Chapter 5

Aid for Trade: Impact on Sub-Saharan Africa

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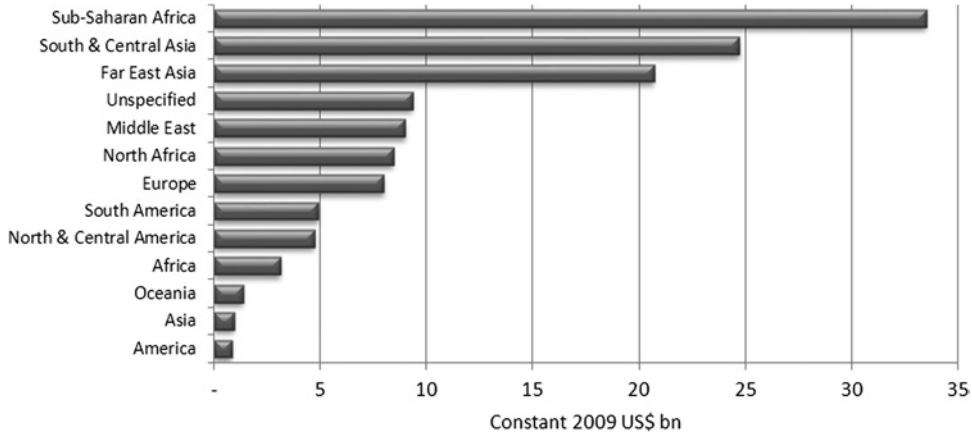
5.1 Introduction

One of the major constraints facing the poor countries in sub-Saharan Africa (SSA) has been their disappointing trade performance. Although there are recent signs of their enhanced participation in the global trading system, largely due to the buoyant commodity prices that have now been sustained for a considerable time, the region's relative significance in world trade in value terms still hovers around at a level which is just half the 3 per cent share it had enjoyed almost 50 years ago.

Moreover, the growth and levels of intra-regional trade in sub-Saharan Africa are also low despite a high level of ambition and progress made in regional integration efforts. At barely 10 per cent, the share of regional exports in total exports from Africa is amongst the lowest compared with other regions and it is also the share showing the slowest long-term growth.[1] This is consistent with generally high trade costs in the whole region. A review by Morrissey (2009) suggests that SSA on average has far higher transport costs than elsewhere and that such costs have been a major constraint to trade and growth in the region. Evidence provided in Portugal-Perez and Wilson (2008) suggests that the gains for African exporters from cutting trade costs has a greater effect on trade flows than a substantive cut in tariff barriers, whereas Djankov et al. (2006) stress the constraint posed by high internal transport costs and long delays. Given these types of constraints, it is no wonder that the recent launch and developments of the Aid for Trade (AfT) initiative were followed with great interests by policy-makers in SSA, as one of the main aims of AfT is to lift supply-side constraints in developing countries to enable them to participate effectively in the world trading system.

The resources necessary to that end are likely to be very large. Calì et al. (2007), for instance, review some estimates of only the annual (trade-related) infrastructure needs in Africa, which are considered to be in the US$10–20 billion range. Donors have started to appreciate the specific challenges posed by trade-related constraints in SSA that have prevented trade in SSA from taking off more decisively, and SSA has become the largest recipient of AfT among developing regions since 2006 (Figure 5.1). It is, however, not only the total AfT resources that matter in helping the region to become a more prominent trade player internationally. Rather, what is perhaps more important is the extent to which these flows are effective in lifting the specific trade constraints. So far, relatively little attention has been devoted to the impact assessment of these flows, although more studies looking at the effectiveness of AfT are starting to appear (e.g. Brenton and von Uexkull 2008; Calì and te Velde 2009;

Figure 5.1 Total Aid for Trade flow by geographical region, 2006–10 (constant 2009 US$billion)



Source: Basnett and Kennan (2012)

Karingi and Leyaro 2010). Without a proper assessment of the impact of different types of AfT flows, it is difficult to identify what works and what does not and in what contexts. This chapter aims to shed some new light on the effectiveness of these flows, especially in the context of SSA. Using an empirical approach, the analysis presented here aims to examine the impact of different AfT categories on an important part of trade costs (i.e. costs of processing imports and exports), as well as on total exports. We examine the effects for a large sample of developing countries, as well as for SSA and for three major regional economic communities in SSA: the Southern African Development Community (SADC), the Economic Community of West African States (ECOWAS) and the Common Market for Eastern and Southern Africa (COMESA).

This chapter is organised as follows: after this introduction, Section 5.2 provides a brief discussion on trade and economic performance of sub-Saharan Africa and how AfT can be of help; Section 5.3 outlines the methodology and data; Section 5.4 provides the results of empirical assessment; and finally Section 5.5 concludes.

5.2 Trade and economic performance of sub-Saharan Africa: how AfT could help

In the economic development landscape, SSA, containing 33 out of a total of 48 least developed countries (LDCs), generally lags behind other regions. The LDCs are recognised as highly disadvantaged in their development process and face a disproportionate risk of failing to overcome poverty and other consequences associated with weak resource capacity and economic vulnerability. [2] The high concentration of LDCs in SSA clearly demonstrates the severity of economic challenges faced by the region.

Table 5.1 GDP per capita (constant 2005 US$)

	1970	1980	1990	2000	2011	Compound annual growth: 1970–2000 (%)	Compound annual growth: 1970–2011 (%)	Compound annual growth: 2000–2011 (%)
World	4,160	4,995	5,710	6,510	7,520	1.50	1.45	1.32
Developing economies	810	1,130	1,290	1,735	2,740	2.57	3.02	4.24
LDCs	350	330	320	340	530	–0.11	1.02	4.12
Sub-Saharan Africa (excluding South Africa)	540	570	505	500	685	–0.26	0.58	2.9

Source: Authors' estimates using data from UNCTAD (2013)

For much of the past half-century, LDCs and SSA have remained trapped in low-income situations and slow progress in social and human capital development. Between 1970 and 2000, the per capita incomes of LDCs and SSA actually fell absolutely in real terms (Table 5.1), while those of developing countries more than doubled. Growth in the most recent past decade (2000–10) has, however, been impressive. Because of the 'lost three decades' (1970–2000), LDCs and SSA registered compound annual per capita income growth of barely 1.02 per cent and 0.58 per cent respectively, just over the 40-year period since 1970, in comparison with more than 3 per cent growth in developing countries as a group.

Between the early 1950s and the mid-1990s, the shares of LDCs and SSA in global merchandise export trade secularly declined from more than 3 per cent, in each case, to less than 0.5 per cent and 1 per cent respectively. In the last decade (2000–10), both the groups of countries showed some sign of reversing the trend; at the time of writing, LDCs have a share of just over 1 per cent and SSA 1.5 per cent. In commercial service exports as well, LDCs and SSA's shares have stagnated at around just above 0.5 per cent and 0.75 per cent respectively.

Lack of productive capacity is considered to be the most important constraint facing SSA countries.[3] To put things into perspective, with a total population of 827 million (i.e. about 12 per cent of the global population), the combined merchandise exports from SSA excluding South Africa in 2011 stood at about US$338 billion, while for Malaysia, a country of 27.8 million people, they were US$228 billion. Similarly, the annual production in SSA, as measured by gross domestic product (GDP), is estimated at US$860 billion (1.24 per cent of world GDP), in contrast to US$775 billion in Turkey, which has a population of 74 million.

One salient feature of limited productive capacities is the lack of diversification. Whereas economic development would imply countries' progressing from primary and traditional activities to more productive manufacturing and modern services sectors, in an overwhelming majority of SSA countries such a transformation mechanism

has largely been absent. For instance, during the 2000s these countries demonstrated remarkable economic performance, recording average annual GDP growth of 6 per cent. However, this has not been translated into an improved relative amount of manufacturing activities: in fact, the share of manufacturing in GDP remained stagnant at around 10 per cent. Similarly, fuels and other raw materials contributed to about 90 per cent of all SSA merchandise exports.

