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Aid for Trade, Foreign Direct Investment and Export Upgrading in Recipient Countries

Sèna Kimm Gnangnon and Michael Roberts

DEVELOPMENT DIVISION
WTO

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Development Division, World Trade Organization, rue de Lausanne 154, CH-1211 Geneva 21, Switzerland.

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Abstract

This paper examines empirically whether Aid for Trade (AfT) programmes and Foreign Direct Investment (FDI) inflows affect export upgrading and, if so, whether their effects are complementary or substitutable. Export upgrading entails export diversification (including overall export diversification, as well as diversification at the intensive and at the extensive margins) and export quality improvement. The empirical analysis shows that total AfT flows have a strong positive impact on export upgrading, and that LDCs as compared to Non-LDCs, are the most important beneficiaries of this positive impact. While the impact of FDI inflows on export diversification in host economies is mixed, these flows do exert a strong positive impact on export quality upgrading. Furthermore, the impact of FDI on export diversification is higher in LDCs than in Non-LDCs. Incidentally, AfT and FDI inflows appear substitutes (in an economic theory sense) in achieving export diversification and complementary in their effect on the improvement of export quality in recipient countries, including LDCs. Results obtained on the impact of components of total AfT are inconclusive, as they suggest both complementarity and substitutability with respect to FDI inflows in affecting export upgrading in recipient countries.

Overall, empirical results suggest that AfT and FDI inflows are effective in influencing export upgrading in recipient countries. However, the results also highlight the importance of the interplay between these two kinds of capital flows in affecting export development strategies and FDI policies of recipient countries, notably LDCs.

We can infer from this study that AfT flows appear to play a particularly important role in ensuring that FDI inflows do not lead to further export concentration, by putting in place the necessary conditions for export diversification.

Keywords: Aid for Trade, FDI, Export Upgrading

Jel Classification: O24, F21, O14

I. Introduction

Since the advent of the General Agreement on Tariffs and Trade (GATT), and particularly the creation of the World Trade Organization (WTO) in 1995, the world has experienced a significant increase in trade volumes, and both the stock and flows of foreign direct investment (FDI) have expanded considerably at the same time. According to UNCTAD[1] statistics, the world's inward FDI flows amounted to US$13.3 trillion in 1970, US$ 208.2 trillion in 1990, US$ 343.3 trillion in 1995 and US$ 1422.3 trillion in 2010. In other words, FDI inflows increased by approximately 107 times between 1970 and 2010, and four times between 1995 and 2010.

Recent years, however, while seeing a decline in total FDI flows, have witnessed FDI inflows rising in developing countries, including in Least Developed Countries[2] (LDCs) albeit from a much lower base. According to the World Investment Report of UNCTAD (2014), FDI inflows to developed economies declined from US$880 billion in 2011 to US$ 566 billion in 2013 (amounting respectively to 51.8% and 39% of the world FDI inflows), whereas developing economies experienced continuous growthin FDI inflows, from US$725 billion in 2011 to US$778 billion in 2013 (amounting respectively to 42.6% and 53.6% of world FDI inflows). In this context, LDCs have also been attracting FDI inflows, although from a very much lower starting level compared to other groups of countries. Indeed, the amount of these inflows increased from US$22 billion in 2011 to US$28 billion in 2013 (representing respectively 1.3% and 1.9% of world FDI inflows).

Compared to other capital flows, FDI inflows represent important and stable external flows in contributing to filling the savings and foreign exchange gaps necessary for sustainable development. These capital inflows now represent the prime source of development financing in many developing countries, as compared to Official Development Assistance (ODA) and remittances flows. Notwithstanding this, ODA and foreign exchange derived from trade remain key to achieving the development objectives of developing economies.

Recognizing the supply-side and trade-related infrastructure challenges faced by developing countries, including LDCs in integrating into the global trading system, WTO Members launched in 2005, at the WTO Ministerial Conference in Hong Kong, China, the Aid for Trade (AfT) Initiative. In launching the AfT Initiative, WTO Members intended to "help developing countries, particularly LDCs, to build the supply-side capacity and trade-related infrastructure that they need to assist them to implement and benefit from WTO Agreements and more broadly to expand their trade" (see Paragraph

[1] UNCTAD = United Nations Conference on Trade and Development.

[2] The category of countries is designated as such by the United Nations[2] and considered as the poorest and most vulnerable in the world. Information on LDCs, including the list of LDCs and the criteria of designation and graduation from the list is available on http://unohrlls.org/about-ldcs/

57 of the HK Ministerial Declaration, 2005 - WTO Secretariat document WT/MIN(05)/DEC). Moreover, regarding the rationale for AfT, the AfT Task Force stated that "Aid for Trade is about assisting developing countries to increase exports of goods and services, to integrate into the multilateral trading system, and to benefit from liberalized trade and increased market access" (see WTO Secretariat document WT/AFT/1).

The wording "*……to expand their trade*" contained in this paragraph of the Hong Kong Declaration could be interpreted in different ways when it comes to assess the effectiveness of the AfT Initiative. Let us consider, therefore, the export side of "trade expansion", i.e. expansion of exports of goods and services, which likely reflects the intention of the WTO Membership when launching this initiative.

As far as exports of products are concerned, export expansion can take three different forms:

- it can reflect an increase in the volume of (active) existing product lines (also referred to as growth of exports at the **intensive margin**);
- it can also reflect a rise in exports of new product lines or exports to new destinations (new trading partners) (also referred to as export growth at the **extensive margin**);
- finally, it can be associated with an improvement in the quality of existing products (export quality **upgrading**).

The concept of "export diversification" in international trade literature embodies both export at the intensive and at the extensive margins. The concept of "export upgrading" could be viewed as a more encompassing one, as it may entail both export diversification and export quality improvement (see for example, Amighini and Sanfilipo, 2014).

This said, neither Paragraph 57 of the HK Declaration, nor the AfT Task Force recommendations provide that clearly export expansion would be performed through export diversification strategy. In other words, it does not clearly state the type of export strategy that AfT could be financing to ensure both better integration of recipient countries into the multilateral trading system and the promotion of development in these countries.

The difficulties in clearly highlighting in the Hong Kong Declaration the optimal type of export strategy that AfT flows could fund to achieve expected results may have been due to the lack of convergence in both policymakers' and academic researchers' circles on such an optimal strategy. Indeed, as we will see later in this paper, the debate on the optimal export strategy (export specialization versus export diversification) that would be conducive to a sustainable economic growth is inconclusive (some authors have recommended export specialization; other have suggested export

diversification and an emerging literature tends to advocate that both strategies may be necessary in the development process of a country).

Against this background, assessing the effectiveness of AfT programmes should involve an evaluation of these programmes with respect to trade, including export performance. Equally importantly, it should also entail the investigation of this effectiveness with respect to export upgrading in recipient countries. Such an assessment is all the more relevant as, for example, LDCs can experience an expansion of their export products thanks to the AfT programmes while still largely relying on primary products. In such a case, the AfT interventions might not be viewed as optimal given that these programmes would be reinforcing LDC dependence on export of primary products (rather than helping them diversify e.g. into manufacturing or services sectors). Such an export strategy might not be viewed as conducive to a genuine integration into the global trading system and engage these economies in a sustainable growth path.

It is important to underline here that the AfT programmes are designed to match with countries' needs. As a result, the initiative per se should not be subject to criticism if by trying to respond to recipient needs it reinforces countries' comparative advantage in existing sectors, thereby leading to concentration in exports of existing products.

While AfT programmes have gained a rising momentum in recent years, their effectiveness has still been questioned, in spite of the positive field-studies' results[3] (case studies on Africa, Latin American and Caribbean, and Asian countries) provided by many international institutions, including the WTO and the Organization for Economic Cooperation and Development (OECD)[4]. Evaluations of AfT programmes from an empirical perspective have only emerged in recent years. These studies mainly focus on how AfT flows affect trade, notably export performance of recipient countries, and they highlight positive effects. They include for example Calì and te Velde (2011), Busse et al. (2011), Helble, Mann and Wilson (2012), Hühne, Meyer and Nunnenkamp (2014) and Martínez-Zarzoso et al. (2015) (and see the recent survey of Cadot et al., 2014).

While a very few studies have been devoted to AfT's effect on export diversification, there has not been any analysis of the impact of AfT on export quality upgrading. For example, Osakwe (2007) uses a sample of 31 African states and finds that foreign aid flows negatively affect the real exchange rate, and result in further export concentration. On the other hand, Cadot et al. (2007) show that infrastructure, whose financing accounts for more than 40% of AfT outlays, contributes significantly to

[3] See for example the report co-written by OECD/WTO 2011: OECD/WTO (2011). Aid for trade 2011: results emerging from the case stories.

[4] OECD (2002:11) suggests that traditional evaluations of AfT programmes did not say much about the impact the impact on trade, and were based mainly on opinions, rather than real indicators.

export diversification. Kim (2012) also obtained evidence that AfT flows have positive impacts on diversifying exports, with the caveat that this diversification did not spread to exports associated with higher income.

It is also worth citing here the work of Munemo (2011), who focused on the impact of total ODA - rather than the AfT component of ODA- on export diversification in developing countries. He obtains empirical evidence that foreign aid not exceeding 20% of a country's GDP significantly promotes export diversification, while foreign aid in excess of this threshold significantly impedes export diversification. These findings lead the author to conclude that there is still some scope for providing additional aid to low-income countries to enhance their export diversification, without causing "Dutch Disease".

Alongside the debate on AfT effectiveness, analysis of FDI effects on their host economies has also been evolving. In fact, given the sizeable inflows of FDI to developing countries/LDCs, and the known positive effects[5] of these inflows, a growing literature has been exploring whether these flows have been associated with export upgrading in host economies. These studies include for example Javorcik (2012), Zhu and Fu (2013), and Amighini and Sanfilipo (2014). In general, they conclude that FDI inflows exert a positive effect on the capacity of host countries to upgrade their exports.

In light of the foregoing, this paper attempts to contribute to the literature by exploring the extent to which the interaction between AfT and FDI affects export upgrading of recipient countries, notably of LDCs. It therefore endeavours to answer two main questions:

-i) Do AfT flows exert an impact on export upgrading (namely overall export diversification and export quality improvement) in recipient countries?

-ii) Is there a substitution or a complementarity between AfT and FDI effects on export upgrading in recipient countries?

The paper is structured as follows. Section 2 provides a state of play in the debate on export specialization versus export diversification to lay the groundwork for the discussion of the impact of AfT on export upgrading in recipient countries. Section 3 presents this discussion, while Section 4 provides a brief literature review on the empirical determinants of export upgrading. Section 5 presents the empirical model, and Section 6 discusses the estimation strategy. Section 7 provides some data analysis, Section 8 interprets estimations results, and Section 9 concludes.

[5] These positive effects include positive economic growth effect (see for e.g., Li and Liu, 2005; positive spillovers generated in the form of enhancing job creation, capital accumulation, knowledge transfer (see for e.g., Baldwin et al., 1999; or structural change in markets (competition and linkages) (see Kokko, 1996).

II. A brief state of play on the debate on export specialization versus export diversification

The international trade literature remains inconclusive on the optimal export strategy (export specialization versus export diversification) that policymakers, particularly in developing countries, should follow to better integrate their economies into the global trading system and engage them on a sustainable development path.

