PART I. EFFECTIVENESS OF AID FOR TRADE

Chapter 2

Impact of Aid for Trade: A Survey of Empirical Evidence[1]

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2.1 Introduction

The amount of Aid for Trade (AfT) assistance provided over the past few years is considerable. AfT is recognised as an important development tool facilitating the integration of developing countries into the global economy through initiatives that expand trade capacity.

Evidence on the impacts of AfT on the trade performance of recipient countries is still scanty, however. Indeed, very few studies have provided an empirical assessment of the effectiveness of AfT, partly because of data limitations. This chapter reviews these studies. Unlike previous surveys of the AfT literature (e.g. Hoekman and Wilson 2010; Suwa-Eisenmann and Verdier 2007; Vijil et al. 2011), this section focuses on a broader sample of research on the effectiveness of AfT. It also provides an in-depth analysis of the different empirical methodologies used, highlighting their strengths and weaknesses in terms of econometric techniques and AfT variables selection, as well as in terms of country and sector coverage. Moreover, the chapter categorises the literature findings by looking at differences in AfT impact by type of aid flow, recipient country income level, recipient sector of aid and recipient country geographical region.

The chapter is structured as follows. Section 2.2 discusses the definition and measurement issues of the AfT variables. Section 2.3 and Section 2.4 analyse respectively the country coverage and sector coverage of the reviewed studies. In Section 2.5, the different empirical estimation approaches used are examined. Section 2.6 summarises the findings of the reviewed studies on the effectiveness of AfT. Finally, Section 2.7 concludes.

2.2 Aid for Trade variables: definition and measurement issues

The concept of AfT is broad and not easy to define. This (together with data limitations) makes it difficult to measure its impact and effectiveness, and leads researchers to prefer using data-driven definitions rather than looking into AfT definitional issues. Most of the papers reviewed rely on the following six categories of AfT, proposed by the World Trade Organization (WTO) AfT Task Force (WTO 2006), in order to define the AfT variable(s) in the quantitative studies:

- **aid directed to trade policy and regulations,** which includes training of trade officials, analysis of proposals and positions and their impact on national

stakeholders, technical and institutional support to facilitate the implementation of trade agreements and compliance with rules and standards;

- **aid directed to trade development,** such as investment and trade promotion, support in different trade sectors and trade finance, market analysis and development;
- **aid directed to trade-related infrastructure,** including physical infrastructure to connect domestic and foreign markets;
- **aid directed to building productive capacity,** meaning investments in industries and specific sectors so that countries are able to diversify production and exports;
- **aid directed to trade-related adjustment,** which comprises complementary measures absorbing some of the costs linked to tariff reductions or declining terms of trade to make developing countries benefit from trade liberalisation; and
- **aid directed to other trade-related needs.**

However, it is important to note that the degree of aggregation of the above aid flows is heterogeneous across the studies. Some focus on AfT at an aggregated level; others take into account one or more specific categories of AfT to shed light on the impact of specific interventions on the ground. A few authors even consider one item from one category or create specific AfT items aggregating single components of different categories. Busse et al. (2011), for example, started focusing on total AfT given by the sum of all six categories, and then restricted their analysis to one category (aid directed to trade policy and regulations) and AfT directed to one item of that category (trade facilitation).

Calì and te Velde (2011), instead, studied the impact of AfT on trade costs by focusing on the Aid for Trade policy and regulation category and one of its sub-categories (trade facilitation), and then examined the impacts of AfT on recipient countries' exports by taking into account two other categories of AfT, namely aid disbursed to economic infrastructure and aid disbursed to productive capacity.

Ivanic et al. (2006) consider an alternative aggregation of aid flows, creating a trade facilitation variable by aggregating a selected number of items from three AfT categories: aid for infrastructure (e.g. port/road improvements); Aid for Trade development; and Aid for Trade policy (e.g. customs reforms). Helble et al. (2009), on the other hand, look at the effectiveness of trade facilitation by defining the trade facilitation variable in four different ways. First, in a narrow sense, trade facilitation is defined as a subset of the Aid for Trade policy and regulations category. Second, and in a broader sense, trade facilitation is computed as the sum of aid flows from the trade development and economic infrastructure categories. Third, a *hard* trade facilitation variable and a *soft* trade facilitation variable are created by including, respectively, funds directed towards investment into infrastructure projects (e.g. upgrading of ports and construction of new roads) and towards building trade-related institutional capacity (e.g. training of customs officials and streamlining customs procedures).

Ferro et al. (2011) also use a particular aggregation of aid flows, creating their AfT variable by combining single items from two different categories (Aid for Trade-related infrastructure and aid to production capacity) to evaluate the impact of aid to the services sector. Vijil and Wagner (2010), instead, assess the effectiveness of AfT in trade performance, directly using two categories as AfT variables: Aid for Trade policy and regulations and aid to trade-related infrastructure.

Among all the categories used in the above-mentioned studies, only Aid for Trade policy and regulations and Aid for Trade-related infrastructure appear to have received adequate attention. Very few studies look at the effectiveness of Aid for Trade development (Ivanic et al. 2006; Helble et al. 2009) and aid for productive capacity (Calì and te Velde 2011). Moreover, trade facilitation receives considerable attention in the range of studies analysed, albeit with heterogeneous definitions of this variable. In some cases, trade facilitation is identified with the corresponding item within the AfT policy and regulations category; in others, it is computed as the sum of selected single items spread across the different categories of AfT. This makes it hard to compare the results of the studies assessing the effectiveness of trade facilitation.