On an index of export diversification, which compares individual countries' export structures with the world average, ranging from a value of 0 (for highly diversified, reflecting the world average) to 1 (highly concentrated and thus far away from the world average), the average value for SSA countries turns out to be 0.78 as against 0.22 for the developing countries as a group.[4] There is now strong evidence to show that high export concentration adversely affects income growth.[5] Therefore, both domestic production and export structures vividly portray the challenge of achieving structural transformation in SSA.

It is against this backdrop that the role of trade becomes most critical for promoting development in SSA. International trade overcomes the problems of small domestic markets accentuated by the low purchasing power of the populations, helps achieve gains from allocative efficiency, facilitates transfer of modern and more productive technology and fosters positive spillover effects from export activities. Aid for Trade is supposed to be particularly helpful in materialising all positive aspects of the trade-led development paradigm. Most important outcomes for SSA countries in this respect could be (i) improved supply response due to enhanced productive capacity supported by AfT and (ii) reduced costs of trading as a result of AfT-supported infrastructure and trade facilitation programmes.

The impact of AfT is likely to be much broader. te Velde (2008), as mentioned in Chapter 3 in this volume, summarises the main examples of market and governance failures that can harm the development of trade in developing countries. It also identifies possible policy responses to address these failures and examines whether such a response may be assisted by an AfT package and what part of the package would be relevant to the task (on the basis of its current classification in the OECD CRS aid statistics).

This approach suggests that, if employed effectively, AfT can be instrumental to achieve a number of trade-related goals, in line with the AfT categorisation proposed by the WTO Task Force on AfT. These include improving trade policy co-ordination (AfT category: trade development); developing standards to improve access for exports (trade facilitation); improving skill formation (trade-related adjustment); improving infrastructure (trade-related infrastructure); and overcoming governance failures, such as weak institutions or weak administrative procedures (trade policy and rules).

The actual macroeconomic effects of AfT depend on the functioning of a number of channels, for example whether the exchange rate appreciates as a result of inflationary expansion, so that exports are affected, or whether aid actually improves trade competitiveness through better infrastructure. From an economic point of

view, if more support goes through investment and productive uses, rather than to consumption or other projects with less growth potential, this will help to remove or reduce the Dutch disease effects of increased aid, as is confirmed by Adam and Bevan (2006). They use a computable general equilibrium model to show that aid-funded increases in public investment yield potentially large medium-term welfare gains, as public infrastructure investments offset short-run Dutch disease effects.

We do not have enough information to predict what channels may be relatively more important for trade-related outcomes. Our hypothesis is that both direct and indirect effects of AfT are potentially important to stimulate competitiveness and exports. These effects are the product of a complex causality chain running from aid to country outcomes and mediated by domestic policy-makers, implementation agencies, policies and country conditions. Bourguignon and Sundberg (2007) define this chain as a 'black box'. 'If a dollar of aid produces little discernible change, was the objective ill-defined, the service delivery inefficient, bureaucratic measures inadequate, or was money diverted?' (Bourguignon and Sundberg 2007: 317). This problem applies to our analysis as well, but it is less significant than for models which estimate a relationship between aid and growth, as the links between AfT and trade-related performance are more direct. This, in turn, implies more precision in the definition of the aid objectives.

In order to formalise these intuitions, we present in Annex 5.1 the simple exports' demand model built by Calì and te Velde (2009) on the basis of Fontagné et al. (2002), which shows how some of the types of AfT presented above may influence exports. From the model we derive the two specifications we test. The first test concerns the effects of Aid for Trade facilitation (*Atf*) and Aid for Trade policy and regulation (*TPR*) on the costs of trading (equation 5.A7 in the annex). The former type of AfT has the explicit objective of reducing the costs and the time to process trade, whereas the second is a broader category which encompasses other types of training and support that may affect the processing of trade (see the data description in the next section).

From the equilibrium equation of the model (equation 5.A8 in the annex), we also derive the other specification which (positively) links the two main types of AfT to exports. There are two intuitions behind these positive relationships in the export demand equation used in the model:

i. Other things being equal, aid for productive capacity (*Apc*) should increase the attractiveness of the products from country *i* (which receives *Apc*), for example through support to public institutions to market these products abroad, or through the introduction of better production techniques which raise the quality of the products. In the model, that is represented by an increase in the share of good from *i* in total expenditure in importing country *j*.

ii. Other things being equal, aid for economic infrastructure (*Ainfra*) should reduce the transport costs from country *i* to country *j*, thus making products from *i* more attractive for consumers in *j*.

We refer the reader to Annex 5.1 for further details on how these theoretical specifications are translated into the empirical framework, to which we turn in the next section.

5.3 Empirical methods

Building on Calì and te Velde (2009), we use two ways of assessing the impact of AfT which reflect the working of the model described above: first, a relatively narrow one looking at the effects of a specific category of AfT (i.e. *Atf* and *TPR*) on the costs of trading; second, a broader assessment of the effects of *Apc* and *Ainfra* on exports.

5.3.1 AfT and the costs of trading

First, we estimate whether or not particular types of AfT have affected trade costs. This is measured by investment climate indicators at the macro level, such as the time taken by customs to clear imports and exports, and the cost of exporting and importing goods across countries and over time (conditional on other variables). As the majority of developing countries, especially in Africa, import a larger variety of goods than they export, the cost of importing is often more important than the cost of exporting. Therefore we mainly examine the former (although we perform some robustness tests using the latter as well).

We use the following fixed-effect (FE) specification to test for the effects of *Atf* and *TPR* on the costs of trading:

$$Cimp_{it} = \alpha_i + \beta ATF_{(it-1)} + \chi TPR_{(it-1)} + \Gamma Z_{it-1} + \gamma_t + \varepsilon_{it} \tag{5.1}$$

where *Cimp* is cost of importing for country *i* at time *t*, *Atf* is Aid for Trade facilitation (as defined by the Organisation for Economic Co-operation and Development (OECD) Creditor Reporting System (CRS) database), *TPR* is Aid for Trade policy and regulation (excluding *Atf*), and *Z* is a vector of other determinants of *Cimp*, including income levels, population size and governance indicators. All of these variables are lagged one year to partly address the problem of endogeneity. Finally, α_i is country-fixed effects and γ_t are time effects.

This is a direct test of the effects of AfT, in particular as far as *Atf* is concerned. According to the data description by OECD/DAC (2009), trade facilitation assistance is aimed at the 'Simplification and harmonisation of international import and export procedures (e.g. customs valuation, licensing procedures, transport formalities, payments, insurance); support to customs departments; tariff reforms'. We would expect that $\beta < 0$ and possibly also $\chi < 0$.

As we are interested in the impact on SSA countries, we also run a modified version of (5.1) to test for any eventual differential impact of these types of AfT on SSA as well as on the main regional economic communities (RECs):

$$\begin{aligned} Cimp_{it} = {} & \alpha_i + \beta_1 ATF_{(it-1)} + \chi_1 TPR_{(it-1)} + \beta_2 ATF_{(it-1)} \times SSA_i + \chi_2 TPR_{(it-1)} \times SSA_i \\ & + \Gamma Z_{it-1} + \gamma_t + \varepsilon_{it} \end{aligned} \tag{5.1'}$$

The β_2 and χ_2 coefficients indicate whether or not these types of trade-related assistance have an impact different in SSA than in other developing countries. We

apply the same type of test to the main SSA RECs as well, that is SADC, ECOWAS and COMESA.