Indeed, this literature broadly encompasses three strands: the first strand argues for export specialization; the second strand advocates for export diversification; and the third strand reconciles the two views arguing that both specialization and diversification strategies are needed in the course of the development. The objective of this sub-section is not to expose in detail[6] these theories, but rather to provide an overview of these arguments in order to fuel discussions on the expected effects of AfT programmes on export upgrading in recipient countries.

Arguments in favour of export specialization

The proponents of this export strategy, drawing from the theories developed by Adam Smith (18th century), David Ricardo (19th century) and Heckscher-Ohlin and Samuelson (20th century), argue that countries should specialize in producing and exporting according to their comparative advantage. This argument has been supported by empirical evidence provided for example by Greenaway et al. (1999), Hausmann et al. (2007) and Rodrik (2006). While these authors defend the export specialization strategy, they do emphasize that it is the nature of the specialization that matters, as specializing in the "wrong" type of export product would be associated with deterioration of economic performance.

Arguments in favour of diversification

The first argument is related to the "Graham paradox", whereby countries with a comparative advantage in agriculture and specializing in this sector (of comparative advantage) would experience declines of productivity in both agriculture and manufacturing sectors, leading ultimately to a decrease in total output. Graham (1923) proposes that a country whose comparative advantage is not in agriculture should not specialize in this sector. This argument therefore calls partially into question Ricardo's theory of comparative advantage.

The second argument refers to the so-called Prebisch-Singer Hypothesis (PSH): as dependency on primary products would increase their vulnerability to commodity shocks, price fluctuations and declining terms of trade, especially since the income elasticity of the demand for primary commodities is

[6] For details in the discussion, please see Kaulich (2012) and Naudé, Bosker and Matthee (2010).

low, Prebisch and Singer suggest that developing countries should reduce their dependence on primary commodity production and exports by shifting their production and export structure from primary commodities to manufactured goods, the so-called vertical diversification.

Thethird important argument draws on the endogenous growth theory and contends that what matters is the nature of sector in which a country specializes, given that the return to scale depends on the sector itself. It therefore suggests that countries diversify their exports from primary commodities into high-skilled, high-technology goods as trade in these products may result in more positive spillovers into other sectors than traditional commodity exports (Herzer and Nowak-Lehmann, 2006; Naudé, Bosker and Matthee, 2010).

The fourth relevant argument is based on the portfolio theory approach of the finance literature. Drawing from this theory, Brainard and Cooper (1968) proposed that risk averse countries should diversify their exports taking into consideration the co-variability of different export goods' world prices (see also Naudé, Bosker and Matthee, 2010). The rationale for their proposition is that in the presence of uncertainty overall world trade will be reduced as risk-averse producers of primary commodities reduce their production thereof (Ruffin, 1974; DeRosa, 1991).

Other arguments in favour of export diversification include: the mitigation of countries' vulnerability to economic shocks, including volatility and instability in export earnings (see for e.g., Bleaney and Greenaway, 2001; Strobl 2005; Samen, 2010); and lowering economic growth volatility in countries that are opening up to trade (Haddad et al., 2013).

Arguments to pursue both strategies

A reconciling view argues in favour of both specialization and diversification: The landmark article of Imbs and Wacziarg (2003) provides empirical and factually-based evidence that countries first diversify and then specialize in production (and exports) over their stages of development. While this finding tends to suggest replacing the rule of economic growth based on specialization by the rule of economic growth based on diversification and late specialization, Subramanian (2007:2) highlights the importance of diversification for developing countries, arguing that "all economies start off agricultural, and the successful ones diversify away from agriculture toward manufacturing and, within manufacturing, from simple to more sophisticated activities. Diversification is thus intrinsic to development." In support to Imbs and Wacziarg (2003)'s finding, Hummels et al. (2001) and Yi (2003) show that countries at further stages of development may tend to specialize also in their export structure. These two authors emphasize the importance of vertical specialization in global trade (when a country specializes in a specific stage of production, rather than in the production of the whole product).

A clear message coming out of this debate on export specialization versus export diversification is that while both strategies are active in the global market, diversification appears particularly relevant for LICs/LDCs.

III. Conceptual framework on the AfT and FDI effect on export upgrading

Building on the outcome of the literature provided in the previous section, as well as on the objective of the AfT Initiative laid out in the Hong Kong Ministerial Declaration and Task Force Recommendations, we first discuss in this section the expected impact of AfT on export upgrading. Second, we draw from the empirical literature on FDI and briefly discuss the expected effect of FDI on export upgrading. Third, we briefly outline the possibility of complementarity or substitution effect that could be expected between AfT and FDI inflows on export upgrading in beneficiary countries. It is worth recalling that in this study export upgrading entails both export diversification and improvement of export quality.

- In relation to the first area of inquiry, we expect for LDCs that AfT interventions are associated with both export diversification and export quality improvement. For the other recipient countries, the effect of AfT programmes(s) depends on their national export strategies as AfT interventions are aligned with these strategies.
- In relation to the second area of inquiry, i.e., the effect of FDI flows on export upgrading of host countries, we expect – based on the theoretical literature on the subject -, that these inflows would be associated with both export diversification and export quality improvement in recipient countries.
- With respect to the third discussion point i.e., the interaction between FDI and AfT inflows in affecting export upgrading of recipient countries, any result is likely to be a pure empirical issue, as from the theoretical literature, there is no a clear-cut expected effect. The latter would likely depend on the type of AfT intervention, as for example, AfT related to economic infrastructure will not likely interact in the same way with FDI inflows like AfT dedicated to Trade Policy and Regulations, which basically affects the design and implementation of the trade policy of recipient-countries. Nevertheless, given the huge financing needs of LDCs and their absolute necessity to upgrade their exports, we expect these two external flows to be complementary in affecting the upgrading of their exports.

III.1 Discussion on the expected impact of AfT on export upgrading

When WTO Members launched in 2005 the AfT Initiative at the Hong Kong Ministerial, they mandated the Director-General of the WTO to establish a Task Force whose objective would be to propose recommendations on how to operationalize the Aid for Trade Initiative (see also Para 57 of the Hong Kong Declaration). This WTO AfT Task Force recommended six policy areas for AfT programmes: trade policy and regulations; trade development; trade-related infrastructure; building productive capacity; trade-related adjustment; and other trade-related needs (see WTO Secretariat document WT/AFT/1). As we will see later on, these six policy areas have been grouped by the OECD in three main AfT categories:

- AfT related to Economic Infrastructure, which encompasses transport and storage, communications, and energy generation and supply;
- AfT dedicated to building Productive Capacity, which includes banking and financial services, business and other services, agriculture, fishing, industry, mineral resources and mining, and tourism; and
- AfT related to Trade Policy and Regulations, which comprises trade policy and regulations and trade-related adjustment interventions.

Therefore, in assessing the expected AfT effect on export upgrading, we will be referring to these three categories of the AfT programmes.

While the discussion elaborated in the previous section recommends that LDCs diversify their production and exports out of primary sector, it does not clearly suggest an optimal export strategy that countries, notably developing ones, could adopt to put their economies on a sustainable development path. This is because both export specialization and export diversification appear as pro-growth strategies, depending on the circumstances and characteristics of the country concerned. Furthermore, as already outlined in the introduction, the objective of the AfT Initiative contained in Paragraph 57 of the Hong Kong Ministerial Declaration does not clearly state that it aims to achieve export diversification in beneficiary countries. In this respect, the provision contained in Para 57 does not provide guidance as to which export strategy AfT could or should finance to achieve an export expansion that would genuinely help countries integrate into the global trading system and engage in a sustainable growth path. This is understandable given that, when crafting the language of Para 57, Members did not want to be prescriptive as to the trade strategy that each recipient country should follow.

Let us now discuss the expected effect of AfT programmes in light of the foregoing. We argue here that AfT interventions are aligned with the national development strategies of recipient countries and, therefore, any expected effect of the AfT programmes would be dependent on the national export strategy persued by these countries. However, as far as LDCs are concerned, we should in principle expect that any AfT programme's effectiveness is associated with export upgrading (diversification and improvement in export quality), as the majority of LDCs are highly dependent on exports of primary products, and they have little choice but to diversify their exports away from this sector.

Notwithstanding this conclusion, AfT programmes for productive capacity building, by targeting specific sectors in the recipient country, could either reinforce the country's comparative advantage, thereby leading to further export concentration, or improve the quality of already existing export products, or help the country diversify its export products - in line with its national export strategy- in which case, the programme would be associated with export diversification.

As AfT interventions related to economic infrastructure do not target a particular export sector, they could be sector-neutral (Cirera and Winters, 2015).By contributing to reducing trade costs in recipient countries, including through hard and soft infrastructure, these AfT programmes could help beneficiary countries achieve in the medium term their desired export strategy. That could either be export specialization – in such a case the AfT interventions would be associated with concentration of exports products and possibly upgrading of quality of existing export products - or export diversification. In line with this argument, Cirera and Winters (2015) have noted that in the absence of large sector distortions, these interventions may favour sectors that enjoy comparative advantage.

AfT support for trade policy and regulations aims at reducing administrative costs and regulatory bottlenecks to trade (Busse, Hoekstra, and Königer, 2012; Calì & TeVelde, 2011). As a result, although we may not expect any direct effect of these interventions on export upgrading, it is still possible to obtain a positive medium-term effect on the export strategy of the country. Meanwhile, it is arguable that as this set of AfT interventions help to build the capacity of trade policymakers, the latter would then be equipped to design appropriate trade policies that tally with their export strategy. Even in this case, AfT programmes related to trade policy and regulations could be associated with export concentration, export quality improvement or export diversification, depending on the national export strategy of the recipient country. In other words, the AfT effect on export upgrading of some countries could be associated with export specialization, while it could be associated with export diversification in other countries. The final impact would depend on the main export strategy of countries contained in the sample under analysis.

Overall, the expected effect of total AfT as well as its components on export upgrading in recipient countries is not clear-cut. Furthermore, as the empirical analysis will be focusing on a panel of countries, any observed empirical medium-term effect would likely hide differentiated impact among recipient countries considered in the sample of analysis.

III.2 Discussion on the expected impact of FDI on export upgrading

Let us next consider the issue related to the expected effect of FDI Inflows on export upgrading. This issue has to some extent been developed in the international trade literature (see for e.g., Gui-Diby and Renard, 2015 for an extensive literature review on the effects of FDI inflows on industrialization; see also Harding and Javorcik 2012, Zhu and Fu 2013, and Amighini and Sanfilipo, 2014).

The effects of FDI inflows on export upgrading can pass through different channels by which FDI affects host countries' development. These channels include the creation of forward and backward linkages, the existence of competitive and demonstration effects, the possibility for domestic firms to hire more experienced and skilled workforce, and more generally through the transfer of positive (pecuniary and non-pecuniary) externalities to local firms (see Gorg & Greenaway, 2004; Lall & Narula, 2004, Amighini and Sanfilipo, 2014). Moran (2010) also argues that multinationals can act as channels of breakthrough transformation for the local economies in which they invest, as they can contribute not only to increased productivity in existing industries but, most importantly, they can also bring new "ideas" and best practices to start exploring new production activities.