Next to those studies that identify the AfT variable(s) by referring to the WTO categories, there are research works that assess the effectiveness of AfT by looking at other factors. Brenton and von Uexkull (2009), Lederman et al. (2010) and Volpe Martincus (2011), for example, refer to export promotion programmes. Gourdon et al. (2011) look at a specific type of export promotion instrument: a matching grant. Finally, Portugal-Perez and Wilson (2010) use factor analysis to create four new indicators of trade facilitation: physical infrastructure; information and communication technology (ICT); border and transport efficiency; and business and regulatory environment.

In terms of sources of AfT data, most of the studies (i.e. Busse et al. 2011; Calì and te Velde 2011; Ferro et al. 2011; Helble et al. 2009; Ivanic et al. 2006; Vijil and Wagner 2010) use the Organisation for Economic Co-operation and Development (OECD) Creditor Reporting System (CRS) database, which has the advantage of providing data for a relatively long time span (from the mid-1970s onwards). Nevertheless, data until 1994 have substantial gaps. Most of the quantitative studies relying on the CRS database therefore use as a time horizon only a few years in the 2000s, with the exception of Helble et al. (2009) and Ivanic et al. (2006), who use longer time spans. The CRS database has also the advantage of accounting for both aid commitments and aid disbursements data. Note that most of the studies relying on the CRS database use aid disbursement data (e.g. Busse et al. 2011; Calì and te Velde 2011; Ferro et al. 2011), with the exception of Vijil and Wagner (2010), who use aid commitments data. Moreover, the CRS database reports data related to several dimensions of AfT, in particular for AfT and trade-related adjustment. However, a number of limitations should also be highlighted. First, the CRS database includes only aid flows allocated by countries that are members of the Development Assistance Committee (DAC); thus it leaves out funds from key donors such as China and many of the multilateral agencies that provide assistance, particularly on trade policy and regulations (Turner 2008). Second, it takes into account only flows given on concessional financial terms.

Third, OECD data on AfT are also likely to overestimate the actual volume of AfT for DAC members, since they include projects that may have no objectives related to trade or little potential impact on a country's capacity to trade (ibid.).

Another important source of data used in econometric analyses to track AfT flows, but to a much lesser extent, is the trade-related technical assistance and trade capacity-building database constructed jointly by the OECD and the WTO. This database, used by, for example, Brenton and von Uexkull (2009), provides very detailed information but only for the period 2000–06. This may constrain the period of analysis even further compared with the CRS database. Moreover, it covers only two categories of AfT (trade policy and regulations and trade development). The reliability of the database has also been questioned, particularly as significant data discrepancies have been found when compared with other datasets (Turner 2008).

Finally, those studies that investigate the effectiveness of export promotion programmes or instruments (Brenton and von Uexkull 2009; Gourdon et al. 2011; Lederman et al. 2010; Volpe Martincus 2011) make use of survey data. Portugal-Perez and Wilson (2010), instead, rely on data sourced from the World Bank's databases (Doing Business and WDI) as well as from the World Economic Forum (WEF) and Transparency International.

2.3 Country coverage

The studies reviewed vary considerably in terms of country coverage. Several cover more than 100 countries (Calì and te Velde 2011; Ferro et al. 2011; Helble et al. 2009; Lederman et al. 2010; Portugal-Perez and Wilson 2010); others cover a rather small sample of countries (e.g. 48 countries in Brenton and von Uexkull 2009) or even only one (e.g. Tunisia in Volpe Martincus 2011).

A number of studies cover both developed and developing countries (Helble et al. 2009; Lederman et al. 2010; Portugal-Perez and Wilson 2010) but, given the nature of AfT, several studies have a specific focus on developing economies (Brenton and von Uexkull 2009; Busse et al. 2011; Calì and te Velde 2011; Ferro et al. 2011; Gourdon et al. 2011; Volpe Martincus 2011).

Moreover, in order to investigate whether there are differences in AfT effectiveness among groups of countries, some studies aggregate economies into special groups using different criteria. Some classify countries by income level: Ferro et al. (2011) distinguish between low-income countries (LICs), lower-middle-income countries (LMICs) and upper-middle-income countries (UMICs). Other studies, such as that by Brenton and von Uexkull (2009), look separately at least developed countries (LDCs) and non-LDCs, and also compare top 20 aid recipients with the rest of the economies. Moreover, there are studies that look at the impacts of AfT in different geographical regions. For example, Ivanic et al. (2006) distinguish among seven sub-samples of countries: (1) developed economies; (2) East Asia and Pacific (EAP); (3) Europe and Central Asia (ECA); (4) Latin America and Caribbean (LAC); (5) Middle East and North Africa (MENA); (6) South Asia (SAS); and (7) sub-Saharan Africa (SSA). In a similar way,

Ferro et al. (2011) focus on six developing regions. Portugal-Perez and Wilson (2010) also simulate the trade effects of trade facilitation on six different regions.

Finally, it is worth mentioning that a few recent studies have started focusing on AfT effectiveness looking at countries belonging to only one region. For example, Volpe Martincus (2011) assess the impact of trade promotion in the Latin American region looking at Argentina, Chile, Colombia, Costa Rica, Peru and Uruguay.

