sweden                           |                      |
| Switzerland                      |                      |
| Syria                            |                      |
| Taiwan                           |                      |



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