As far as export performance is concerned, FDI inflows can contribute to promoting export upgrading in the host economies by increasing exports at the intensive margin (rise in export volume of (active) existing product and/or increase in number of trading partners), by inducing growth of exports at the extensive margins (increase the number of exported products) and by improving the quality of existing export products. These effects could occur through the development by foreign firms or production of new and more sophisticated goods that are then exported. These newly produced and exported goods could also contribute to positive spillovers on local firms, for example, by reducing their entry costs in foreign markets (Crespo and Fontoura, 2007; Harding and Javorcik, 2012; see also Amighini and Sanfilipo, 2014).

III.3 Discussion on the complementarity/substitutability between the impact of AfT and FDI on export upgrading

The literature that has examined the relationship between foreign aid and FDI inflows is still in its infancy (as very few papers specifically address the issue), and it remains inconclusive as to whether these financing flows are complementary or substitutive (in an economic theory sense) for host economies. For example, Karakaplan et al. (2005) find that aid is a substitute for FDI in developing countries, while Harms and Lutz (2006) argue in contrast that aid acts as a complement to FDI, particularly in countries where private agents face a substantial regulatory burden. Based on case studies on Japanese FDI and aid flows, Blaise (2005) points out that aid to infrastructure projects exerts a positive effect on FDI. Using the same case studies, Kumura and Todo (2010) find no significant positive infrastructure impact, but rather a positive vanguard effect (arising when foreign aid from a specific donor country promotes FDI from the same country, but not from other countries).

Recently, Selaya and Sunesen (2012) contend that the mixed results stemming from previous studies could be attributed to the high level of aggregation used for the aid variable. They provide empirical evidence that aid invested in complementary input (like public infrastructure and human capital investments) draws in FDI, whereas aid invested in physical capital, i.e. directed towards productive sectors (such as agriculture, manufacturing, banking..etc) crowds out FDI.

Whether the impact of total AfT and FDI inflows will be complementary or substitutive on the export upgrading strategy of recipient countries is thus likely to depend on the type of AfT intervention.

We follow Selaya and Sunesen (2012) and consider that total AfT could be disaggregated into two main components: the first component contributes to improving physical capital in the recipient country. This component comprises the AfT programmes for productive capacity building; that is AfT flows that are sector oriented (agriculture, manufacturing, banking etc). The second component entails those programmes for economic infrastructure as well as AfT interventions for trade policy and regulations. These two categories of AfT programmes serve as complementary inputs (to physical capital accumulated thanks to AfT for productive capacity) for export upgrading in recipient countries.

It is important to underline here that if we suppose that aid could be partly used to finance projects that could have been financed by private (foreign or domestic) investors, then an increase in the flow of aid opens up the possibility for a substitutability effect between AfT and FDI flows on export upgrading policies in recipient countries. Investments in human resources to enhance capacity on trade policy design and implementation, as well as physical investments on economic infrastructure, could be financed either by the international community, and/or by the governments of recipient countries, if they

have the means to do so. Of course, this latter course is not always available to many developing countries, notably LDCs – and this is one reason why the AfT Initiative was launched.

On the basis of this established framework, let us discuss now how AfT and FDI could be complementary or substitutive in affecting export upgrading in recipient countries. It is important to recall here our (principal) hypothesis that AfT flows are provided to align with recipient countries' trade development strategies – and therefore may be associated either with export specialization (concentration), with export diversification and/or export quality improvement, depending on the prevailing trade development strategy in the country in question.

Consider firstly the case of AfT programmes related to productive capacity. If these programmes are used to enhance investment in physical capital that could have been financed by private investors including foreign investors, then we may expect that an increase in such flows would crowd out FDI. In this scenario, AfT and FDI would be viewed as a substitute in affecting the export strategy of the recipient country.

Secondly, consider the case of AfT flows used as complementary inputs to investments in physical capital, i.e. AfT related to economic infrastructure and AfT associated with trade policy and regulations. As these two types of AfT programmes could not be financed by private (including foreign) investors, there would not be a crowding out effect on FDI.

AfT related to economic infrastructure, by helping to develop production and export facilities in the recipient countries would contribute to trade costs reduction and thereby encourage FDI inflows[7] FDI. These AfT programmes would therefore be complementary to and catalytic for FDI in affecting the export strategy of the recipient country.

By contributing to building capacity among policymakers in designing and implementing appropriate trade policies, AfT interventions associated with trade policy and regulations could potentially be associated with trade liberalization. Hence, they could help reduce trade costs by affecting the costs of trade, production or services. This would in turn help to achieve the recipient country's export development strategy, thus attracting additional FDI inflows. Taking these two effects together, it could be expected that AfT flows related to trade policy and regulations would be complementary to FDI inflows in influencing host countries' export strategies.

Finally, one could also consider AfT as a substitute for FDI inflows in countries that are experiencing FDI inflows reversals: a rise in AfT flows in countries experiencing reversals in FDI inflows

[7] Export platform FDI is a form of FDI where multinationals undertake foreign investment in a host country to serve both the local market and the surrounding countries. This type of FDI is mainly determined by market access conditions faced by the host country exporters in neighbouring countries. The development of production and export facilities in the host country contribute to attracting this form of FDI. Furthermore, initial high tariffs in the host country discourage export platform FDI (see e.g. Fuggaza and Trentini, 2014).

could help fill the gap left by the fall in FDI in terms of export upgrading. For example, increases in AfT related to productive capacity could compensate for a decline in FDI inflows by targeting export sectors where FDI was previously undertaken, and consequently contribute to achieving the export development strategy of the recipient country in these sectors.

Overall, the issue of complementarity or substitutability between the effects of Total AfT flows and FDI inflows on export upgrading is *a priori* uncertain and would depend on several factors, including the category of AfT programmes concerned, and more importantly the export development strategy of the recipient (host) country. Nevertheless, it would obviously be most desirable that AfT be complementary rather than a substitute with FDI in LDCs, given the huge financing needs of these countries for their development.

IV. A brief literature review on the determinants of export upgrading

In the growing literature on export upgrading, the studies of Hausmann, Hwang and Rodrik (2007), Harding and Javorcik (2012), Zhu and Fu (2013), Amighini and Sanfilipo (2014) and Henn, Papageorgiou and Spatafora (2015) are most closely related to our work. In these studies, export upgrading has been associated with export diversification, export quality improvement, or export sophistication, the latter being measured by export productivity (the implied productivity of exports).

It is important to mention here that none of these studies have explored the effects of AfT flows on export upgrading. However, FDI has been either the main variable of interest or a control variable in these studies.

Hausmann, Hwang and Rodrik (2007) in their landmark study on "what you export matters", provided evidence that export sophistication is determined by both fundamentals and idiosyncratic elements. The fundamental elements include human and physical capital endowments, the size of the labour force, and natural resources. The idiosyncratic elements entail the income level and institutional quality.

Harding and Javorcik (2012) investigated the relationship between FDI and export upgrading in both developed and developing countries, export upgrading being measured here by improvement of export quality. Using a sample of 105 countries over the period 1984-2000, they have obtained evidence of a positive effect of FDI on unit values of exports in developing countries, but found a mix of evidence for high income economies. The other determinants of export upgrading considered in their study are the income per capita, the size of the population, inflation rate and tax rate.

Zhu and Fu (2013) examined the determinants of export upgrading using a cross-country panel dataset over the 1992–2006 period. Their study extends the analysis of Hausmann, Hwang and Rodrik

(2007) by including in their model two important variables (FDI and Imports) that reflect the sources of foreign knowledge available to a given country. Hence, measuring export upgrading by the degree of export sophistication in a country, they obtained evidence that the factors that enhance export sophistication in the set of countries examined include capital deepening, engagement in knowledge creation, transfers via investment in education and R&D, foreign direct investment and imports and institutional quality. The effect of natural resources is complex and mixed, and depends on the type of commodity which the country trades. More importantly, the observed effects appear to vary between low, middle, and high income country groups.

Amighini and Sanfilipo (2014) focused on African economies to explore whether FDI and imports contribute to upgrading African countries' exports. Export upgrading is associated here with both export diversification and export quality improvement. More specifically, the authors have considered the particular impact of South–South FDI and imports flows, compared to North-South flows on the export upgrading of African economies. They draw their empirical model from the literature on modelling the export supply capacity of developing countries (see e.g., Edwards and Alves, 2006; Faini, 1994) and consider, similarly to Tadesse and Shukralla (2013), a modified version of a standard export supply function. Their model includes external flows (South-South and North-South FDI and imports) as well as several potential variables that influence the export capacity of a country. These variables are (1) the income per capita, (2) the real exchange rate, (3) the share of domestic investment, (4) the macroeconomic stability prevailing in the country (measured by changes in the domestic price levels), (5) the terms of trade, (6) the share of natural resources on total exports and finally (7) the institutional quality measured by the political stability in the country concerned. They find evidence that, on one hand, south-south trade flows can improve the capacity of importing countries to expand the variety of manufacturing exports in a number of different industries, even more so when these countries are at low-mid stages of diversification. On the other hand, FDI from the South, by bringing technologies more likely to be adapted in other developing countries, appears to exert a positive and higher effect on diversification of export baskets of African economies and on the improvement of export quality of these countries, when compared to the same flows originating from the North.

Henn, Papageorgiou and Spatafora (2015) developed new estimates of export quality[8] on a set of 178 countries (both advanced and developing countries) and over hundreds of products during the period 1962-2010. They have undertaken an empirical analysis of the determinants of the growth rate of product quality through product-level cross-country panel regressions. They reach the following conclusions: (1) export quality converges over time to the world frontier within any given product line

[8] Note that as provided in the Appendix 1, these export quality data have been used in our empirical analysis.

and (2) improvement in export quality is driven by institutional quality, liberal trade policies, FDI inflows, and human capital, (3) with the impact varying across sectors. The authors infer from these results that the reduction of entry barriers into new sectors can allow economies to benefit from rapid quality convergence over time.

Other important studies that have explored the export upgrading impact of FDI have been performed at the firm-level and include, for example, Banga (2006), Iwamoto and Nabeshima (2012), Tadesse and Shukralla (2013) and Faruq (2011). Banga (2006) used firm level data on FDI inflows from the US, Japan and India, and provided empirical evidence that FDI inward inflows have a significant positive impact on the capacity of the host country to horizontally diversify its exports, with this mostly happening in non-traditional sectors. However, the results obtained still hinge on the fact that foreign firms in such sectors are more export-oriented than domestic ones. The findings of Iwamoto and Nabeshima (2012), Tadesse and Shukralla (2013), although based on different samples of countries, corroborate the results obtained by Banga (2006). Faruq (2011) evaluated the role of institutions in improving export quality in developing countries, showing that a better institutional environment (i.e. lower corruption, more efficient bureaucracy and more secure property rights) is associated with higher export quality. Incidentally, increases in income per capita, R&D spending, FDI inflows, and education were also associated with higher export prices.

V. Empirical Specification

This section describes the baseline model to be tested. As mentioned in the introduction, the objective of this paper is two-fold: first, to evaluate the impact of AfT and FDI on the export upgrading of AfT recipient countries; second, to assessing whether AfT and FDI inflows are complementary or substitutive in affecting these countries' upgrading of exports.

We start by presenting the baseline model underlying the assessment of the (individual) impact of AfT flows and FDI inflows on beneficiary countries.