2.4 Sector coverage

Sectoral analyses of AfT effectiveness are very scanty. Indeed, only five out of eleven studies reviewed evaluate the impacts that AfT may have in terms of improving trade-related performance in particular productive sectors. The majority of these look simultaneously at two or more sectors (Brenton and von Uexkull 2009; Calì and te Velde 2011; Ivanic et al. 2006; Portugal-Perez and Wilson 2010), and only one study focuses on a single sector: the services sector (Ferro et al. 2011).

Among the sectors covered, researchers tend to focus mainly on agriculture and manufacturing, probably because of the availability and frequency of data. The mining and services sectors also gain some attention (e.g. Calì and te Velde 2011; Portugal-Perez and Wilson 2010 for mining; Calì and te Velde 2011; Ferro et al. 2011; Ivanic et al. 2006; Portugal-Perez and Wilson 2010 for services).

It is also important that only one of the studies reviewed evaluates the impact of aid flows directed to specific sub-sectors. Ferro et al. (2011) look separately at five different dimensions of the services sector: transport, communications, energy, banking/financial services and business services.

This suggests a clear need to expand the scope of existing research to better understand the various degrees of effectiveness that AfT interventions might achieve in different productive sectors and sub-sectors. Annex 2.1 summarises the estimation methodologies and technical aspects of the studies reviewed.

2.5 Estimation approaches

The growing number of econometric studies on AfT's impact, although they are not unanimous, do indicate that AfT has been effective at increasing exports and reducing the costs of trading. A number of econometric techniques are used, with various degrees of sophistication, to assess the effectiveness of AfT. Although some studies use cross-section analysis, most tend to use variants of panel data, favouring macro- rather than micro-analysis. In what follows, we provide a quick overview of the econometric models used and their inherent advantages and disadvantages. We also discuss some of the theoretical models used as a basis of a few empirical studies.

2.5.1 Gravity models

Ivanic et al. (2006), Helble et al. (2009) and Portugal-Perez and Wilson (2010) use as a theoretical base for their studies the gravity model.[2] This specification has become

almost a 'classic' in trade studies. The gravity model facilitates interpretation of econometric results by providing a clear theoretical framework, and its flexibility allows researchers to extend the model by adding new variables and testing new hypotheses. Furthermore, it can be used to study macro and micro scenarios, as well as single-period cross-sections or panels. Of course, the usual caveats attached to every theoretical model apply. Ivanic et al. (2006) use a two-step approach. First, they compute an extended gravity model to obtain estimates of the effects that trade-promoting aid might have on transaction costs. They then feed these estimates into a computable general equilibrium (CGE) model to obtain projections of global trade transaction costs and their effects on welfare. This is a strong point, since it uses estimates rather than subjective shocks to obtain projections from the CGE model. However, the accuracy of the projections depends on the accuracy of the estimates obtained through the gravity model.

The precise type of econometric methodology used by Ivanic et al. (2006) to estimate the gravity model specification is not entirely clear, so we can provide only a general description of the weaknesses inherent to this type of model. The first drawback is related to the excessive reliance on dummy variables, which may distort the final outcome. Moreover, the effects that AfT flows might have on trade performance or economic growth are not immediate, and it takes time for full influence. For this reason, when including AfT variables, most empirical studies use varying periods' lagged values of AfT. Finally, endogeneity remains a major concern.

Helble et al. (2009) extend the traditional gravity model to accommodate AfT facilitation flows. The estimation methodology is a fixed-effects panel data study, and they use four main components. The first addresses the relationship between AfT facilitation and trade flows. The second assesses this relationship across various country groups to highlight possible different effects among countries. The third studies the lagged effects of aid. The last component investigates how the relationship between AfT facilitation and trade might vary with the type of aid flow. The fixed-effects panel data methodology is widely used, although it does not satisfactorily address endogeneity issues and possible biases owing to zero values within the sample. That said, the authors' decision to analyse the impact of AfT facilitation in different groups of countries, taking into account different types of aid flows, provides useful insights and helps address the extreme heterogeneity (in terms of both type of countries and aid flows) that often characterises trade studies.

Portugal-Perez and Wilson (2010) also use an extended gravity model to study the effects of a series of trade facilitation indicators. Their methodology is a two-stage Heckman selection model. This allows correcting for selection and is particularly useful to deal with the excessive number of zeros that characterise the gravity model specifications, as well as the scarcity or incompleteness of AfT data. The study also uses Tobit and Poisson regressions to check the robustness of results. To address possible endogeneity/causality problems, the authors use the lags of their trade facilitation indicators. This is a valid alternative, although the inclusion of lagged variables implies a reduction of the overall sample used in the regression analysis. Indeed, the more the lags the smaller the sample becomes.

2.5.2 Control groups

Another branch of the empirical literature studying the effectiveness of AfT has focused mainly on difference-in-difference (DID) estimations.[3] These types of models are used traditionally in public health to determine whether a particular treatment or medicine is effective or not. In its simplest version, the model observes two groups of individuals (countries or firms) over two or more time periods (weeks, months or years). The two groups must share similar characteristics, with the difference that one receives the prescribed treatment or policy (in our case AfT) while the other continues business as usual. This model is particularly attractive, since it allows better isolation of any potential effects that AfT might have on a particular exporting sector or group of countries.