5.3.2 AfT and exports

We also estimate the effects of AfT on exports directly, using an augmented export demand equation which is directly derived from the model developed in the annex:

$$E_{it} = \alpha_i + \gamma_1 Apc_{it-2} + \gamma_2 Ai_{it-2} + \gamma_3 MP_{it} + \gamma_4 p_{it} + \lambda_t + \varepsilon_{it} \quad (5.2)$$

where E is the (log of) exports value in constant prices (country i, time t), Apc is (log of) aid disbursed to productive capacity and Ai is (log of) aid disbursed to economic infrastructure, MP is a market potential measure, and p is the level of prices (both in log); α_i country effects, λ_t estimation period effects. Unlike expression (5.1), we use a two-year lag for the AfT variables here, as AfT may take some time before affecting the level of exports, as its impact is mediated through other variables. On the other hand, the impact of Atf on trading costs is more immediate and thus a one-year lag seems more appropriate. The results from (5.2) are robust to including one instead of two lags (results are available upon request). MP is computed as a distance weighted measure of other countries' GDP:

$$MP_{it} = \sum_{j=1}^{N} \frac{GDP_{jt}}{d_{ij}}$$

where GDP_{jt} is total GDP of country j at time t and d_{ij} is the distance in km between country j and country i (measured as the great circle distance between capital cities).

Ideally we would want to use the real effective exchange rate (REER) as a control for prices of the domestic economy relative to its trading partners in (5.2). However, the use of REER would halve the number of observations available, so we use the Consumer Price Index (CPI) instead. We note that the results are robust to using REER instead of CPI with the sub-sample of observations for which REER is available.[6]

Again, we add a series of interaction terms to (5.2) to test for any eventual differential impact of AfT interventions in SSA and its main RECs:

$$E_{it} = \alpha_i + \gamma_1 Apc_{it-2} + \gamma_2 Ai_{it-2} + \phi_1 Apc_{it-2} \times SSA_i + \phi_2 Ai_{it-2} \times SSA_i + \gamma_3 MP_{it} + \gamma_4 p_{it} + \lambda_t + \varepsilon_{it} \quad (5.2')$$

There are still a couple of potential problems with running specifications (5.2) and (5.2′). First, the AfT variables are likely to be endogenous to exports. This is the case, for example, if better-performing and/or faster-reforming countries tend to receive more AfT than others. This would generate an upward bias in the AfT coefficients.

Also, there could be some error in the measurement of the AfT variables, as this is based on voluntary reporting of disbursements by donors to the OECD secretariat. Such error could be caused by inefficiency in reporting and/or misclassification of projects and, if it is correlated to (time-varying) unobserved characteristics of recipients, could make the AfT coefficients inconsistent. In order to control for these potential issues, we use a series of instruments for *Apc* and *Ainfra*.

The first of them is based on the degree of respect for civil liberties, as measured by Freedom House (2009), which is used by Calì and te Velde (2009) as well. There is consistent evidence that donors tend to give relatively more aid to countries which are considered to respect civil liberties and human rights (Alesina and Dollar 2000; Macdonald and Hoddinott 2004 for Canada). The Millennium Challenge Corporation, one of the major providers of US AfT, explicitly uses Freedom House indicators on respect for civil liberties and for political rights as criteria for recipient countries to be eligible for assistance. Other than being a good predictor of future aid allocation, this variable (*civil liberties*) is also not related to exports in any meaningful way, thus satisfying the exclusion restriction's conditions. It is hard to find any clear link between a country's respect of civil liberties and its capacity to export. This is also confirmed by the insignificant coefficient of *civil liberties* when we include it in the specification.[7]

The second instrument is calculated as the total AfT provided by the largest AfT bilateral donor, that is Japan (net of the part accruing to the specific recipient to ensure exogeneity), divided by the recipient's distance from Japan. This variable should capture the part of the changes in AfT received by a country due to the change in total AfT disbursed by Japan (which is exogenous to whatever occurred in that country). The distance weight provides a good proxy for the extent to which recipient countries may be affected by such exogenous changes (with more distant countries likely to be less affected than countries closer to Japan). Using distance from Japan as the weighting dimension is consistent with the determinants in the pattern of AfT allocation by Japan, which is skewed towards Asian, and particularly East Asian, countries.

The final set of instruments used for the AfT variables in (5.2) is based on the 'affinity' in foreign policy between each recipient and the four major bilateral donors for which data are available, that is Japan, the USA, the UK and France. This degree of affinity is measured by an affinity index computed by Gartzke (2009) on the basis of dyadic UN voting patterns. Annex 5.2 provides more details about the calculation of these affinity indices.

We instrument the interaction terms testing for the differential impact on SSA through a series of interactions between the instruments and the SSA (or REC) dummy.

Another potential issue with the estimation of (5.2) is its lack of dynamics property. It is generally acknowledged (Senhadji and Montenegro 1999; Santos-Paulino and Thirlwall 2004) that exports are fairly persistent over time, as they tend to depend on previous exports. Thus we test our results also against a dynamic specification. In particular, we estimate a version of (5.2), which includes the lagged value of exports

E_{it-1}. As this lagged value is endogenous to the error term ε_{it}, we need to take the first differences of the variables to purge the fixed-effect terms (Bond 2002):

$$\Delta E_{it} = \gamma_1 \Delta Apc_{it-2} + \gamma_2 \Delta Ai_{it-2} + \gamma_3 \Delta MP_{it} + \gamma_4 \Delta p_{it} + \gamma_5 \Delta E_{it-1} + \lambda_t + \Delta \varepsilon_{it} \quad (5.3)$$

where $\Delta E_{it} = E_{it} - E_{it-1}$

By construction, ΔE_{it-1} is correlated with $\Delta \varepsilon_{it}$ in (5.3) (as E_{it-1} is correlated to ε_{it-1}). Hence we resort to the generalised methods of moments (GMM) estimator, which generates internal instrument using appropriate lagged values of the explanatory variables (Arellano and Bond 1991). The GMM technique serves also as a robustness test for the impact of AfT variables on exports, as it allows controlling for (weak) endogeneity of the AfT variables by using a different type of instrumental variables from that employed above. As the measurement error of the AfT variables could be determined not only by random errors but also by recipient-specific characteristics (e.g. if the disbursement process is cumbersome and thus under-reported in certain countries), we employ the GMM system estimator (Blundell and Bond 1998). This estimator uses the explanatory variables in levels in the regression and instruments them through their past values of first differences. In this way we control for unobserved recipient-specific effects that are potentially correlated with the explanatory variables.

5.3.3 Data

We employ data from a variety of sources. AfT data (constant 2008 US$million disbursements) come from the OECD/DAC (2010) CRS database on disbursements. This database has covered a number of AfT activities since the mid-1970s, and reporting to the CRS is improving. However, disbursements data until 2001 have substantial gaps, so we base the analysis on the post-2001 period. We use different types of AfT data from this database, including Aid for Trade facilitation, for trade policy and regulation, for productive capacity (both total and sectoral) and for economic infrastructure.

The OECD Development Co-operation Directorate bases its classification of the destinations of aid on the specific area of the social or economic structure in the receiving country that the aid transfer is intended to foster. The categories therefore refer to the overarching goal (e.g. trade facilitation), rather than the service provided through the funds (e.g. funding of regional trade agreements (RTAs) or training). The system of purpose codes summarises this classification in five digits: the first three refer to the respective DAC5 sector, and the remaining two represent numbering from more general (10–50) to more specific (60–90). We use the following categories:

1. **Ainfra:** *Aid to Economic Infrastructure*, coded as number 200, includes Transport & Storage and Communications, Energy, Banking & Financial Services and Business & Other Services, each with its own sub-components.

2. **Apc:** *Aid to Production Sectors*, coded as 300, includes the four sectors *Agriculture–Forestry–Fishing*, *Industry–Mining–Construction*, *Trade Policy & Regulations* and *Tourism*, treated separately.