V.1 Empirical Specification of Export Upgrading effect of AfT and FDI

Drawing from the previous empirical literature, in particular Zhu and Fu (2013) and Amighini and Sanfilipo (2014), we postulate the following baseline empirical model:

$$ExpUpg_{it} = \alpha_0 + \alpha_1 ExpUpg_{it-1} + \alpha_2 AfT_{it} + \alpha_3 InFDI_{it} + \alpha_4 IMP_{it-1} + \alpha_5 GDPCapita_{t-1} + \alpha_6 Termstrade_{it} + \alpha_7 Pop_{it} + \alpha_8 HumCap_{it-1} + \alpha_9 \mathrm{Re}er_{it-1} + \alpha_{10} FinDev_{it-1} + \alpha_{11} RulesLaw_{it-1} + \alpha_{12} RQual_{it-1} + \mu_i + \varepsilon_{it} \quad (1)$$

where i is an index representing the AfT recipient country and t is an index capturing the time-period. The dependent variable denoted by "ExpUpg" represents the "export upgrading" variable; it could be measured by the index of overall export concentration, denoted by "ExpCon" or its components, namely export concentration at the intensive margin ("ExpIntMarg") and export concentration at the extensive margin ("ExpExtMarg"); it could also be measured by the index of overall export quality, represented by "ExpQual". As it can be noted in Appendix 1, the export concentration indices used in the study have been calculated by means of Theil Index based on the definitions and methods used in Cadot et al. (2011). The overall export concentration index represents the sum of its two components.

Hence, in this study, we consider as measure of the export upgrading variable, either the export concentration variable ("Expcon") or its components, or the export quality variable ("ExpQual"). "$ExpUpg_{i,t-1}$" stand for the one-period lagged values of the variable "$ExpUpg_{it}$" for a given country i in period t.

α_j, $j = 1,..,12$ are parameters to be estimated. μ_i are country-specific effects. The disturbance term ε_{it} is assumed to be independently and identically distributed (i.i.d.; $0, \sigma_\varepsilon$).

AfT represents our first explanatory variable of principal interest. This variable could be the total AfT disbursement or its three main categories usually used in the empirical literature and defined in the OECD/DAC Creditor Reporting System (CRS) database: AfT related to Economic Infrastructure, AfT dedicated to building Productive Capacity, and AfT related to Trade Policy and Regulations (see Appendix 1 for more details on the these variables). In light of the foregoing, we consider the following AfT variables in model (1): Total AfT (AfTTotal), or the subcategories of total AfT, namely Aid for Trade related to Trade Policy and Regulations (AfTPol), Aid for Trade related to Economic Infrastructure (AfTEcoInf), and Aid for Trade dedicated to Productive Capacity (AfTProd). All variables are expressed as a share of the recipient country's GDP.

The variable "lnFDI" represents the FDI inflows in the recipient country as a share of its GDP; "IMP" stands for the imports of goods and services, in % of recipient-country's GDP. Note that these two variables represent the sources of foreign knowledge that are available to a country. "GPDCapita" denotes the real GDP per capita of a recipient country i; "TermsTrade" captures the net barter terms of trade of a recipient country i; "Pop" is the size of the population of country i; "HumCap" stands for the human capital accumulated by a recipient country i; "Reer" is the Real Effective Exchange Rate; FinDev is a measure of the level of financial development of a given AfT recipient country; "RulesLaw" and "RQual" are proxy for institutional quality and denote respectively an Index of Rules of Law and Index of regulatory quality in the recipient country.

In the empirical analysis, we further check whether the impact of AfT and FDI are different in LDCs compared to other AfT recipients denoted by Non-LDCs. To do so, we include in model (1) a dummy variable, labelled "LDC", - which takes value "1" when a given country of our sample is an LDC and "0" otherwise – that we interact with the "AfT" and "lnFDI" variables.

The estimated model, therefore, derives from the baseline model (1) as follows:

$$ExpUpg_{it} = \alpha_0 + \alpha_1 ExpUpg_{it-1} + \alpha_2 AfTTotal_{it} + \alpha_3 InFDI_{it} + \alpha_4 LDC + \alpha_5 AfTTotal_{it} * LDC + \alpha_6 InFDI_{it} * LDC + \alpha_7 IMP_{it-1} + \alpha_8 GDPCapita_{t-1} + \alpha_9 Termstrade_{it} + \alpha_{10} Pop_{it} + \alpha_{11} HumCap_{it-1} + \alpha_{12} \mathrm{Re}er_{it-1} + \alpha_{13} FinDev_{it-1} + \alpha_{14} RulesLaw_{it-1} + \alpha_{15} RQual_{it-1} + \mu_i + \varepsilon_{it} \quad (2)$$

where $\alpha_j, j = 1,..,15$ are new parameters to be estimated.

Note that from now, the only AfT variable that will be used in all specifications would be the Total AfT, expressed in % of GDP**.** However, we also estimate these model specifications with the components of total AfT.

V.2 Empirical Specification of Export Upgrading effect of AfT and FDI

Relying on the previous sub-section and focusing on the Total AfT flows, we test the existence of a complementary or substitutability effect on the export upgrading of AfT and FDI Inflows in recipient countries. We consequently modify the baseline model (1) as follows:

$$ExpUpg_{it} = \alpha_0 + \alpha_1 ExpUpg_{it-1} + \alpha_2 AfTTotal_{it} + \alpha_3 InFDI_{it} + \alpha_4 \{AfTTotal_{it} * InFDI_{it}\} + \alpha_5 IMP_{it-1} + \alpha_6 GDPCapita_{t-1} + \alpha_7 Termstrade_{it} + \alpha_8 Pop_{it} + \alpha_9 HumCap_{it-1} + \alpha_{10} \mathrm{Re}er_{it-1} + \alpha_{11} FinDev_{it-1} + \alpha_{12} RulesLaw_{it-1} + \alpha_{13} RQual_{it-1} + \mu_i + \varepsilon_{it} \quad (3)$$

where $\alpha_j, j = 1,..,13$ are new parameters to be estimated.

The parameter α_4, interaction term between the external flows resources (Total AfT and FDI), is here our coefficient of interest. It measures whether AfT and FDI are complementary or substitutable in affecting export upgrading in beneficiary countries.

Two distinct results may be expected from the specification (3): if $\alpha_4 > 0$, then we should conclude for the existence of a complementary effect between Total AfT and FDI on export upgrading. In contrast, if $\alpha_4 < 0$, then there exists a substitution between Total AfT and FDI inflows in affecting export upgrading.

Incidentally, the marginal effect of rising Total AfT flows (in % of GDP) and/ or FDI Inflows (in % of GDP) can be evaluated by computing the partial derivatives of export upgrading (variable) with respect to either Total AfT or FDI variables, viz:

$$\frac{\partial ExpUpg_{it}}{\partial AfTTotal_{it}} = \alpha_2 + \alpha_4 InFDI_{it} \quad \text{and} \quad \frac{\partial ExpUpg_{it}}{\partial InFDI_{it}} = \alpha_3 + \alpha_4 AfTTotal_{it}$$

It is possible that the nature of interactions between Total AfT and FDI flows is different between LDCs and Non-LDCs sub-samples. To account for this possibility, we include in model (3) a double interaction between "AfTTotal", "lnFDI" and "LDC" variables. The model (4) estimated takes the form:

$$ExpUpg_{it} = \alpha_0 + \alpha_1 ExpUpg_{it-1} + \alpha_2 AfTTotal_{it} + \alpha_3 InFDI_{it} + \alpha_4 \{AfTTotal_{it} * InFDI_{it}\} + \alpha_5 LDC + \alpha_6 AfTTotal_{it} * LDC + \alpha_7 InFDI_{it} * LDC + \alpha_8 \{AfTTotal_{it} * InFDI_{it}\} * LDC + \alpha_9 IMP_{it-1} + \alpha_{10} GDPCapita_{t-1} + \alpha_{11} Termstrade_{it} + \alpha_{12} Pop_{it} + \alpha_{13} HumCap_{it-1} + \alpha_{14} \mathrm{Re}er_{it-1} + \alpha_{15} FinDev_{it-1} + \alpha_{16} RulesLaw_{it-1} + \alpha_{17} RQual_{it-1} + \mu_i + \varepsilon_{it} \quad (4)$$

where α_j, $j = 1,..,17$ are new parameters to be estimated.

Note that in estimating models (4), we are particularly interested in the cross derivative of the export upgrading variable with respect to "AfTTotal" and "lnFDI" variables, viz:

$$\frac{\partial^2 ExpUpg_{it}}{\partial AfTTotal_{it} \partial InFDI_{it}} = \alpha_4 + \alpha_8 LDC$$

Hence, for countries belonging to the LDC sub-sample, the empirical net measure of the substitution or complementary effect between Total AfT and FDI on export upgrading is given by $\alpha_4 + \alpha_8$. For example, if α_4>0 and $\alpha_4 + \alpha_8$>0, then we would conclude for a complementary effect between these two capital flows variables in both LDCs and Non-LDCs, with this effect being higher in LDCs compared to Non-LDCs. In the event α_4< 0 and $\alpha_4 + \alpha_8$>0, then we would conclude for the existence of a substitution effect in Non-LDCs and a complementarity effect in poorest countries (LDCs). Finally, if α_4< 0 and $\alpha_4 + \alpha_8$< 0, then the substitution effect between Total AfT and FDI on export upgrading will be present in both LDCs and Non-LDCs.

A non-statistically significant coefficient α_8 (i.e., α_8 =0) along with a statistically significant parameter α_4 would suggest a complementary/or substitution effect (depending respectively on whether α_4>0 or α_4 <0) in both LDCs and Non-LDCs.

VI. Estimation strategy

Model specifications (1) to (4) raise the issue of endogeneity, i.e., the reverse causality between many regressors, notably our variables of interest, "AfT" and "lnFDI" and the dependent variable. In fact, one could argue that AfT is provided to countries that make some effort to upgrade their exports in order to encourage policymakers of these countries to pursue export upgrading policies. Likewise, countries that are engaging in upgrading their exports may attract more FDI inflows compared to other

countries. The reverse causality may also occur for other variables such as Imports, GDP per capita, level of human capital, Real Exchange Rate, Financial Development and Institutional variables. However, by using one-year lagged values for these controls, we mitigate the risk of their endogeneity.

The presence of the lagged dependent variable as a right-hand-side variable in model specifications (1) to (4) implies a correlation between the regressors and the error term, given that the lagged dependent variable depends also on the lagged error term, the latter being in turn a function of the cross-section specific effect. This correlation results in the so-called Nickell (1981)'s bias in models (1) to (4), which disappears as T tends to infinity.

To address this endogeneity problem as well as the possible endogeneity of explanatory variables along with the possible omitted variables biases, the econometric literature has proposed instrumental variables techniques, notably the Generalized Methods of Moments (GMM) estimator. Two GMM estimators are available: the Difference GMM (DGMM) proposed by Arellano and Bond (1991) and the system GMM (SGMM) proposed by Blundell and Bond (1998). The DGMM tackles the endogeneity issue by taking the first difference of the data and then utilizing lagged values of endogeneous variables as their instruments. The SGMM technique consists of estimating a system of two simultaneous equations: one in levels (with lagged first differences as instruments) and the other in first differences (with lagged levels as instruments). The SGMM approach could be performed either as a one-step SGMM approach or as a two-step SGMM approach. In the one-step approach, the weighting matrix makes use of differenced errors whereas in the two-step SGMM technique, the one-step residuals are used to compute a new weighting matrix (for more details, see Blundell and Bond, 1998).