Brenton and von Uexkull (2009) use a DID model to estimate the impacts that export development programmes might have on export performance. To obtain their estimates, the authors use fixed-effects regressions with a series of dummy variables that represent the inclusion or absence of export development programmes in a particular country. As discussed earlier, excessive zeros in trade samples can affect the outcome. The authors are aware of this and use also a Poisson fixed-effects estimator to check the robustness of their results, which allows for better predictions. However, little is done to address endogeneity problems, and the authors omit the use of alternative control variables that would reinforce the credibility of any result.

Summarising, DID models are a good alternative to traditional gravity models, but the use of econometric techniques to estimate them should be more thorough and take care not to neglect potential causality/endogeneity issues.

2.5.3 Miscellaneous

In addition to the research mentioned above, the literature also offers a series of studies analysing linear relationships between AfT and other variables of interest. These studies rely more on the robustness of standard econometric techniques rather than theoretical trade models. This is acceptable, even though the interpretation or justification of the estimates is more burdensome.

Busse et al. (2011) use fixed-effects panel data estimations to study the effects of AfT and trade facilitation on the costs of trading. The authors also take care to differentiate between LDCs and non-LDCs. This approach facilitates the identification of significant differences among countries or groups of countries. Overall, the estimation technique is fairly standard and the usual limitations apply. Endogeneity cannot be addressed unless instrument variables are introduced.

Ferro et al. (2011) follow a different approach and propose a new framework to study AfT effectiveness. They reverse traditional specifications, use aid as the dependent variable and try to explain changes in aid flows through a series of dummies that identify specific business sectors, rule of law, country stability and others. This approach seems promising, and should be taken into account in future research. With respect to the econometric technique used to estimate this specification, the authors apply a standard ordinary least squares (OLS) regression. They do, however,

address causality issues to some extent by replacing the dependent variable with other, previously independent, variables. Nevertheless, the estimation is on the weak side and alternative techniques are available.

Vijil and Wagner (2010) derive an equation that explains total value of exports of a country using a classic symmetric constant elasticity of substitution (CES) function.[4] Then they introduce aid-related variables to explain changes in export values. Using this relationship, they proceed to log-linearise it and then to estimate it using OLS and a two-stage least squares (2SLS) regression. This approach is simple and neat, and allows the researcher a theoretical background that facilitates the interpretation of the results. Moreover, the use of OLS followed by 2SLS provides a good robustness test and addresses endogeneity problems satisfactorily. The drawbacks of this model are that it fails to take into account possible fixed effects and to deal with zero values in the sample.

Calì and te Velde (2011) also use a CES utility function to derive their trade specification. The novelty of their approach relies on the fact that they divide AfT into four main categories: (1) AfT facilitation; (2) AfT policy and regulation; (3) aid to economic infrastructure; and (4) aid to productive capacity. This classification allows better disentangling of aid effects on specific sectors or areas. The estimation technique used is a generalised method of moments (GMM). This technique is particularly robust; it addresses endogeneity issues and allows more efficient estimation of big samples. Drawbacks remain in the excessive number of zeros within AfT samples and the difficulty in choosing adequate instrumental variables for the GMM regressions. The technique is also sensitive to the sample size. If the sample is relatively small, results should be treated with caution.

Volpe Martincus (2011) studies the impact of export promotion programmes in six Latin American countries. He employs a DID and matching-DID methodology, whose advantages and disadvantages we discussed above. However, this study is innovative in the sense that it pursues a micro-based approach. It uses national firm-level data and controls for differences in trends among firms. This is a good option for future AfT studies.

Finally, Gourdon et al. (2011) also use the DID methodology to study the effects of specific export promotion instruments, focusing on Tunisian firms. A single-country approach allows better understanding of AfT, since it avoids biases resulting from other countries. However, such studies need enough data over time to provide better insights into the effects that AfT could have. A particular feature of this article is that it covers both service firms and manufacturing firms, providing a clear comparison of the varying effects that AfT might have on both.

Overall, empirical studies on the effectiveness of AfT have applied a number of econometric techniques (see also Annex 2.1), each with its own advantages and disadvantages. Therefore, the researcher should ponder well before choosing the model that best suits a particular sample. Regardless of the econometric technique, other important issues are the definition of the AfT variable(s) being used and the type of sub-samples or groups of countries analysed. Considering AfT as a dummy variable or measuring it by monetary amounts makes a difference when deciding what

methodology to use. Furthermore, analysing regions, groups of countries or productive sectors separately might make more sense than aggregating different AfT flows into one single variable. Indeed, the heterogeneity among countries and sectors makes it difficult to isolate AfT effects when studied in an aggregate manner.

2.6 Empirical findings on Aid for Trade effectiveness

Taken together, the existing empirical literature tends to confirm that AfT can be effective at both the macro and the micro level. Nevertheless, its impacts may vary considerably depending on a number of factors, as we analyse below.