3. **Atf**: *Aid for Trade Facilitation*, coded as 33120 (single category).
4. **TPR** *Aid for Trade Policy and Regulation*, coded as 331, includes *Trade policy and administrative management*, *Trade facilitation*, *Regional trade agreements (RTAs)*, *Multilateral trade negotiations*, *Trade-related adjustment* and *Trade education/training* (we exclude the *Trade facilitation* part of TPR in the analysis, as we test for its effect separately).

For data on the cost (and time) of trading, we use the World Bank's 'Doing Business Indicators' dataset. In particular we use the 'Trading across borders' section of this survey, which gathers data on the number of documents, time and costs required to process exports and imports of goods across borders. These variables measure separately the time and the costs (in US$) of handling and transporting a 20-foot container to (or from) the port of departure (or entry). In the case of costs, these include costs for documents, administrative fees for customs clearance and technical control, terminal handling charges and fees for in-country transport. The cost measure does not include tariffs or trade taxes. Only official costs are recorded. These cost and time variables capture the efficiency with which exports and imports are handled within the country of interest. For instance, in the case of exports, procedures start after the goods are packed at the factory and include all official costs until the goods' departure from the point of exit. For imports, procedures start when goods are unloaded from a vessel at the port of entry or when the vehicle carrying them has crossed the border, and go on until delivery at the factory or warehouse. Therefore these measures are not affected by the degree of isolation of the country (e.g. its distance from its trading partners), as the costs of transporting the goods from (or to) the point of departure (or destination) are excluded. In any instance we use country-fixed effects in some of the specifications to account for the potential influence of any time-invariant country-specific factor, such as geography and location.

Export data and most other controls, including population, CPI and GDP data, are from World Bank (2010). We also use REER from the International Monetary Fund (IMF 2009). Data on bilateral distances between capital cities come from Mayer and Zignago (2006), who compute geodesic distances through the great circle formula. Government effectiveness indicators come from Kaufmann et al. (2008), and the index of *civil liberties* is computed by Freedom House (2009). This index is measured on a one-to-seven scale, with one representing the highest degree of freedom and seven the lowest. Finally, foreign policy affinity index data come from Gartzke (2009). Table 5.2 presents the summary statistics for the main variables.

5.4 Results

5.4.1 Aid for Trade and the cost of trading

We first carry out the analysis on the effect of AfT on the cost of trading variables by implementing equation (5.2).

Table 5.3 presents the results, which show that Aid for Trade facilitation (*Atf*) has a consistently negative impact on the cost of trading, when measured both as cost

Table 5.2 Summary statistics for the main variables

	Obs	Mean	Std Dev.	Min	Max
Cosimp	282	1,523.81	933.25	367	5520
Cosexp	282	1,291.15	754.68	390	4867
Timimp	401	35.93	20.29	3	104
tf_disb	677	0.59	3.34	–0.07	53.96
tpr_tf_disb	677	3.52	13.86	0.00	194.52
Goveff	642	–0.34	0.80	–2.51	2.53
Lpop	636	15.31	2.17	9.90	21.00
lpop2	636	239.06	65.57	98.01	441.19
lgdpcons	567	7.31	1.37	4.48	11.19
lexpcons	594	22.01	1.97	17.13	27.83
Laidinf	747	2.35	1.76	0.00	7.64
Laidprod	863	1.83	1.46	0.00	6.54
lMkt_pot	888	8.66	0.36	7.95	9.77
CL	848	3.71	1.63	1.00	7.00
a4tnet_japan	844	337.78	243.93	0.00	2,001.36
japan_aff	896	0.51	0.18	–0.26	1.00
uk_aff	896	0.28	0.19	–0.21	1.00
france_aff	896	0.33	0.19	–0.21	1.00
usa_aff	896	–0.53	0.28	–1.00	0.98
Lcpi	731	4.96	0.74	4.37	18.44

of imports (column 1) and as cost of exports (column 2). On the other hand, the rest of Aid for Trade and policy and regulations (TPR) – i.e. excluding *Atf* – has a negative but insignificant impact. This suggests that it is the specific assistance to customs authorities for import and export procedures that is particularly effective at reducing the costs of trading. After all, this type of assistance has the stated objective of reducing these costs. These results are consistent with those of Calì and te Velde (2009), although the magnitude of the effect is different, as here the period of analysis is longer, the sample slightly larger and the specification somewhat different, as explained above. An increase of US$1 million in *Atf* is associated with a reduction by between US$15 and US$20 in the cost of packing goods and loading them into a 20-foot container, transporting them to the port of departure and loading them onto the vessel or truck. Considering that, in 2000, the number of 20-foot containers loaded and unloaded in African ports reached almost 7.3 million, including 2.5 million in sub-Saharan countries (UNCTAD, 2003), the return on *Atf* is likely to be substantial.

The virtuous effect of *Atf* does not apply to the time taken to process imports instead (column 3). However, it is robust to the inclusion of the number of import documents as a control (which is, as expected, negatively related to the costs of importing, column 4) and to restricting the sample to those observations with a positive value of *Atf* (column 5). This should limit the potential error in reporting aid data, that is if the zeros are in fact unreported data rather than actual zero *Atf*.

In columns (7) and (8) we examine whether or not these effects are different in the case of SSA, by introducing a series of interaction terms between the AfT variables and

Table 5.3 The impact of Aid for Trade on the cost of trading, 2005–09

Sample Dep. Var.	(1) All cosimp	(2) All cosexp	(3) All timimp	(4) All cosimp	(5) $A_{TF} > 0$ cosimp	(6) All cosimp	(7) All cosexp
Trade fac. (*t*–1)	–15.00**	–12.68*	–0.21	–12.93**	–19.70**	–12.86**	–14.49*
	(6.54)	(7.31)	(0.21)	(6.48)	(7.87)	(6.39)	(7.60)
Other TPR (*t*–1)	–2.10	–3.06	0.12	–2.05	–0.90	1.27	–0.48
	(1.89)	(2.12)	(0.08)	(2.01)	(2.51)	(2.30)	(2.04)
Atf (*t*–1) × SSA						–19.89	24.42
						(30.72)	(24.66)
Other TPR (*t*–1) × SSA						–4.84*	–2.96
						(2.71)	(3.38)
Import doc				–24.07			
				(17.53)			
Gov. Eff (*t*–1)	159.27	–6.33	–1.27	135.52	41.42	164.73	0.10
	(108.10)	(110.07)	(1.34)	(84.97)	(153.61)	(109.98)	(109.21)
Ln pop (*t*–1) ('000)	63.67**	10.46	1.66*	70.50**	351.65**	63.51**	13.66
	(29.79)	(33.86)	(9.28)	(27.26)	(143.93)	(31.05)	(37.10)
Ln pop (*t*–1) sq. ('000)	–2.30*	0.03	–62.18*	–2.56**	–10.67**	–2.28*	10.10
	(1.23)	(1.40)	(32.75)	(1.10)	(4.23)	(1.29)	(1.51)
Ln GDP pc (*t*–1)	–324.05	296.49	–0.31	–333.14	–1,538.21*	–312.43	267.92
	(366.96)	(332.64)	(7.71)	(362.06)	(897.08)	(371.24)	(294.07)
Observations	501	501	607	501	266	501	501
R-sq. (within)	0.801	0.760	0.900	0.809	0.882	0.803	0.755
Countries	128	128	129	128	101	128	128

Robust standard errors in parentheses; * significant at 10 %; ** significant at 5 % *** significant at 1 %. All regressions include country-fixed effects, year effects and country-specific time trends.

the SSA dummy. The results suggest that, although there is no significant differential SSA impact for *Atf*, the other TPR aid has a significantly more negative impact on the cost of imports than in the other developing countries (column 6). In particular, every US$1 million disbursed in TPR is associated with a US$5 greater reduction in the cost of imports for every 20-foot container. This result suggests that the more general support for trade policy and regulation, such as trade-related human resource development and support to ministries and departments responsible for trade policy, is likely to yield particular benefits in SSA over and above those of other developing regions. The same does not apply to the cost of export (column 7).