For several reasons, the system GMM, in particular the two-step SGMM is preferred to the DGMM: first, in a multivariable dynamic panel data setting, the SGMM is argued to perform better than the DGMM. Second, in the presence of "random walk" variables or variables close to be random walk, the DGMM estimator can suffer from weak instruments problem (Safaridis et al., 2009); as a consequence, in such a case, the SGMM estimation is more appropriate (Bond, 2002; Roodman, 2009a, 2009b). Third, SGMM is a more consistent estimator when series are persistent, in which the lagged levels of variables are weak instruments for subsequent changes, and where there is a dramatic reduction in the finite sample bias due to the exploitation of additional moment conditions (Arellano and Bover, 1995, Blundell and Bond, 1998, 2000; Blundell et al., 2000; Roodman, 2009a). Fourth, in the presence of unbalanced panel data, it is preferable to use the SGMM approach as the DGMM technique has the weakness of magnifying gaps (Roodman, 2009b). Fifth, in the presence of heteroscedasticity and serial correlation, the two-step SGMM is preferable to the one-step SGMM as it

uses a consistent estimate of the weighting matrix taking the residuals from the one-step estimate (Davidson and Mackinnon, 2004).

Notwithstanding this, the consistency of the GMM estimation approach rests on the validity of the instruments used (i.e., the absence of correlation between the error term and the instruments) and on the absence of second order serial correlation in the first differences of the residuals. To test these assumptions, two diagnostic tests have been proposed: the first is the Sargan-Hansen (SH) test of over-identifying restrictions to confirm the validity of our internal instruments; thus, our instruments would be considered as valid if we do not reject the null hypothesis. The second test is based on Arellano-Bond (AB) procedure and consists of testing for first-and second-order serial correlation. Here, for the consistency of the GMM approach, we should not reject the null hypothesis of absence of second-order serial correlation in the disturbances, while the null hypothesis of absence of first-order serial correlation should be rejected.

All in all, in this paper, we employ the two-step SGMM estimator. To check the reliability of our instruments, we perform the SH and AB diagnostic tests.

As far as the GMM estimation is concerned, there is convincing evidence that too many moments introduce bias while increasing efficiency. As a result, it is suggested to use a subset of these moments in order to take advantage of the trade-off between the reduction in bias and the loss in efficiency (see for e.g., Baltagi, 2005). We follow this suggestion by restricting in our two-step SGMM estimation, the moment conditions to a maximum of three lags on the dependent variable. In addition, a maximum of two lags are used on predetermined and endogenous variables for the instrumentation. Our main explanatory variables of interest "AfT" and "lnFDI" are considered as endogenous in models (1) to (4). Are considered as predetermined variables the following regressors (with one-period lagged values): "IMP", "GDPCapita", "HumCap", "Reer", "FinDev", "RulesLaw", and "RQual". The controls "TermsTrade" and "Pop" have been considered as exogenous.

VII. Data sources and analysis

The analysis is conducted on an unbalanced panel data comprising 86 AfT recipient countries (i = 1,...,86), of which 23 LDCs, over the period 1995–2010. The choice of these countries and the time period is dictated by data availability. We follow the practice in the empirical literature and adopt a non-overlapping 3-year average sub-periods approach with the view to capturing medium term effects, while simultaneously smoothing out the effects of business cycles on the variables used in the models. Therefore, we obtain 4 (non-overlapping) sub-periods of the 3-year average, namely: 1995-1997, 1998-2000, 2001-2003, 2004-2006 and one sub-period of 4-year average, that is, 2007-2010.

The definition and source of the variables used in all specifications are provided in Appendix 1. As it can be observed in this Appendix, AfT data are drawn from the database developed by Hühne, Meyer and Nunnenkamp (2014)[9] who extend the OECD-DAC data on AfT on earlier periods, i.e., the 1990s. Descriptive statistics, list of countries used in the sample and pairwise correlation on these variables are reported respectively in Appendix 2, 3 & 4. To provide an insight into the relationship (correlation pattern) between export concentration index, export quality index, Total AfT and FDI, we present in Figures 1 to 3 the scatter plots of correlation between Export concentration Index and Total AfT, Export concentration Index and FDI, Export quality index and Total AfT, and Export quality index and FDI. Note that these figures are based on the 3-year average data. Hence, Figures 1, 2 & 3 display these correlation patterns respectively over the entire sample, LDCs, and Non-LDCs.

On the left-hand side of Figure 1, we observe both a positive correlation pattern between export concentration and total AfT and a loose positive correlation between FDI and export concentration. The right hand side graphs of Figure 1 suggest a non-clear cut relationship between AfT flows and export quality on one hand and FDI and export quality on the other hand.

Turning to Figure 2, in particular to the left-hand side, AfT flows appear to have a (loose) negative correlation with export concentration in LDCs, while FDI inflows and export concentration exhibit a positive correlation. On the right-hand side graphs of Figure 2, export quality in LDCs is negatively correlated with AfT and FDI Inflows.

Concerning Non-LDCs, AfT flows and FDI inflows exhibit respectively a positive and a negative correlation pattern with respect to export concentration (see the left hand side graphs). Additionally, no clear correlation pattern is observed between AfT and export quality, while FDI seem to be positively correlated with export quality.

VIII. Estimation Results

We start the interpretation of estimation results of models (1) to (4), by reporting in Table 1 "naïve" within fixed-effects estimation of model (1) performed by using the technique of Driscoll and Kraay (1998) to correct standard errors. This technique, adapted for unbalanced panel data by Hoechle (2007), takes into account the presence of heteroscedasticity, serial correlation and contemporaneous correlation in the data.

[9] We would like to extend our sincere gratitude to Philipp Hühne, Birgit Meyer as well as Professor Peter Nunnenkamp for having generously shared with us their dataset on Aid for Trade.

It is worth recalling here that an increase in the index of overall export concentration (or the indices of export concentration at the intensive and extensive margins) reveal higher concentration, while a decrease reveals a lower concentration. Hence, a negative and significant coefficient of a regressor signifies that the latter is associated with export diversification. Similarly, a rise in the index of export quality represents an improvement in the quality of existing products, while a fall in this index indicates a lowering quality of existing export products. Thus, a positive and significant impact of a regressor signifies that the latter is associated with export quality improvement.

Results in Table 1 suggest on one hand that AfT flows are associated with diversification of exports (column [1]), although with a statistical significance at only 10% level - but neither with export concentration components, nor with export quality improvement (see columns [2] to [4]). On the other, FDI inflows are only positively and significantly associated with the improvement of the quality of exports; they do not exert a significant effect on export concentration. As these results could be potentially biases due to the endogeneity problem, we now turn to the Tables 2 to 5 that report estimation results of models (1) to (4) based on the two-step system GMM approach. Results on SH and AB diagnostic tests are reported at the bottom of each Table. They are broadly supporting the validity of instruments and the consistency of the GMM approach.

Assessment of the model (1) estimation's results: Table 2 presents the results of model (1) estimation with both "AfTTotal" variable (see columns [1] to [4]) as well as with its components (see columns [5] to [8]).

Let us start with results in columns [1] to [4]. They are quite interesting: AfT programmes are associated with diversification of exports in recipient countries (the coefficient of the variable "AfTTotal" is positive and statistically significant at 1% level) (see column [1]). This result is confirmed by the negative and statistically significant (at 1% level) coefficient of the "AfTTotal" variable (see columns [2] &[3]). Put differently, AfT programmes induce export diversification at both the intensive margins and the extensive margins. Last but not least, AfT interventions contribute to improving the quality of existing export products (see column [4]), as the coefficient of the AfT variable is also statistically significant and positive at 1% level of statistical significance.

FDI inflows appear to be associated with the diversification of all export products (see column[1]), while at the same, we find no significant effect of this variable on the index of export concentration at the intensive and extensive margins (see columns [3] &[4]). This may probably be due to the fact that in the dataset, there are sometimes missing values for the export concentration index at the

extensive/intensive margins, while these values exist for the overall export concentration index. Meanwhile, a positive and significant effect on improvement of export quality in recipient countries is obtained for FDI inflows (see columns [4]).

Let us now consider the results display in columns [5] to [8] of Table 2 regarding the components of the Total AfT variable.

The positive effect of Total AfT flows on export quality upgrading in recipient countries obtained in column[6] seems to be a combination of the effect (with opposite/or identical sign) of the three main components of the Total AfT variable.

The positive effect of total AfT flows on overall export diversification in recipient countries (see column [1]) reflects a positive effect of both AfT related to trade policy and regulations and AfT related to economic infrastructure, along with a negative effect of AfT for productive capacity on overall export diversification (see column [5]). As the positive effects dominate the negative one, we obtain an overall positive effect on export diversification. Likewise, diversification of exports at the extensive margin seems to be driven by AfT programmes related to economic infrastructure and AfT programmes for productive capacity, with AfT flows dedicated to trade policy and regulations having no significant effect on export diversification at the extensive margins (see column [6]). Hence, without any surprise, we obtain an overall positive effect of total AfT on diversification of exports at the extensive margin.

Regarding diversification of exports at the intensive margin, the overall positive effect obtained for total AfT on export diversification in column [3] reflects a positive and significant effect of both AfT programmes related to economic infrastructure and AfT interventions related to trade policy and regulations, but a negative effect of AfT for productive capacity programmes (see column [7]). As the positive effects dominate in magnitude the negative effect, we obtain a total positive effect of Total AfT on export diversification at the intensive margins.

Regarding regressions of Total AfT components on export quality variable, we observe that the positive effect of Total AfT flows on export quality upgrading of recipient countries obtained in column [6] seems to be an outcome stemming from positive effect of both AfT related to economic infrastructure and AfT for productive capacity and a negative effect of AfT dedicated to trade policy and regulations.

These results on components of Total AfT can be re-interpreted as follows: interventions of AfT related to trade policy and regulations are positively and significantly related to export diversification in beneficiary countries, with this effect being solely driven by diversification of exports at the intensive margin (i.e. such interventions tend to facilitate the increase in volume of existing products exports and trading partners, not an increase in new export products). As mentioned earlier, such a result likely

reflects the fact that policymakers of recipient countries, thanks to the capacity acquired in trade policy area, tend to develop trade policies that favour the development of existing export products rather than new export products. As expected, AfT programmes related to economic infrastructure have a positive and significant medium term effect on export upgrading, be the latter overall export diversification (including diversification at the intensive and extensive margins) or export quality improvement. Interestingly, AfT programmes dedicated to productive capacity tend to be associated with concentration of exports at the intensive margin along with diversification of export at the extensive margin, with the effect of former being higher than the effect of the latter. As a result, these interventions are positively associated with the index of export concentration in recipient countries. As noted earlier, this result does not reflect donors' desires on the utilization of their AfT budget allocations, but rather the fact that the trade strategy of recipient countries is dominated by export specialization strategy. AfT flows related to productive capacity also appears to be generating export quality improvement in beneficiary countries.