2.6.1 Type of Aid for Trade flow

A number of quantitative studies suggest that alternative types of AfT may have different impacts at the macro level on trade-related performance and growth. Ivanic et al. (2006), for example, study the role of three categories of trade-promoting aid (aid for infrastructure, for trade development and for trade policy) as well as trade facilitation to reduce trade transaction costs of recipient countries and to generate trade welfare gains. Taken together, the three categories of aid are found to reduce worldwide trade costs by 0.2 per cent and to generate a total welfare gain of US$18.5 billion, but empirical evidence suggests that not all types of AfT have the same impact. Indeed, the authors find that aid directed to trade policy is the most effective in lowering trade costs of the importer and exporter; trade facilitation is also found to have a significant and large impact on the trade costs of the exporter. Moreover, in terms of welfare impacts, it is found that trade facilitation is the type of AfT that generates the highest welfare gain (US$24.8 billion). The return to trade facilitation aid is also found to be the greatest among the types of AfT considered.

In a similar way, Busse et al. (2011) empirically examine the impact of total AfT, aid directed to trade policy and regulations and trade facilitation on trade costs in developing countries as well as on the time of trading. Their results show that AfT is both statistically and economically significant in reducing the costs of trading, but the impact depends on the particular aid category. Indeed, highly targeted aid, such as aid spent on trade policy and regulations, and particularly on trade facilitation, is more effective than total AfT. Evidence on the effectiveness of AfT in reducing the time of trading is less robust, but there is still some evidence that aid directed to trade policy and regulations has a significant (though small) effect in terms of shrinking the time of trading.

Helble et al. (2009) empirically assess the relationship between different categories of AfT and trade performance of recipient countries. They find that a 1 per cent increase in assistance directed to trade facilitation could generate an increase in global trade of about US$415 million. However, one aid category, that is, aid directed to trade policy and regulations, appears to have a particularly high impact on recipient countries' exports. Indeed, it is found that a 1 per cent increase in AfT policy and regulations could generate an increase in global trade of about US$818 million.

Another interesting study assessing the relationship between different categories of AfT and recipient countries' exports is that by Calì and te Velde (2011). Its results

show that AfT has an overall positive and significant impact on exports. However, this effect is entirely driven by aid to economic infrastructure; aid to productive capacity has no significant impact on exports. Calì and te Velde (2011) also investigate the impact of different types of AfT on trading costs and time of trading. They find that AfT investments aimed at improving trade facilitation reduce import and export costs as well as time of trading. On the other hand, evidence on the impact of aid to trade policy and regulations on the costs of trading is more mixed.

Vijil and Wagner (2010) highlight the importance of Aid for Trade-related infrastructure (proxied by aid for economic infrastructure) in fostering recipient countries' exports. The results of their empirical assessment indicate that a 10 per cent increase in aid to infrastructure commitments leads to an average increase of the exports to GDP ratio for a developing country of 2.34 per cent. On the other hand, aid directed to trade policy and regulations turns out to have a limited impact on developing countries' exports.

Next to these studies looking at the impacts of different types of AfT, there are very few studies focusing on the effectiveness of specific instruments for delivering AfT. Among the studies reviewed, only Gourdon et al. (2011) in their firm-level study try to fill this gap, by examining the effectiveness of a single, well-defined export promotion instrument: an export promotion matching grant, as opposed to a mix of instruments. Their results suggest that recipients of the matching grant have experienced significantly better export growth (in terms of volumes, products and destinations) than non-recipients. This is particularly true in the case of first-time exporters, that is firms that started exporting after receiving the grant and services firms.

2.6.2 Recipient country's income level

The empirical evidence on whether the effectiveness of AfT changes depending on the level of income of recipient countries is still very limited, and deserves further investigation. Among the very few studies dealing with this issue, it is worth mentioning that by Ferro et al. (2011), which examines the impact of AfT in five service sectors by distinguishing between LICs, LMICs and UMICs. The results show that in certain sectors, such as transport and banking services, the effectiveness of aid in terms of export growth diminishes for higher-income country groups. Indeed, the impact of aid to transportation and banking services is found to be positive and significant for LICs and LMICs, but it becomes negative and significant in the case of UMICs. On the other hand, the effectiveness of aid to sectors such as energy and business services increases with the income level of the group of recipient countries.

These findings are to some extent in line with those reported in the study by Portugal-Perez and Wilson (2010), according to which the marginal effect of infrastructure improvement on exports is decreasing in income. However, although the findings of Ferro et al. (2011) on the effectiveness of aid to the ICT sector in different income groups of countries are mixed, Portugal-Perez and Wilson (2010) clearly show that the impact of ICT on exports is increasingly important for richer countries.

In this context, it is also important to mention the results of the empirical assessment by Busse et al. (2011), which distinguishes between LDCs and non-LDCs, since low income is one of the criteria used to identify LDCs. Busse et al. (2011) find that none of the types of AfT considered are effective in reducing the costs of trading in LDCs, whereas all the variables are highly significant in the non-LDC sub-sample, with the exception of the total AfT variable. As the authors suggest, this unexpected result might be due to absorption capacity constraints in LDCs, but also to the fact that in the sample the amounts of aid flows directed to LDCs are too low to show any impact on trading costs.

2.6.3 Recipient sector of aid

Some studies suggest that AfT may have a bigger impact on specific sectors. Indeed, sector analysis shows some interesting differences. For example, Brenton and von Uexkull (2009) (in line with Calì and te Velde 2011) find that export development programmes tend to have a higher impact in sectors that already have strong export performance. However, they suggest this may not necessarily be the result of AfT, since the good performance of these sectors would have made them a success anyway.