After examining the impact of AfT on the cost of trading for the entire SSA region, in Table 5.4 we present the results for the major African RECs. We test for a differential impact, first vis-à-vis the entire sample of developing countries and then vis-à-vis the SSA region only. The results suggest that *Atf* has a more negative effect for SADC than for the rest of developing countries (column 1) as well as for the rest of SSA (column 2), although the coefficient is not significant at the standard levels. There is no differential impact for other TPR instead. The opposite holds for ECOWAS, where TPR has a more cost-reducing effect than in other developing countries (column 3) but not relative to the rest of SSA (column 4), while *Atf* has a less cost-reducing effect than in the rest of SSA (column 4). Finally, there is no discernible differential impact of *Atf* or TPR in the case of COMESA, vis-à-vis both the rest of developing countries (column 5) and SSA region (column 6).

5.4.2 Aid for Trade and exports

Table 5.5 presents the analysis of the impact of the two major categories of AfT, aid for infrastructure (*Ainfra*) and aid for productive capacity (*Apc*), on real exports. Again we follow Calì and te Velde (2009) closely, although we introduce a couple of more instruments to account for the endogeneity of the AfT variables. To minimise the possible measurement error we use only the period 2002–07, which guarantees a good coverage of the disbursement data. Column (1) confirms the results in Calì and te Velde (2009) that *Ainfra* has a positive and significant influence on exports, while *Apc* has a positive but not significant effect. Interestingly, these results change once we account for the differential impact of these variables on SSA in column (2). The coefficient of *Apc* becomes positive and significant while that of *Ainfra* remains significant but reduces in size.

This change is even more evident when we employ the FE IV estimation to account for the endogeneity of the AfT variables. We use a large battery of instruments, some of which are used for the first time in the literature on the impact of aid. In particular we use the index of civil liberties (CL), as in Calì and te Velde (2009), the total AfT provided by Japan (net of the part accruing to the specific recipient to ensure exogeneity) weighted by the recipient's distance to Japan, and the affinity index of the recipient with Japan, the USA, France and the UK (computed by Gartzke 2009 on the basis of UN voting patterns). The results suggest that *Ainfra* exerts a positive and significant impact on real exports (column 3), whose magnitude is six times as large as that in column (1). On the other hand, *Apc* exerts a negative but not significant

Table 5.4 The impact of Aid for Trade on the cost of trading in SSA, 2005–09

Var. Dep. Sample	(1) cosimp All	(2) cosimp SSA	(3) Cosimp All	(4) cosimp SSA	(5) cosimp All	(6) cosimp SSA
Trade fac. (*t*–1)	–13.54**	–32.45**	–15.24**	–108.87*	–13.95**	–40.87*
	(6.40)	(15.21)	(6.83)	(58.44)	(6.58)	(21.11)
Other TPR (*t*–1)	–2.16	–5.17***	–1.32	–4.14**	–1.66	–5.84**
	(2.00)	(1.58)	(2.38)	(1.96)	(2.34)	(2.48)
Trade fac. (*t*–1) × SADC	–64.12	–58.71				
	(53.26)	(50.53)				
Other TPR (*t*–1) × SADC	–0.47	3.79				
	(4.02)	(6.65)				
Trade fac. (*t*–1) × ECOWAS			2.59	80.01		
			(9.58)	(55.79)		
Other TPR (*t*–1) × ECOWAS			–4.14	–2.60		
			(2.94)	(2.99)		
Trade fac. (*t*–1) × COMESA					–120.43	–120.20
					(143.55)	(120.89)
Other TPR (*t*–1) × COMESA					–1.02	1.62
					(3.50)	(3.13)
Other controls	YES	YES	YES	YES	YES	YES
Observations	501	176	501	176	501	176
Number of recipients code	128	45	128	45	128	45
R-squared	0.802	0.901	0.802	0.902	0.802	0.901

Robust standard errors in parentheses; * significant at 10 %; ** significant at 5 %; *** significant at 1 %. All regressions include country-fixed effects, year effects and country-specific time trends.

Table 5.5 The impact of Aid for Trade on real exports, 2002–07

	(1) All FE	(2) All FE	(3) All FE IV	(4) All FE IV	(5) All – SSA FE IV	(6) SSA FE IV	(7) SSA FE IV
Aid for infra (*t*–2)	0.027***	0.019*	0.173***	–0.017	0.110	0.326***	0.309***
	(0.009)	(0.010)	(0.063)	(0.050)	(0.069)	(0.115)	(0.111)
Aid to prod. capacity (*t*–2)	0.012	0.016*	–0.150	0.144*	–0.033	–0.255	–0.278*
	(0.009)	(0.009)	(0.135)	(0.077)	(0.099)	(0.167)	(0.158)
Aid for infra (*t*–2) × SSA		0.033		0.181			
		(0.026)		(0.121)			
Aid to prod. capacity		–0.020		–0.314*			
(*t*–2) × SSA		(0.026)		(0.186)			
CPI	–0.050	–0.040	0.049	0.010	0.228	0.127	0.120
	(0.043)	(0.038)	(0.063)	(0.067)	(0.188)	(0.083)	(0.081)
Market potential	4.381***	4.310***	5.815***	4.985***	5.335***	–6.862	–6.420
	(1.481)	(1.519)	(1.505)	(1.311)	(1.165)	(9.845)	(9.900)
Market potential							0.007*
							(0.004)
Observations	506	506	442	442	273	169	169
R-sq. (within)	0.590	0.592	0.167	0.395	0.683	–0.539	–0.484
Countries	99	99	88	88	54	34	34

Robust standard errors in parentheses; * significant at 10 %; ** significant at 5 %; *** significant at 1 %. All regressions include country-fixed effects and year effects. *Ainfra* and *Apc* are instrumented through civil liberties (lagged one year), total AfT by Japan weighted by the recipient's distance from Japan, and the affinity index of the recipient with Japan, the USA, France and the UK (computed by Gartzke 2009).

impact on exports this time. Interestingly, these results are mainly explained by the differential impact that AfT has in SSA, as shown in column (4). Once we account for this differential impact, *Ainfra* becomes insignificant while *Apc* turns positive and significant as a result of the positive differential impact of *Ainfra* in SSA and the negative and significant differential impact of *Apc* in SSA. Taken at their face value, these results suggest that the negative impact of *Apc* on exports is *entirely* explained by the negative impact in SSA, and a good part of the positive impact of *Ainfra* on exports is also explained by its differential impact in SSA. In other words, a lot of the different impact of *Ainfra* (largely positive) and *Apc* (mainly negative) is explained by their behaviour in SSA. As a further confirmation of this pattern, we run the FE IV regressions separately for the non-SSA (column 5) and SSA (col. 6) sub-samples. The results suggest that *Ainfra* has a positive effect on exports for non-SSA which is only significant at the 11 per cent level, while *Apc* has an insignificant impact for the same sample. On the other hand, *Ainfra* has a strongly positive impact on exports, which is three times as large as the impact on non-SSA countries, while the *Apc* coefficient is much more negative (and significant at the 13 per cent level) than for the non-SSA sub-sample. Interestingly, the market potential coefficient is insignificant for the SSA sample, which is probably explained by the limited intra-regional trade in SSA (thus reducing the dependence of exports on the income of neighbouring countries). On the basis of this result, we then try to examine the extent to which *Ainfra* may increase the dependence of SSA exports on the income of neighbouring countries by facilitating trade between African countries. We do so by adding an interaction term between *Ainfra* and the market potential variable in column (7). The positive and significant coefficient of this interaction suggests that indeed part of the beneficial effect of *Ainfra* in SSA occurs through the facilitation of intra-SSA trade (which increases the coefficient of the distance-weighted market potential variable). This interaction term is instead insignificant for the overall sample of developing countries (not reported here), suggesting that *Ainfra* reduces the barriers to trade with neighbouring countries mainly in SSA.