Regarding control variables, we focus on the results contained in columns [1] to [4] (i.e., results associated with the estimation of model (1) with the Total AfT variable), as results on controls related to estimations of model (1) with the components of "AfTTotal" variable are more or less similar to those in columns[1] to [4] (though with sometimes differences on the statistical significances).

We observe that imports of goods and services are associated with a rise in overall export concentration. This effect is driven by a negative effect on export concentration at the extensive margin (i.e. increase in new product lines or new export destinations), and a positive effect on export concentration at the intensive margin (i.e. an increase in the volume of existing product lines and/or trading partners). Interestingly, imports of goods and services are conducive to export quality improvement in recipient countries. In the meantime, per capita income is associated with overall export diversification, but this result reflects both a positive effect on export concentration at the intensive margin and a negative effect on export concentration at the extensive margin. In other words, while a rise in income per capita is associated with overall export diversification in recipient countries, it does generate export growth thanks to both an increase in the number of new products exported and an increase in the volume of existing export products. Income per capita does not appear to exert a significant effect on export quality improvement.

Improvement in Terms of Trade is not significantly associated with export diversification as this result reflects both a positive effect of terms of trade improvement on export concentration at the intensive margins and a negative effect of this improvement on export concentration at the extensive margins, with similar magnitude in absolute values. Export quality improvement in recipient countries

does not seem to be significantly dependent on terms of trade as the effect of the latter is yet positive, but loosely significant (at 10% level).

While the size of the country proxied by its total population has no significant effect on overall either export concentration or its components, it does exert a positive and significant effect on improvement of export quality in recipient countries.

Accumulation of human capital induces overall export diversification. However this result hides a positive and significant effect on export concentration at the extensive margins and a negative effect on export concentration at the intensive margins. Put differently, a rise in the level of human capital reduces the volume of (active) existing export product lines but increases the exports of new products, with the latter effect dominating the former. Without any surprise, an accumulation of human capital is positively associated with export quality improvement.

The results on real exchange rate variable are to some extent unexpected: while real effective exchange rate appreciation is associated with both lower export concentration at the intensive and extensive margin, it has no significant effect on overall export concentration. Less surprisingly, such an appreciation is associated with lower improvement of export quality, i.e., it discourages exporting firms from upgrading their export products.

The development of domestic financial markets has a positive effect on overall export diversification. However, this result is driven by an effect on export concentration at the extensive margin (i.e., less export of new products) and an impact on export diversification at the intensive margin (i.e., rise in the volume of existing export products), with the positive effect on diversification at the intensive margin being higher than the negative effect on export diversification at the extensive margin**.** No significant effect on export quality is obtained for the variable "FinDev".

Regarding institutional quality, we find mixed results: an improvement in rule of law is positively associated with overall export concentration, including at both the intensive and extensive margins. No significant effect is observed on export quality improvement. In the meantime, the formulation and implementation by recipient countries governments of sound policies and regulations that permit and promote private sector development is associated with higher export diversification (including at both intensive and extensive margins) as well as with higher export quality improvement.

It is worth noting that when replacing the "AfTTotal" variable by its components, we obtain in contrast with previous findings (see columns [1] to [3]) a positive and significant effect of FDI inflows on the diversification of exports at the extensive margins and no significant effect on overall export concentration index and export concentration at the intensive margins. This lack of constancy in the results of FDI inflows on export diversification in host countries does not allow us to draw a definitive

conclusion regarding the impact of FDI on export diversification in host countries. FDI inflows exert positive effects on export quality improvement in host countries (see column [8]), result similar to that of column [4].

Assessment of the model (2) estimation's results: these results are displayed in Table 3.

It is worth recalling that we introduce here the LDC dummy along with its interactions with "AfTotal" and "lnFDI". We observe neither a significant coefficient of the "AfTTotal" variable on overall export concentration index (see column [1]), nor a significant coefficient of its interaction with the LDC dummy. At least this means that the Total AfT flows do not have differentiated effect on overall export concentration between LDCs and Non-LDCs. When it comes to export concentration at the extensive margin, we obtain no differential impact of total AfT flows on export concentration in LDCs compared to Non-LDCs, with the net effect of either of these two sub-groups being -0.984 (i.e., a rise in Total AfT flows by 1% reduces the index of export concentration at the extensive margins by 0.98%). Regarding export concentration at the intensive margin, higher total AfT to LDCs seems to generate a higher degree of export diversification in LDCs compared to Non-LDCs, with a net measured effect of LDCs, being 7.393. This result is very interesting and encouraging as it clearly suggests evidence that AfT programmes are conducive to export diversification at the extensive margin in LDCs, i.e., these programmes are likely associated with a diversification of LDC export products away from the primary sector. Similarly, AfT programmes generate higher significant and positive effect on export quality upgrading in LDCs compared to Non-LDCs, with the net measured effect for LDCs being 1.163. Once again such a result adds to the previous one in suggesting that AfT interventions are associated with export quality improvement in LDCs.

Turning to the second variable of principal interest, "lnFDI", the results obtained are in line with previous findings. Moreover, results on the interaction of "LDC" dummy with the "lnFDI" variable reveal that FDI Inflows to LDCs tend to generate higher export concentration effect in LDCs compared to Non-LDCs (see column[1] of Table 3: the coefficient of the variable "lnFDI" is yet negative and significant (indicating a positive effect of FDI inflows on overall export diversification) but the coefficient of the variable "lnFDI*LDC" – which represents the interaction between "lnFDI" and LDC variable – is positive and significant (suggesting that FDI inflows has a lower effect on export diversification in LDCs compared to Non-LDCs). Thus, the net measured effect of FDI inflows on overall export concentration index in LDCs is 0.00547 = (0.0116 – 0.00613). Put differently, FDI inflows to LDCs tend to be associated with export concentration of LDC products. This means that when undertaking FDI in LDCs,- which mostly occurs in the natural resource sector of these countries, multinationals that engage in

exports from the host country do not necessarily process these products before exporting them either back to their country of origin or to the rest of the world.

This result of FDI effect on export concentration in LDCs compared to Non-LDCs is confirmed when examining estimates related to FDI effect on export concentration at the extensive and intensive margins: the net measured effect of FDI inflows on export concentration index at the extensive margins is -0.00005 (= 0.00227 – 0.00232), while this net measured effect on export concentration at the intensive margins is 0.01012 (= 0.0151 - 0.00498). These two outcomes lead us to conclude that while FDI inflows to LDCs exert a marginal but significant negative effect on reducing export concentration at the extensive margin, they do result in export concentration at the intensive margin. The two resulting effects put together, generate a positive effect of FDI inflows to LDCs on the concentration of their exports.

Results contained in Table 3 also suggest that LDCs compared to Non-LDCs exhibit a similar index of overall export concentration index, lower index of export concentration at the extensive margins and higher index of export concentration at the intensive margins. In addition, LDCs experience a lower improvement degree in their export quality compared to Non-LDCs, a result that is not unexpected as these countries are highly reliant on exports of primary products compared to Non-LDCs.

With respect to control variables, we roughly obtain the same results (although sometimes with differences in significance and magnitude of estimates) as in columns [1] to [4] of Table 2.

Assessment of the model (3) estimation's results: the latter are reported in Table 4. In this table, we are yet interesting in the effect of both "AfTTotal" and "lnFDI" variables on export upgrading, but more importantly, we want to assess whether Total AfT flows and FDI inflows are complementary or substitutive external flows regarding their effect on export upgrading. It is important to note that results in columns [1] to [4] of Table 4 on the effect of total AfT variable on export upgrading are similar to those contained in the same columns of Table 2, although with different magnitude of the estimates.

Column [1] of Table 4 shows evidence that both AfT flows and FDI Inflows are associated with export diversification in recipient countries, and that more importantly, these capital inflows are substitutive in achieving export diversification. In fact, the coefficient of the interaction term of "AfTTotal" crossed with the FDI variable (the resulting variable is represented by "AfTTotal*FDI") is significant and positive, which means a negative effect of this interaction on export diversification in recipient countries. **We can then conclude that AfT and FDI are complementary in affecting countries' overall export diversification**. The marginal effect of an increase in Total AfT flows (in % of GDP) on overall export

concentration is given by the expression - 4 + 0.7*lnFDI. **Putting differently, if FDI increases by 1%, a 1% rise in AfT flows (% GDP) would raise the degree of overall export diversification by 3.3 points.**

While Total AfT flows reduce export concentration at both the extensive and intensive margins in recipient countries, FDI inflows in these countries have negative effect on export growth at the extensive margin, but a positive effect on export growth at the intensive margin. The coefficient associated with the interaction between "AfTTotal" and "lnFDI" is negative and significant as far as export growth at the extensive margins is concerned and positive and significant as far as export growth at the intensive margins is concerned. This is suggestive that Total AfT and FDI external flows are complementary in generating export diversification at the extensive margins, while they are substitutive in generating export diversification at the intensive margins. The net effect of the interaction between these capital inflows on overall export concentration is given by 0.704 (= -0.114 + 0.818). **This shows that AfT and FDI Inflows are substitutable in generating export diversification in recipient countries**. Interestingly, both total AfT flows and FDI inflows exert positive and significant effect on export quality upgrading in recipient countries and, **these two external capital inflows are complementary in their effect on the improvement of export quality in recipient countries**.

Once again, control variables exhibit broadly similar effects on export upgrading variables to the effects observed in Table 2.

Assessment of the model (4) estimation's results: the latter are reported in Table 5.

We are particularly interested here on whether the complementarity/substitution effects observed above varies with the type of sub-sample considered (LDCs and Non-LDCs). Hence, we are looking specifically at the interactions terms associated with variables "lnFDI*AfTtotal" and "lnFDI*AfTtotal*LDC" to draw our conclusion (see the partial derivative associated with model (4) in section V).

Starting with the estimations on the overall export concentration index, we find that AfT and FDI flows are substitutable with respect to their effect on export diversification and that, the degree of this substitutability is lower in LDCs compared to Non-LDCs (as exemplified by the positive and significant interaction term of the variable "lnFDI*AfTtotal*LDC"). Hence, the net measured effect of "lnFDI" on export concentration index is 1.709 (=1.134 + 0.575). **This means that AfT and FDI are complementary in their effect on overall export concentration, i.e., they are substitutable in their effect on overall export diversification in LDCs.**

In the meantime, the effect of the variable "lnFDI*AfTtotal" on the export concentration index at the extensive margins (see column[2] of Table 5) is 0.925 points lower in LDCs compared to Non-LDCs. This means that the complementary effect between these two capital inflows generates higher export diversification at the extensive margins in LDCs relatively to Non-LDCs. Thus, the net measured effect of this variable in LDC export concentration at the extensive margins is -0.338 (= -0.925 + 0.587). **This signifies that AfT and FDI are complementary in achieving export diversification at the extensive margin in LDCs.** However, AfT and FDI are substitutable in achieving export diversification at the intensive margin in LDCs (see column [3] of Table 5), as the measured net effect for this sub-sample of countries is 1.488. Besides, the degree of the (complementarity) substitutability between the impact of these two types of capital inflows on export concentration (diversification) at the intensive margins is higher in LDCs compared to Non-LDCs.