Portugal-Perez and Wilson (2010), instead, find evidence that trade facilitation (as measured by the physical infrastructure indicator) has a greater impact in the fuels sector and the ores and metal sector than in the textiles and manufactures sectors. Aid to ICT appears to be effective in the fuels sector but has a negative and significant impact in the ores and metals sector. On the other hand, Ferro et al. (2011) suggest that aid to the transport and energy sectors is the most effective in boosting exports. According to their baseline estimates, a 10 per cent increase in aid to transportation and energy is associated with a 2 per cent and 6.8 per cent increase in manufacturing exports, respectively, compared with a mere 0.3 per cent increase from aid to the ICT sector.

Finally, Ivanic et al. (2006) find that Aid for Trade policy can significantly lower costs of trading in the processed agriculture and primary agriculture sectors. Aid for infrastructure and for trade development seem instead to be particularly effective in the primary non-agriculture sector.

2.6.4 Geographical regions of recipient countries

Existing empirical evidence suggests that the same type of AfT may have varying effects depending on the geographical regions to which the aid flows are directed. Ivanic et al. (2006), for example, show that Asia sees the highest welfare gain from AfT facilitation, followed by SSA. Moreover, they find that, among all developing regions, SSA is the one that could benefit the most from AfT facilitation in terms of costs of trading reductions. Indeed, in the region, trade facilitation is estimated to reduce export costs by 1.9 per cent and import costs by 0.7 per cent, whereas in other regions, such as LAC, the reduction in export costs and import costs is estimated to be just 0.5 per cent and 0.2 per cent, respectively. This result is consistent with the

Table 2.1 Overview of empirical literature findings on Aid for Trade effectiveness

Aid for trade effectiveness by	
Type of aid flows	• Evidence on the effectiveness of different types of AfT flows is mixed, partly because results are not always comparable, as different definitions of specific categories of AfT are used. • However, there is some evidence that highly targeted aid flows (e.g. trade facilitation) are more effective. • A few studies find that Aid for Trade-related infrastructure is particularly effective in promoting recipient countries' exports. Evidence on the effectiveness of Aid for Trade policy and regulations in improving trade-related performance is more mixed. • Evidence on the effectiveness of single export promotion instruments is still scarce.
Recipient's income level	• There is some evidence that certain types of AfT flows (e.g. aid to infrastructure such as aid flows to transportation) are more effective in LICs, whereas other aid flows, such as those directed to the business sector, are more effective in higher-income countries. • Much more evidence is needed in this area with respect to different types of AfT (especially aid to trade policy and regulations, aid to trade development and trade facilitation) and different recipient sectors of aid.
Recipient sector of aid	• The impact of AfT is found to vary among sectors. • Evidence is still mixed and the different sector classification used in the studies prevents comparability of results.
Geographical regions of recipient country	• There is evidence that the same type of AfT may have varying effects depending on the geographical regions of recipient countries. • It appears that SSA is one of the regions that could benefit the most from AfT.

Source: Author's elaboration from different sources

findings of Calì and te Velde (2011), according to which Aid for Trade facilitation has a larger cost-reducing impact in SSA than in the entire sample of developing countries.

Other relevant findings are those in Ferro et al. (2011) and Portugal-Perez and Wilson (2010). The former find that aid to the services sector has different impacts across developing regions. Aid to business appears to have a positive effect on exports in LAC and MENA, but a negative impact in SAS. On the other hand, aid to banking displays a negative relation with exports in LAC as well as in MENA, but has a positive impact on exports in SAS. These results suggest that regions with a high percentage of UMICs (e.g. LAC and MENA) benefit more from aid to business than regions with several LICs and LMICs (e.g. SAS). However, the latter gain the most from aid to banking. On the other hand, Portugal-Perez and Wilson (2010) find that aid to infrastructure produces much more significant trade gains in SSA than in other regions, especially SAS. Table 2.1 summarises the main findings of the empirical studies reviewed.

2.7 Conclusions

This review of empirical studies on the effectiveness of AfT shows that several econometric techniques with different degrees of sophistication have been used to assess the impact of AfT on trade and other economic performance in recipient countries, favouring analysis at the macro rather than the micro level. These methodologies include gravity model specifications, DID estimations, panel data estimations, OLS, 2SLS and GMM, among others. Each technique has its own advantages and disadvantages, so it is difficult to identify the best approach to employ; an approach should be chosen depending on the characteristics of the sample used.

Most of the studies reviewed assess the effectiveness of AfT at an aggregated level: very few focus on the impact of specific AfT interventions or instruments. Among the different categories of AfT, researchers have focused mainly on Aid for Trade policy and regulations and for trade-related infrastructure; Aid for Trade development and for productive capacity have received very limited attention. On the other hand, among the components of the different categories of AfT, only trade facilitation seems to have received some consideration, even though various definitions of this variable have been used.

In terms of country coverage, the existing research appears to be very heterogeneous. Some studies cover several developed and developing countries, whereas others focus on a small sample of economies or even on only one country. Differences across countries by income level and geographical region have been analysed to some extent. Very few studies have tried to assess differences in AfT effectiveness by productive sector (or sub-sector); those that have favour the agriculture and manufacturing sectors, and to a lesser extent the mining and services sectors.