Table 5.6 presents the results for the main SSA RECs. Again, there are marked differences across them. Similarly to SSA as a whole, *Apc* in SADC has a more negative impact than in other developing countries. That is valid for both FE and FE IV estimations (columns 1 and 2). On the other hand, there is no differential impact of *Ainfra* in SADC. In ECOWAS (columns 3 and 4) there seems to be no differential impact of either *Ainfra* or *Apc*, except for a slightly more positive impact of *Apc* vis-à-vis the rest of developing countries when using FE IV estimation (column 4). Finally, both *Ainfra* and *Apc* appear to impact exports in COMESA in the same way as they do in the overall sample of developing countries (columns 5 and 6).

We also check the robustness of the results to employing a dynamic specification with lagged exports estimated through system GMM, as explained in the previous section. Table 5.7 presents the results, which broadly confirm the differential impact of *Ainfra* vis-à-vis *Apc*, with the former exerting a positive and significant effect on exports while the latter has an insignificant impact on exports. This time, however, there does

Table 5.6 The impact of Aid for Trade on real exports in SSA, 2002–07

	(1) FE	(2) FE IV	(3) FE	(4) FE IV	(5) FE	(6) FE IV
Aid for infra (*t*–2)	0.027**	0.020	0.025**	0.157***	0.023**	0.176**
	(0.011)	(0.056)	(0.010)	(0.059)	(0.011)	(0.076)
Aid to prod. capacity (*t*–2)	0.019**	0.168	0.014	–0.104	0.020**	–0.175
	(0.009)	(0.114)	(0.009)	(0.100)	(0.009)	(0.147)
Aid for infra (*t*–2) × SADC	0.016	0.013				
	(0.032)	(0.105)				
Aid to prod. capacity (*t*–2) × SADC	–0.046	–0.266				
	(0.038)	(0.191)				
Aid for infra (*t*–2) × ECOWAS			0.042	–0.064		
			(0.037)	(0.088)		
Aid to prod. capacity (*t*–2) × ECOWAS			–0.037	0.163		
			(0.054)	(0.107)		
Aid for infra (*t*–2) × COMESA					0.045	–0.084
					(0.030)	(0.123)
Aid to prod. capacity (*t*–2) × COMESA					–0.053	–0.039
					(0.035)	(0.165)
CPI	–0.052	–0.060	–0.049	0.043	–0.039	–0.017
	(0.045)	(0.049)	(0.043)	(0.058)	(0.044)	(0.085)
Market potential	4.404***	5.203***	4.418***	5.539***	4.357***	5.611***
	(1.481)	(1.329)	(1.486)	(1.390)	(1.475)	(1.577)
Observations	506	442	506	442	506	442
R-sq. (within)	0.593	0.398	0.591	0.333	0.595	0.026
Countries	99	88	99	88	99	88

Robust standard errors in parentheses; * significant at 10 %; ** significant at 5 %; *** significant at 1 %. All regressions include country-fixed effects and year effects. *Ainfra* and *Apc* are instrumented through civil liberties (lagged one year), total AfT by Japan weighted by the recipient's distance to Japan, and the affinity index of the recipient with Japan, the USA, France and the UK (computed by Gartzke 2009).

Table 5.7 The impact of Aid for Trade on real exports, dynamic estimations, 2002–07

Sample Method	(1) All Sys GMM	(2) All Sys GMM	(3) All – SSA Sys GMM	(4) SSA Sys GMM	(5) All Sys GMM	(6) All Sys GMM	(7) All Sys GMM
Exports (*t*–1)	0.604***	0.685***	0.563***	0.740***	0.641***	0.630***	0.655***
	(0.082)	(0.058)	(0.066)	(0.052)	(0.075)	(0.064)	(0.075)
Aid for infra (*t*–2)	0.014**	0.012*	0.017*	0.008	0.006	0.014**	0.007
	(0.006)	(0.006)	(0.009)	(0.011)	(0.006)	(0.007)	(0.006)
Aid to prod. capacity (*t*–2)	0.004	0.010	0.007	0.003	0.009	0.005	0.010
	(0.007)	(0.007)	(0.006)	(0.011)	(0.008)	(0.007)	(0.008)
Aid for infra (*t*–2) × SSA		–0.015					
		(0.011)					
Aid to prod. capacity (*t*–2) × SSA		–0.006					
		(0.017)					
Aid for infra (*t*–2) × SADC					–0.002		
					(0.012)		
Aid to prod. capacity (*t*–2) × SADC					–0.018		
					(0.015)		
Aid for infra (*t*–2) × ECOWAS						0.003	
						(0.021)	
Aid to prod. capacity (*t*–2) × ECOWAS						–0.012	
						(0.030)	
Aid for infra (*t*–2) × COMESA							0.011
							(0.012)
Aid to prod. capacity (*t*–2) × COMESA							–0.015
							(0.014)
CPI	–0.031*	–0.035*	0.048	–0.011	–0.034**	–0.023	–0.021
	(0.018)	(0.018)	(0.072)	(0.014)	(0.017)	(0.019)	(0.015)
Market potential	1.798**	1.836**	2.838***	–2.526	1.637**	1.863**	1.565**
	(0.801)	(0.745)	(0.825)	(3.675)	(0.734)	(0.794)	(0.690)
Observations	491	491	307	184	491	491	491
Countries	96	96	61	35	96	96	96

Robust standard errors in parentheses; * significant at 10 %; ** significant at 5 %; *** significant at 1 %. All regressions include country-fixed effects and year effects. Dependent variable is value of total exports in constant 2000 US$. All variables are in log; endogenous variables are lagged exports; *Ainfra* and *Apc* across all the specifications.

not appear to be any differential effect of *Ainfra* or of *Apc* on exports in SSA (column 2). If anything, there is a slightly, albeit not significantly, less positive impact of *Ainfra* in SSA. This is confirmed also when we run the estimations separately for SSA (column 4) and for other developing countries (column 3). Similarly, no differential impact of either *Ainfra* or *Apc* is visible for the three main RECs in SSA (columns 5–7). These results suggest that the differential impact of *Ainfra* and *Apc* in SSA does not hold on short-term export growth (i.e. controlling for lagged exports), whereas it seems to apply for medium-term growth of exports.

Having established the positive impact of *Ainfra* on exports, it is worth examining in some more details what types of intervention drive such a positive impact. We do so by decomposing the *Ainfra* variable into its main categories: transport and storage, energy, and financial and business services infrastructure. We present the results in Table 5.8. As we do not have an appropriate set of instruments for all of the aid variables now in the specification, we run only the FE and GMM estimations. The results suggest that it is aid to financial and business infrastructure (F&B) that has the strongest effect on exports for the entire sample of developing countries (column 1). The other infrastructure aid types have positive but not significant effects. The impact of F&B seems to be even stronger for SSA (column 2). In general, the other two types of infrastructure also have larger returns to exports in SSA, although the differential impact is not significant at standard levels. When we run the estimation only for SSA (column 3), the coefficients of the *Ainfra* terms are larger than for the entire sample of developing countries, with F&B having the largest effect, followed by transport (which is only mildly significant) and then energy (significant at the 10 per cent level). These results lose significance in the system GMM estimations (columns 4 and 5), although the message that F&B has the strongest impact on exports among the types of infrastructure aid is retained. In the system GMM however, it is transport aid that has the strongest differential impact in SSA among the infrastructure aid categories. Although preliminary, and bearing in mind the notes of caution required to interpret them in the absence of appropriate instruments, these results point to the relative importance of soft infrastructure investments in developing countries and in SSA in particular. They also suggest that other forms of infrastructure support are important as well, especially in SSA, including transport and energy. They broadly confirm the higher returns to *Ainfra* in SSA.