Turning to export quality upgrading, we note that AfT and FDI are more complementary in their effect on export quality improvement in LDCs than in non-LDCs (see the interaction term of the variable "lnFDI*AfTtotal*LDC" in column [4] of Table 5). As the coefficient of the variable "lnFDI*AfTtotal" is not statistically significant at 10% level, we do conclude that the net effect of the interaction between these two variables on export quality upgrading for LDCs is 0.134. **This suggests that the degree of complementarity between AfT and FDI in inducing export quality improvement is higher in LDCs than in Non-LDCs**.

Further Assessment

In order to check whether the complementarity/substitution effect observed above varies with AfT components as well as with the sub-sample considered, we report in Table 6 the results of estimation of model (3) and (4) where "AfTTotal" is replaced by its components. Note that for sake of brevity, we do not present results on the control variables. The latter could be obtained upon request. The diagnostic tests on the system GMM technique confirm the validity of the instruments used as well as the consistency of the GMM estimator at 10% of statistical significance, although the second-order correlation test on the model with the "ExpIntMarg" variable generates p-values yet lower than 10% level, but very close to that threshold (0.0958 in model (3) and 0.0956 in model (4)).

Let us consider results on model (3) with AfT components. The first part of the table suggests that AfT interventions related to trade policy and regulations are complementary with FDI inflows in inducing export concentration, be the latter the overall diversification or at the extensive or intensive margins in recipient countries. This complementarity effect is also observed with respect to export quality improvement.

AfT flows related to economic infrastructure are substitutable with FDI in generating overall export diversification and export quality improvement. However, **this substitutability effect on overall diversification reflects a complementarity effect between these two flows on export diversification at the extensive margin and a substitutability effect on export diversification at the intensive margin, with the latter effect dominating the former**.

Surprisingly and interestingly, AfT programmes for productive capacity are complementary with FDI inflows in achieving overall export diversification, including both diversification at the intensive and extensive margins.

Let us now move on to the second part of Table 6 that displays estimates of model (4) with AfT components.

The interaction between the effect of AfT flows associated with trade policy and regulations and FDI is higher in LDCs compared to Non-LDCs in leading to overall export concentration (the effect is the same for export concentration at the extensive margins). This interaction effect is less important in LDCs compared to Non-LDCs as far as the export concentration at the intensive margins is concerned and is identical on the two sub-sets of countries when it comes to export quality improvement. The net effect of the interactions between these AfT programmes and FDI in overall export concentration of LDCs is 14.7 points (= 13.16+1.212), while it is 25.696 (=20.19+5.506) for export concentration at the extensive margins, - 25.61 for export concentration at the intensive margins and 5.077 for export quality improvement.

Putting differently, these results suggest that in LDCs, AfT programmes related to trade policy and regulations could be a substitute to FDI inflows in achieving higher overall export diversification. Looking more closely at the components of the overall export diversification index, we obtain that in LDCs, AfT programmes related to trade policy and regulations act as a substitute for FDI inflows in achieving higher diversification of exports at the extensive margins, while these programmes appear to be a catalyser for FDI inflows in achieving the diversification of exports at the intensive margins.

Additionally, results show that LDCs need both FDI inflows and AfT inflows related to trade policy and regulations to achieve higher export quality.

The interaction effect between AfT flows dedicated to economic infrastructure and FDI inflows is higher in LDCs compared to Non-LDCs only for overall export diversification and export quality improvement. **Hence, AfT flows for economic infrastructure development act as substitute to FDI inflows in enhancing the diversification of these countries' exports (the net effect obtained is**

2.76) or in improving the quality of their exports (the net effect obtained is -0.06). It is noteworthy that the above substitutability effect between AfT related to economic infrastructure and FDI Inflows on LDCs' overall export diversification seems to be driven only by a substitutability effect of AfT flows related to economic infrastructure with respect to FDI Inflows in achieving higher diversification of LDCs' exports at the intensive margins (net effect = 2.079). This is because we obtain a statistically nil effect of the interplay between AfT for economic infrastructure and FDI inflows on LDCs' export diversification at the extensive margins.

Turning now to the last AfT main sub-category, namely AfT for productive capacity, we observe that the interaction between these flows and FDI inflows are associated with higher overall export diversification, effect lower in LDCs compared to Non-LDCs, with the net effect on overall export concentration index of LDCs being -2.509 (=-1.441 - 1.068). **This signifies that AfT for productive capacity could act as a catalyst for FDI inflows in achieving overall export diversification in LDCs. This catalytic effect is reflected for LDCs in both higher export diversification at the intensive margin (net effect = -0.538) and at the extensive margin (the net effect is (-3.616).**

Concurrently, it could be noted that for export quality improvement in LDCs, AfT flows for productive capacity and FDI inflows appear to be substitutable (the net effect is -0.559).

IX. Conclusion

The AfT initiative, launched in 2005 by WTO Members to assist developing countries and LDCs address their supply side and trade-related infrastructure constraints and expand their trade, has gained significant momentum. Empirical studies on Aid for Trade (AfT) effectiveness have usually examined the issue through the lens of the impact of AfT flows on trade flows, including export performance. However, very few studies have been devoted to the consequences of these programmes on export diversification in recipient countries, and to the best of our knowledge, there is no study that considers the issue with respect to export quality improvement in recipient countries. In the meantime, FDI inflows have become an important external source for finance for development of host economies, and much academic work has explored their impact on the host countries.

This paper contributes to two strands of literature (the AfT effectiveness literature and the literature on the impact of Foreign Direct Investment (FDI) inflows on host economies) by providing two assessments: it first assesses how AfT flows and FDI inflows affect individual export upgrading in recipient countries. Second, it analyses the interplay between the effects of these two types of capital inflows on recipient countries, that is, whether these effects are complementary or substitutable (from

the perspective of economic theory). The empirical analysis is conducted on a panel dataset of 86 recipient countries over the period 1995–2010, with a special focus on the 23 Least-Developed Countries (LDCs) of the sample. Export upgrading entails here export diversification (including overall export diversification, diversification at the intensive and at the extensive margins) and export quality improvement. The assessment relies on the AfT database recently developed by Hühne, Meyer and Nunnenkamp (2014) who indeed extend the OECD-DAC data on AfT to earlier periods, i.e, to the 1990s.

Based on the system-GMM approach, we obtain the following results:

- *First*, total AfT flows have a strong positive impact on export upgrading. Compared to Non-LDCs, LDCs appear to obtain the most benefit on the diversification of their exports at the intensive margin, and on the improvement of the quality of their exports: **a 1% increase in the Total AfT (% GDP) inflows is associated with a rise in 7.3 points of the export diversification at the intensive margin; an increase of the Total AfT (% GDP) by 1% induces a 1.16 point rise in the degree of export quality improvement**.
- *Second*, FDI inflows exert a positive effect on export diversification in host economies, and they also influence positively and strongly export quality upgrading in recipient countries. More importantly, the impact of these financing inflows on the export diversification of LDCs is higher than in Non-LDCs.
- *Third*, AfT and FDI inflows are substitutes in achieving export diversification in recipient countries, but complementary in their effect on improving the export quality in these countries. Regarding LDCs, results suggest that these two types of external capital flows are substitutable in their effect on overall export diversification, with the degree of this substitutability being lower in these countries compared to Non-LDCs. In addition, **it appears that LDCs need both AfT flows and FDI inflows to achieve higher** export products quality (these two external flows are complementary in generating export quality improvement in LDCs), with this complementarity effect being higher compared to Non-LDCs.

Regarding the sub-categories of Total AfT flows, we obtain mixed results, both in terms of their effect, on export upgrading in recipient countries, as well as in terms of their interactions with FDI in influencing export upgrading in recipient (host) countries.

In short, this set of results leads us to infer that not only are AfT programmes and FDI inflows important drivers of export upgrading in recipient countries, notably in LDCs, but that **AfT flows could play a catalysing role with respect to FDI inflows in contributing to export upgrading in recipient**

countries, in particular LDCs. Policymakers should therefore take into account the existence of the potential interplay between these two types of external capital flows in designing both their export development strategies and their policies that affect FDI inflows into their countries.

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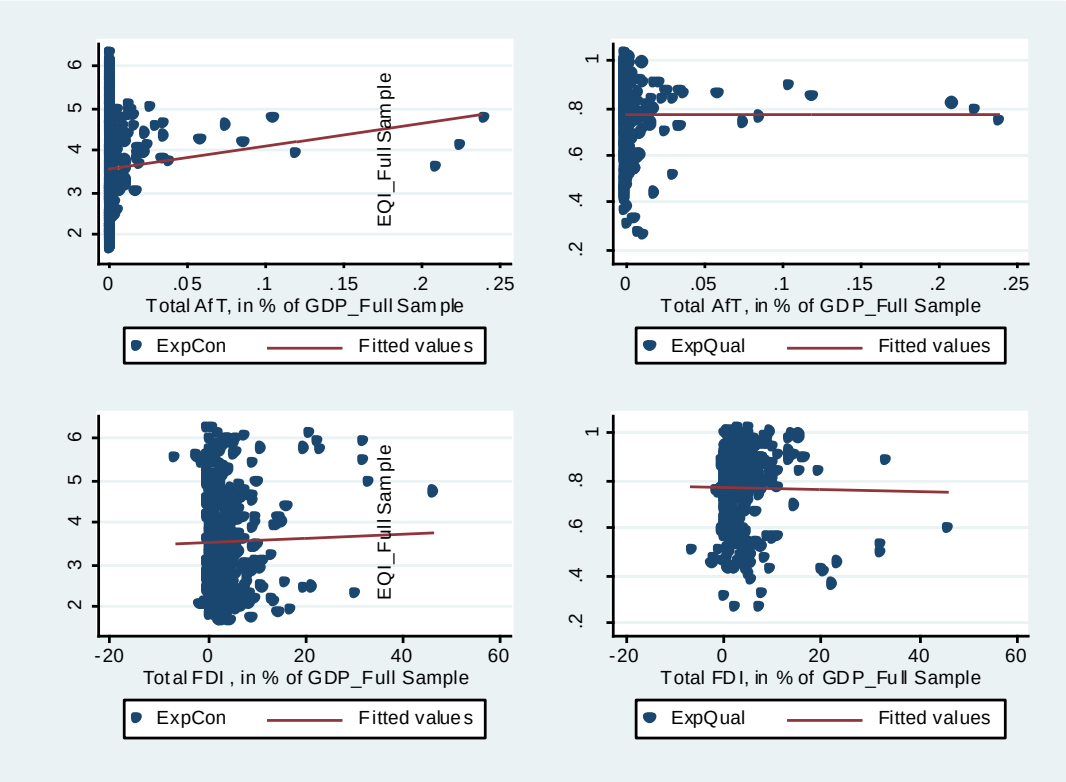
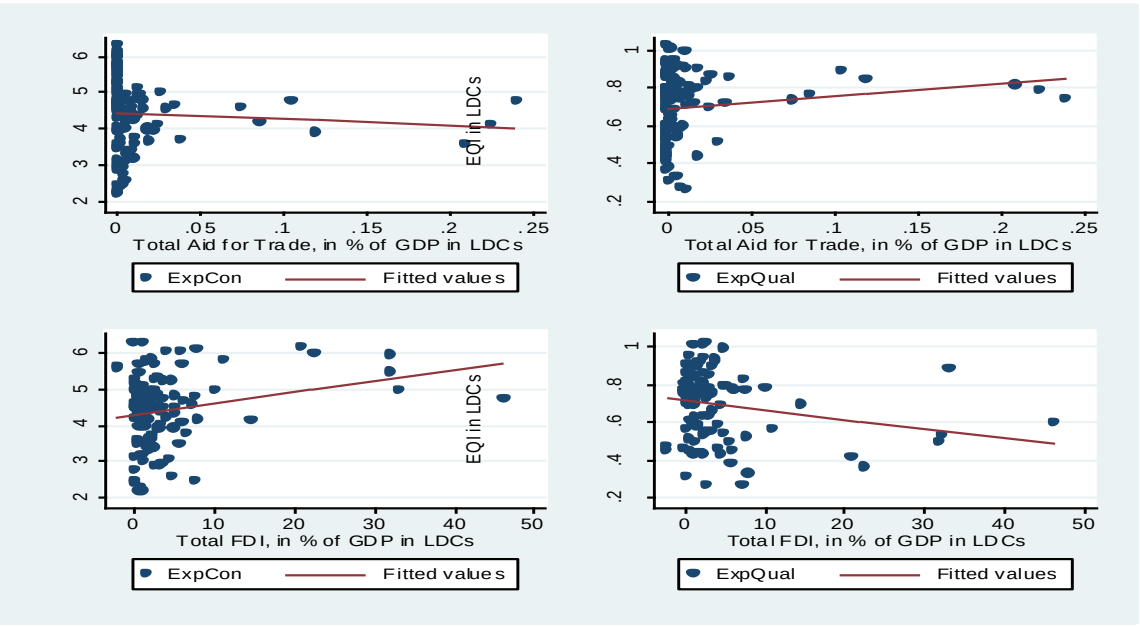
FIGURES