Availability of data remains an important issue in conducting empirical studies on the effectiveness of AfT. The majority of studies rely on the OECD's detailed CRS database, which has significant gaps in the years before 1994. Moreover, it includes only aid flows allocated by countries that are members of the DAC – thus leaving out funds from key donors such as China – and takes into account only flows given on concessional financial terms. The CRS database is also likely to overestimate the actual volume of AfT for DAC members, since it does not disaggregate the trade component of projects that have trade and non-trade objectives. Hence, the development of improved databases on AfT is needed.

The empirical literature tends to confirm that AfT can be effective at both the macro and the micro level. However, its impacts may vary considerably depending on the type of AfT intervention, the income level and geographical region of the recipient country and the sector to which AfT flows are directed.

These findings have important policy implications. Indeed, the empirical evidence suggests that highly targeted AfT flows may be particularly effective in enhancing trade performance. More precisely, trade facilitation and Aid for Trade-related infrastructure are found to have significant positive impacts on recipient countries' exports. Moreover, among the different types of AfT flows, lower-income economies appear to benefit especially from Aid for Trade-related infrastructure. Finally, SSA is

one of the regions that could benefit the most from AfT, implying that greater efforts should be directed towards this region.

In summary, the review of the existing econometric research on the effectiveness of AfT shows four key issues that need to be addressed:

- evidence on the impact of specific AfT interventions or instruments is limited;
- differences in AfT effectiveness by productive sector have been taken into account to only a limited extent;
- evidence on the actual effects of AfT at the micro level is scanty; and
- databases on AfT need to be improved.

The literature survey also highlights that:

- AfT tends to be positive and economically relevant; and
- the impact of AfT is different depending on the type of intervention, the income level and geographical region of the recipient country and the sector to which AfT flows are directed.

In the light of the above, for future research it is worth analysing further the impact of different AfT instruments as well as investigating the sectors to which AfT flows should be directed to be more effective. Moreover, empirical analysis is required on how different country characteristics, such as institutional quality and different donor strategies, affect the effectiveness of AfT. More studies on the effectiveness of AfT at the micro level are also needed.

Annex 2.1 Summary of estimation methodologies and technical aspects of econometric studies

	AfT variable(s)	AfT data sources	Econometric technique(s)	Country coverage	Time horizon	Sector coverage
Busse et al. (2011)	1. Total AfT 2. AfT policy and regulations 3. AfT facilitation	OECD CRS database, aid disbursements	Panel data (fixed effects)	99 developing countries (including 33 LDCs) Countries grouped into LDCs and non-LDCs Top 20 recipients and others	2004–09	
Calì and te Velde (2010)	1. AfT facilitation 2. AfT policy and regulation 3. Aid to economic infrastructure 4. Aid to productive capacity	OECD CRS database, aid disbursements	Panel data (GMM)	130 developing countries regions	2005–09	Agriculture (including forestry and fishing); manufacturing; mining; tourism
Brenton and von Uexkull (2009)	Product specific export development programmes	OECD/WTO Doha Development Agenda trade capacity-building database and data received from German Development Cooperation (GIZ) on technical assistance projects	DID, fixed-effects Poisson	48 developing countries	1975–2005	Agriculture; manufacturing

(continued)

Annex 2.1 Summary of estimation methodologies and technical aspects of econometric studies (continued)

	AfT variable(s)	AfT data sources	Econometric technique(s)	Country coverage	Time horizon	Sector coverage
Ferro et al. (2011)	Aid targeting service sectors	OECD CRS database, aid disbursements	OLS	132 developing countries Countries grouped by income and geographical	2002–08	5 service sectors: transport; ICT; energy; banking/ financial services; business services
Gourdon et al. (2011)	A single export promotion instrument (matching grant)	Official Registry of Firms in Tunisia and firm-level survey data	DID	1 developing country (Tunisia)	2004 and 2008	
Helble et al. (2009)	1. AfT policy and regulation 2. AfT development and economic infrastructure 3. *Hard* trade facilitation 4. *Soft* trade facilitation	OECD CRS database	Fixed-effects panel data (gravity model)	172 developed and developing countries	1990–2005	n.a.
Ivanic et al. (2006)	1. Aid to infrastructure 2. AfT development 3. AfT policy 4. Trade facilitation	OECD CRS database	Gravity model, CGE	Nearly all individual countries aggregated into the 90 regions of Version 6 of the Global Trade Ana lysis Project model Countries grouped into 7 regional sub-samples: developed countries; EAP; ECA; LAC; MENA; SAS; and SSA	1988–2004	Primary agriculture; primary non-agriculture; processed agriculture; manufactures; advanced manufactures; services
Lederman et al. (2010)	EPAs	Survey data	OLS, 2SLS, Heckman correction	103 developing and developed countries	2000–04	n.a.