5.5 Summary and policy implications

This chapter has provided one of the first empirical examinations of the impact of AfT on the SSA region. Building on Calì and te Velde (2009), it has analysed to what extent AfT flows have translated into improved trade performance in SSA and its main RECs and how this compares with other developing countries. We employed two different types of analysis to that end: one examining the effect of specific types of aid to trade policy and regulations on the cost and time of processing imports and exports; and one looking at the effect of the two broad categories of AfT on exports. In line with the results in Calì and te Velde (2009), we found that *Atf* has a positive

Table 5.8 The impact of Aid for Trade on real exports, infrastructure types, 2002–07

Method sample	(1) FE All	(2) FE All	(3) FE SSA	(4) Sys GMM All	(5) Sys GMM All
Aid to transport infra (*t*–2)	0.010	0.004	0.032	–0.001	–0.003
	(0.007)	(0.006)	(0.021)	(0.004)	(0.004)
Aid to energy infra (*t*–2)	0.006	0.002	0.030*	–0.002	–0.002
	(0.005)	(0.005)	(0.017)	(0.004)	(0.004)
Aid to financial and business infra (*t*–2)	0.018**	0.004	0.060***	0.011	0.005
	(0.008)	(0.009)	(0.020)	(0.008)	(0.004)
Aid to prod. capacity (*t*–2)	–0.001	0.010	–0.061	0.000	0.005
	(0.013)	(0.011)	(0.037)	(0.007)	(0.008)
Aid to transport infra (*t*–2) × SSA		0.027			0.013
		(0.022)			(0.012)
Aid to energy infra (*t*–2) × SSA		0.019			–0.004
		(0.016)			(0.011)
Aid to financial and business infra (*t*–2) ×S SA		0.048**			0.010
		(0.022)			(0.022)
Aid to prod. capacity (*t*–2) × SSA		–0.059			–0.016
		(0.040)			(0.016)
CPI	–0.064	–0.044	–0.031	–0.025*	–0.014
	(0.040)	(0.035)	(0.033)	(0.013)	(0.014)
Market potential	3.314**	3.211*	–15.993	1.510**	1.164*
	(1.568)	(1.625)	(11.834)	(0.723)	(0.655)
Exports (*t*–1)				0.709***	0.739***
				(0.044)	(0.050)
Observations	423	423	156	379	379
Countries	89	89	33	81	81
R-squared	0.588	0.604	0.431	–	–

Robust standard errors in parentheses; * significant at 10 %; ** significant at 5 %; *** significant at 1 %. All regressions include country-fixed effects and year effects. Dependent variable is value of total exports in constant 2000 US$. All variables are in log; endogenous variables in GMM estimations are lagged exports and all AfT variables.

and significant effect on the cost of importing and exporting. In particular an increase of US$1 million in *Atf* is associated with a reduction by between US$15 and US$20 in the cost of packing goods and loading them into a 20-foot container, transporting them to the port of departure and loading them on the vessel or truck. Moreover, although there is no significant differential SSA impact for *Atf*, the other TPR aid has a significantly more negative impact on the cost of importing in SSA than in the other developing countries. Looking at specific effects in the main RECs, the results suggest that *Atf* has a more negative effect for SADC than for the rest of developing countries as well as than for the rest of SSA, whereas, in ECOWAS, TPR has a more cost-reducing effect than other developing countries but not relative to the rest of

SSA, while *Atf* has a less cost-reducing effect than in the rest of SSA. The effects of *Atf* or TPR in COMESA are in line with the other developing countries rather than SSA.

In terms of the broad impact of AfT on exports, consistently with Calì and te Velde (2009), we find that *Ainfra* has a positive and significant impact on exports, whereas *Apc* has no significant impact. Interestingly, these results seem to be at least partly driven by the differential impact of these types of AfT in SSA. Whereas the returns to *Ainfra* on exports are much larger in SSA than in the other developing countries, the opposite is true for *Apc*. It looks as if SSA benefited significantly from infrastructure investments, but not from direct support to its productive sectors. It is mainly SADC (rather than ECOWAS and COMESA) that seems to drive this differential pattern of *Ainfra* and *Apc* in SSA. Our analysis further suggests that part of the beneficial effect of *Ainfra* in SSA occurs through the facilitation of intra-SSA trade. Finally, the analysis points to the relative importance of soft infrastructure investments (finance and business services) in developing countries and in SSA in particular, but it also suggests that other forms of infrastructure support are important as well, especially in SSA, including transport and energy.

Annex 5.1 The full working of the theoretical model

In the model, each country produces only one good, differentiated from the others by the place of origin; the supply of each good is fixed; and consumers have identical and homothetic preferences represented by a constant elasticity of substitution (CES) utility function. The collective utility function of individuals in country j is denoted by:

$$U_j = \left(\sum_{i=1}^{N} \varphi_i^{1/\sigma} C_{ij}^{(\sigma-1)/\sigma} \right)^{\frac{\sigma}{\sigma-1}} \tag{5.A1}$$

where σ is the elasticity of substitution between all goods, φ is the share of good from i in total expenditure in j and c_{ij} the value of consumption of the good produced in country i by individuals in country j, with $i, j \in [1, N]$.

The utility function is subject to the budget constraint stating that the value of goods consumed by individuals in country j needs to equal the national income of j:

$$y_j = \sum_{i=1}^{N} C_{ij} p_{ij} \tag{5.A2}$$

where p_{ij} is the price in j of the good produced in i. Defining p_i as the exporter's supply price, then $p_{ij} = p_i \tau_{ij}$ where $\tau_{ij} \geq 1$ and includes all types of trade costs, for example transportation, tariffs, administrative costs of trade and information costs. These costs are modelled as the standard iceberg type.[8]

Maximising equation (5.A1) subject to the budget constraint (5.A2), and after some manipulation, we obtain the total (real) consumption (i.e. import) of good i by country j:

$$C_{ij} = \frac{\phi_i Y_j}{\tau_{ij} p_i} \left(\frac{\tau_{ij} p_i}{\Pi_j} \right)^{1-\sigma} \tag{5.A3}$$

where

$$\Pi_j = \left(\sum_{i=1}^{N} \varphi_i \tau_{ij}^{1-\sigma} p_i^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \tag{5.A4}$$

is a CES index of the trade costs faced in exporting to j, that is an index of trade remoteness of country j; Y_j is total income in country j ($Y_j = p_j Q_j$). Following (5.A3) the actual – free on board – value of exports of country i to country j is given by:

$$X_{ij} = C_{ij} p_i = \frac{\phi_i Y_j}{\tau_{ij}^{\sigma}} \left(\frac{\Pi_j}{p_i} \right)^{\sigma-1} \tag{5.A5}$$

Aggregating all bilateral exports from one source as defined in (5.A5), we obtain the equation for the total value of exports from country i:

$$X_i = \frac{\varphi_i}{p_i^{\sigma-1}} \sum_{j=1}^{N} \frac{Y_j \Pi_j^{\sigma-1}}{\tau_{ij}^{\sigma}} \tag{5.A6}$$

This implies that the exports from i are positively related to countries' preferences for goods from i (i.e. a measure of how appealing good i is in the global market) and to the demand capacity of all potential importing countries j (Y_j), and negatively related to trade costs faced by i in exporting to all other destinations. The direction of influence of the price of i on exports depends on σ: in particular, if $\sigma > 1$ then $\partial X_i / \partial p_i < 0$. This condition states that, when the elasticity of substitution (between goods) is high, an increase in price yields a more than proportionate reduction in export volumes.