(*continued*)

Annex 2.1 Summary of estimation methodologies and technical aspects of econometric studies (continued)

	AfT variable(s)	AfT data sources	Econometric technique(s)	Country coverage	Time horizon	Sector coverage
Portugal-Perez and Wilson (2010)	4 trade facilitation indicators constructed using factor analysis: 1. Physical infrastructure 2. ICT 3. Border and transport efficiency 4. Business and regulatory environment	20 primary indicators collected from Doing Business, WDI, WEF, Transparency International	2-stage Heckman selection model (gravity model), Tobit and Poisson regressions	101 developed and developing countries Countries grouped into different developing regions	2004–07	Fuels; ores and metals; manufactures; textiles
Vijil and Wagner (2010)	1. AfT policy and regulation 2. Aid to economic infrastructure	OECD CRS database, aid commitments	OLS and 2SLS	n.a.	2002–08	n.a.
Volpe Martincus (2011)	Export promotion programmes	National customs agencies	DID	6 LAC developing countries	2002–07	

Source: Author's elaboration from different sources

Notes

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2 The basic classical gravity model of trade is given by the benchmark log-linearised econometric specification:

$$\ln(EXP_{ijt}) = \alpha_0 + \alpha_1 \ln(GDP_{it}) + \alpha_2 \ln(GDP_{jt}) + \alpha_3 \ln(POP_{it})$$
$$\alpha_4 \ln(POP_{jt}) + \alpha_5 \ln(DST_{it}) + \varepsilon_{ijt}$$

where i stands for the source exporting country, j for the target importing country and t for the time period. ε_{ijt} is a normally distributed idiosyncratic error term, with mean 0 and variance $\sigma 2_s$. The dependent variable EXP_{ijt} represents the export flows from country i to country j at time t. Among the explanatory variables, GDP_{it} and GDP_{ij} measure the gross domestic product (GDP) of countries i and j in period t, respectively. The population is given by POP_{it} and POP_{jt} for each of the two countries. The distance between the exporting and importing countries is given by $DIST_{ij}$, which represents trade costs or market frictions.

3 The simplest DID specification is as follows: $\gamma_{it} = \beta_0 + \beta_1 X_i + \beta_2 T_t + \beta_3 X_1 \times T_t + \varepsilon_{it}$, where X_i is a dummy variable that takes the value of 1 if the individual/firm/country is in the treatment (in our case the treatment is AfT) group, and 0 if it is in the control group. T_t is a dummy that takes the value of 1 during the post-treatment period and 0 before the treatment period. The interaction term between X_i and $T_t(\beta_3)$ corresponds to our DID outcome.

4 A normal CES utility function is $U_j = [\sum_i^R n_i x_{ij}^{(\sigma-1)/\sigma}] \quad (\sigma / (\sigma - 1)), \sigma > 1$, where σ is the elasticity of substitution between products, n_i represents a set of varieties produced in country i and x_{ij} would be country j's consumption of a variety from n_i.

References

Brenton, P and E von Uexkull (2009), 'Product specific technical assistance for exports-has it been effective?', *Journal of International Trade & Economic Development*, Vol. 18 No. 2, 235–54.

Busse, M, R Hoekstra and J Koniger (2011), 'The impact of aid-for-trade facilitation on the costs of trading', Working Paper, University of Bochum, Ruhr.

Calì, M and DW te Velde (2011), 'Does aid-for-trade really improve trade performance?', *World Development*, Vol. 39 No. 5, 725–40.

Ferro, E, A Portugal-Perez and JS Wilson (2011), 'Aid to the services sector. Does it affect manufacturing exports?', Policy Research Working Paper 5728, World Bank, Washington, DC.

Gourdon, J, JM Marchat, S Sharma and T Vishwanath (2011), 'Can matching grants promote exports? Evidence from Tunisia's FAMEX II programme', in Cadot, O, AM Fernandes, J Gourdon and A Mattoo (Eds), *Where to Spend the Next Million? Applying Impact Evaluation to Trade Assistance*, World Bank, Washington, DC.

Helble, M, C Mann and JS Wilson (2009), 'Aid-for-trade facilitation', Policy Research Working Paper 5064, World Bank, Washington, DC.

Hoekman, B and S Wilson (2010), 'Aid-for-trade: building on progress today for tomorrow's future', Policy Research Working Paper, World Bank, Washington, DC.

Ivanic, M, CL Mann and JS Wilson (2006), 'Aid-for-trade facilitation', *Global Welfare Gains and Developing Countries*. Draft.

Lederman, D, M Olarreaga and L Payton (2010), 'Export promotion agencies: do they work?', *Journal of Development Economics*, Vol. 91, 257–65.

Portugal-Perez, A and J Wilson (2010), 'Export performance and trade facilitation reform: hard and soft infrastructure', Policy Research Working Paper 5261, World Bank, Washington, DC.

Suwa-Eisenmann, A and T Verdier (2007), 'Aid and trade', *Oxford Review of Economic Policy*, Vol. 23 No. 3, 481–507.

Turner, L (2008), 'Quantifying aid-for-trade', Economic Paper 83, Commonwealth Secretariat, London.

Vijil, M and L Wagner (2010), 'Does aid-for-trade enhance export performance? Investigating on the infrastructural channel', Working Paper 10-07, SMART-LERECO, Rennes.

Vijil, M, M Huchet-Bourdon and C Le Mouel (2011), 'Aid for trade: a survey', Working Paper 110, April 2011, Agence Française de Développement, Paris.

Volpe Martincus, C (2011), 'Assessing the impact of trade promotion in Latin America', in Cadot, O, AM Fernandes, J Gourdon and A Mattoo (Eds), *Where to Spend the Next Million? Applying Impact Evaluation to Trade Assistance*, World Bank, Washington, DC.

WTO (World Trade Organization) (2006), *Recommendations of the Task Force on Aid-for-Trade*. Geneva: WTO.