AfT enters the picture in (5.A6) essentially by influencing two parameters of the equation: φ_i and τ_{ij}. First, AfT may affect exports by strengthening country i's production competitiveness, which would in turn raise φ_i. This is the kind of assistance that aid to productive capacity (*Apc*) could provide. We can think of this as an improvement in the quality of good i which induces a relative increase in the preference of the rest of world towards i. Given equation (5.A6), other things being equal, this would translate in an increase in exports.

Second, following Bouet et al. (2008), τ_{ij} can be expressed as a function of administrative and legal barriers, distance and infrastructure:

$$\tau_{ij} = (1 + t_{ij}) b_i b_j f(I_i, I_j) d_{ij} \tag{5.A7}$$

where t_{ij} is the bilateral import duty applied by country j on exports from i, b_i (b_j) is the cost of processing exports (imports) in the exporting (importing) country; transportation costs are assumed to be a positive (linear) function of d_{ij} and a negative function of the level of economic infrastructures I in country i and j (i.e. $\partial f/\partial I_i < 0$ and $\partial f/\partial I_j < 0$). A few studies have already quantified the effects of infrastructure provision on trade, finding a positive correlation.[9] AfT to country i may affect both b_i and I_i. In particular, Aid for Trade facilitation (Atf) may reduce the time and costs of processing trade (b_i); and aid to economic infrastructure ($AINFRA$) may increase the level of I_i. To the extent that these types of AfT affect these variables, from (5.A7) we have that $\partial\tau/\partial ATF < 0$ and $\partial\tau/\partial AINFRA < 0$.

In order to make the hypotheses on the relation between exports and AfT explicit, let us assume a simple inverse relation between trade costs and infrastructure and let us re-express total infrastructure in country i as the sum of $AINFRA$ and domestically financed economic infrastructure I_D such that (5.A7) becomes:

$$\tau_{ij} = \frac{(1+t_{ij})b_i(ATF)b_j d_{ij}}{(AINFRA + I_D)_i + I_j} \tag{5.A7′}$$

Plugging (5.A7′) into (5.A6), the export equation then becomes:

$$X_i = \frac{\left[\varphi_i(APC)\right](AINFRA + I_D)_i^{\sigma}}{p_i^{\sigma-1}\left[b_i(ATF)\right]^{\sigma}} \sum_{j=1}^{N} \frac{Y_j \Pi_j^{\sigma-1}}{K_{ij}^{\ \sigma}} \tag{5.A8}$$

where $K_{ij} = ((1 + t_{ij})b_j d_{ij})/I_j$

This is a given component in our empirical model, as the analysis looks at the effects of AfT on a country's total exports (rather than bilateral exports) over time. Thus we are able to use country-fixed effects, which take care of the effects of bilateral distance d_{ij} (i.e. the country's location in our framework). Also, given the framework we use, we are interested not in bilateral trade costs as such but rather in unilateral trade costs, that is the costs of trading of country i with all other countries. Because of this, the other determinants of trade costs in K_{ij} specific to the importing country j (i.e. b_j and I_j) can be approximated by time dummies in a panel data analysis (capturing the average level of these determinants across countries in any year). Finally, we would ideally need to have the bilateral tariffs (t_{ij}) faced by country i in each country; such tariffs have a fairly high variation across countries but a relatively small one over time, so country-fixed effects should be able to capture most of the variation in this case.

According to equation (5.A8), various types of AfT have all a positive impact on exports. In particular:

$$\frac{\partial X_i}{\partial (APC)_i} = \frac{\partial X_i}{\partial \varphi_i}\frac{\partial \varphi_i}{\partial (APC)_i} > 0 \text{ (as both terms are positive)}$$

$$\frac{\partial X_i}{\partial (ATF)_i} = \frac{\partial X_i}{\partial b_i} \frac{\partial b_i}{\partial (ATF)_i} > 0 \text{ (as both terms are negative)}$$

and $(\partial X_i)/(\partial (AINFRA)_i) = W_i Z_{ij} (AINFRA + I_D)_i^{\sigma - 1} > 0$, where W_i and Z_{ij} are constant positives from equation (5.A8) (referred to country *i* and country pairs *i–j* respectively).

Given the availability of data, we empirically implement a reduced form of (5.A8), measuring $\partial X_i/\partial (APC)_i$ and $\partial X_i/\partial (AINFRA)_i$. We also separately compute $\partial b_i/\partial (Atf)i$. We cannot include *bi* in the empirical analysis of (5.A8), as data are available only for the last three years. However, the analysis of *Atf*'s impact on b_i is important, as the costs faced and the time taken by firms to trade goods are significant determinants of a country's competitiveness. Djankov et al. (2006) find that each additional day that a product is delayed before shipping reduces trade by at least 1 per cent.

Annex 5.2 The Affinity of Nations Index

This index, calculated by Gartzke (2009), measures the political affinity of pairs of states (dyadic) on the basis of voting patterns at the UN General Assembly (UNGA). It relies on the theory defined by Signorino and Ritter (1999), which identifies a suitable measure of strategic similarity in foreign policy on the basis of a metric distance between states within a policy space. This space is determined by the kind of policy decisions that each state makes, on trade agreements, strategic alliances and votes at the UN. The use of this index assumes, thus, that voting patterns at the UNGA are a fundamental component of the foreign policy portfolio of each state. Formally, the index is computed as follows:

$$S_{i,j} = 1 - 2\frac{d(V_i, V_j)}{d_{MAX}}$$

where *i* and *j* denote the countries in the dyad, $d(Vi, Vj)$ is the difference between countries in terms of UNGA votes (1 = approval; 2 = abstention; 3 = disapproval) and d_{MAX} is the largest possible difference in UNGA votes for a given year. For instance, if there have been 100 resolutions in a year, $d_{MAX} = 200$. The index therefore ranges from –1 (minimum affinity) to 1 (maximum affinity). We compute four variables for each recipient country *i* by using the four major AfT bilateral donors for which data are available as counterpart countries *j*, that is Japan, the USA, the UK and France.

Notes

1 Authors' calculations on the basis of UNCTAD (2009) data.

2 The categorisation of LDCs is due to the United Nations. A country is classified as an LDC based on three criteria: low income, weak human resource base and economic vulnerability. The United Nations Committee for Development Policy (CDP) is responsible for assessing LDC status, based on a set of indicators under the above criteria. When it was initiated in 1971, the group comprised 25 countries. The membership swelled to reach 50 over the next two decades. Only three countries have ever graduated from the list: Botswana in 1994, Cape Verde in 2007 and Maldives in 2011.

3 According to the United Nations Conference on Trade and Development (UNCTAD), productive capacities include physical and human resources, entrepreneurial capabilities and productive linkages, which together determine the capacity of a country to produce goods and services. This definition is broad and includes infrastructural development, accumulation of factors of production in agriculture, industry and services sectors, and enhancement of productivity etc.
4 This is based on the widely used UNCTAD export diversification index.
5 Hesse (2008) provides recent empirical evidence.
6 Results available from the authors upon request.
7 Results available from the authors upon request.
8 This means that, if an amount x_{ij} of good is shipped from i to j, only x_{ij}/τ_{ij} will reach location j.
9 For example, François and Manchin (2007) estimate that an increase of one standard deviation (from the mean) in the communications infrastructure raises the volume of trade by roughly 11 per cent, compared with a 7 per cent effect on transport infrastructure and a 2 per cent effect on trade for tariffs. Buys et al. (2006) find that upgrading a primary road network connecting the major 83 urban areas in SSA would expand overland trade in the region by around US$250 billion over 15 years.

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