Figure 1: Correlation pattern between Export Upgrading Variables, Total AfT and FDI Inflows (% GDP) over the entire sample



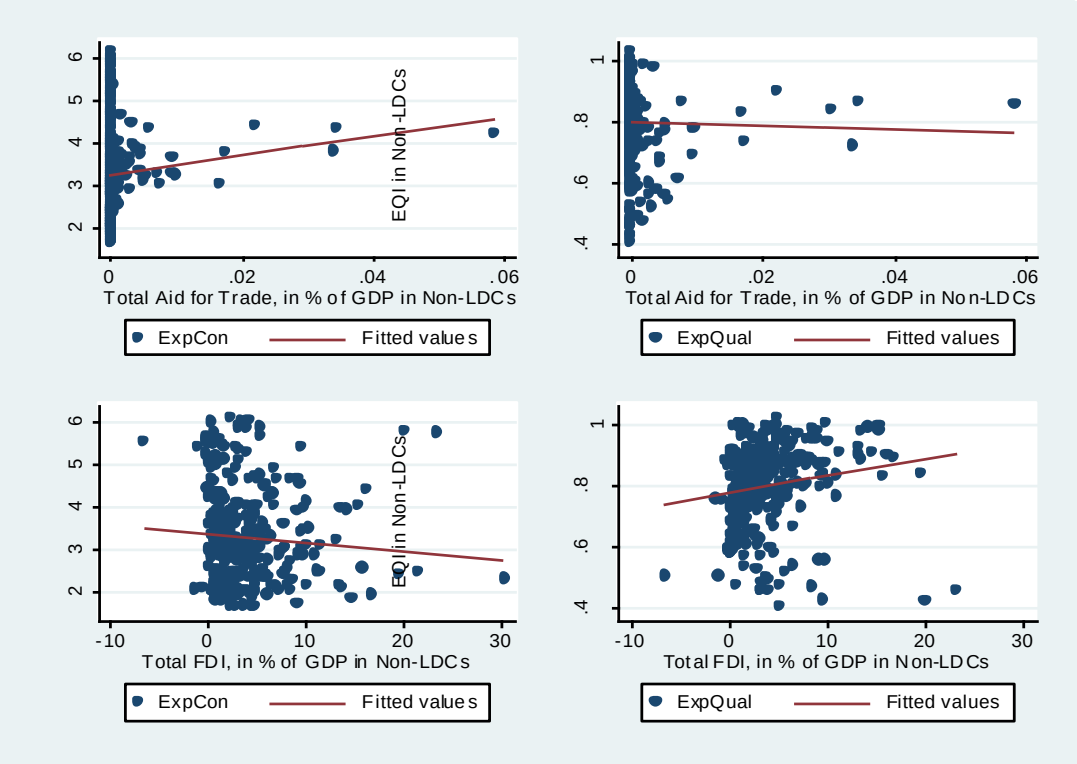
Note: *ECI = Export Concentration Index and EQI = Overall Export Quality Index.*

Figure 2: Correlation pattern between Export Upgrading Variables, Total AfT and FDI Inflows (% GDP) over the sub-sample of LDCs



Note: *ECI = Export Concentration Index and EQI = Overall Export Quality Index.*

Figure 3: Correlation pattern between Export Upgrading Variables, Total AfT and FDI Inflows (% GDP) over the sub-sample of Non-LDCs



Note: *ECI = Export Concentration Index and EQI = Overall Export Quality Index.*

TABLES

Table 1: Estimation of Model (1), with Total AfT using within Fixed Effects technique

	ExpCon	**ExpExtMarg**	**ExpIntMarg**	**ExpQual**
	(1)	**(2)**	**(3)**	**(4)**
1-Period Lag of the dependent variable	0.378***	0.572***	0.362**	0.403**
	(0.131)	(0.172)	(0.151)	(0.181)
AfTTotal	**-1.568***	**0.0577**	**-1.375**	**0.221**
	(0.798)	**(0.101)**	**(0.878)**	**(0.286)**
lnFDI	**-0.00122**	**0.00561**	**-0.00940**	**0.00323*****
	(0.00579)	**(0.00486)**	**(0.00876)**	**(0.00109)**
IMP_{t-1}	0.00274***	-0.00206*	0.00492***	-0.000649***
	(0.000311)	(0.00117)	(0.00146)	(0.000223)
$GDPCapita_{t-1}$	-8.32e-06*	-4.20e-06	-6.96e-07	2.48e-06***
	(4.84e-06)	(5.60e-06)	(6.01e-06)	(8.48e-07)
Termstrade	0.00218***	-0.000876***	0.00295***	0.000130***
	(0.000625)	(0.000273)	(0.000839)	(4.36e-05)
Pop	-4.94e-10***	3.50e-10	-8.67e-10*	4.38e-10***
	(1.63e-10)	(2.56e-10)	(4.48e-10)	(8.18e-11)
$HumCap_{t-1}$	-0.00618***	-0.00195**	-0.000755**	-3.65e-05
	(0.000564)	(0.000785)	(0.000294)	(0.000110)
$Reer_{t-1}$	0.000983***	0.000157	0.000193	-7.25e-05*
	(0.000146)	(0.000123)	(0.000208)	(3.91e-05)
$FinDev_{t-1}$	-0.000547	-0.000151	-0.000670	-6.26e-05
	(0.00132)	(0.000273)	(0.00140)	(0.000129)
$RulesLaw_{t-1}$	0.000698	0.0438**	0.00748	0.0248***
	(0.0957)	(0.0215)	(0.112)	(0.00761)
$RQual_{t-1}$	-0.0714	-0.0684*	0.0332	0.00255
	(0.0698)	(0.0393)	(0.0446)	(0.00269)
Constant	2.180***	0.425**	1.604***	0.446***
	(0.438)	(0.197)	(0.344)	(0.160)
Observations	306	308	308	308
Number of Countries	86	86	86	86
Within R^2	0.2101	0.4795	0.2346	0.2423

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis.*

Fixed Effect Regressions have been performed by means of the stata device "xtscc" which Hoeckle (2007) developed in Stata for unbalanced panel to correct the standard errors by the use of Driscoll Kraay (1998). This technique allows to take into account heteroscedasticity, serial correlation and possible cross-sectional dependence in the data.

Table 2: Estimation of Model (1) with Total AfT, using the Two-Step System GMM Approach

	ExpCon	ExpExtMarg	ExpIntMarg	ExpQual	ExpCon	ExpExtMarg	ExpIntMarg	ExpQual
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1-Period Lag of the dependent variable	0.951***	0.744***	0.765***	0.517***	0.925***	0.762***	0.757***	0.534***
	(0.0118)	(0.00724)	(0.0184)	(0.0102)	(0.0108)	(0.00934)	(0.0160)	(0.0112)
AfTTotal	**-5.527*** **	**-1.293*** **	**-3.412*** **	**0.532*** **				
	(0.118)	**(0.155)**	**(0.171)**	**(0.0318)**				
AfTPol					**-31.38*** **	**-1.591**	**-25.52*** **	**-5.130*** **
					(2.386)	**(1.682)**	**(3.202)**	**(0.691)**
AfTEcoInf					**-2.603*** **	**-1.070*** **	**-1.062*** **	**0.0829*** **
					(0.0951)	**(0.0718)**	**(0.155)**	**(0.0188)**
AfTProd					**5.086*** **	**-0.298*** **	**4.841*** **	**0.465*** **
					(0.106)	**(0.0361)**	**(0.170)**	**(0.0209)**
lnFDI	**-0.00212** **	**0.000302**	**-0.00147**	**0.00240*** **	**-2.13e-05**	**-0.000689** **	**0.00122**	**0.00199*** **
	(0.000901)	**(0.000406)**	**(0.000924)**	**(0.000333)**	**(0.000727)**	**(0.000346)**	**(0.000869)**	**(0.000269)**
IMP_{t-1}	0.00358***	-0.000528***	0.00288***	-0.000578***	0.00268***	-0.000209	0.00240***	-0.000491***
	(0.000201)	(0.000134)	(0.000180)	(5.11e-05)	(0.000132)	(0.000139)	(0.000143)	(3.97e-05)
$GDPCapita_{t-1}$	-4.73e-06***	-2.08e-06***	7.77e-06***	8.11e-08	-8.21e-07	-2.64e-06***	1.02e-05***	-2.37e-07**
	(6.42e-07)	(4.75e-07)	(1.03e-06)	(1.96e-07)	(5.21e-07)	(2.83e-07)	(9.02e-07)	(1.21e-07)
Termstrade	0.000456	-0.000268***	0.00235***	7.75e-05*	0.000650*	-0.000138***	0.00244***	0.000125***
	(0.000396)	(5.09e-05)	(0.000184)	(4.36e-05)	(0.000376)	(3.03e-05)	(0.000207)	(3.88e-05)
Pop	-4.62e-11	-8.54e-11	-2.02e-10	2.48e-10***	3.47e-11	-8.30e-11*	3.02e-11	2.32e-10***
	(1.48e-10)	(5.58e-11)	(1.39e-10)	(1.90e-11)	(1.27e-10)	(5.01e-11)	(1.03e-10)	(1.50e-11)
$HumCap_{t-1}$	-0.000872**	0.000484***	-0.00417***	0.000706***	-5.89e-05	0.000378*	-0.00366***	0.000609***
	(0.000373)	(0.000178)	(0.000610)	(0.000108)	(0.000337)	(0.000211)	(0.000465)	(0.000105)
$Reer_{t-1}$	0.000118	-0.000397***	-0.00101***	-0.000134***	8.20e-05	-4.04e-05	-0.00105***	-0.000262***
	(0.000369)	(8.30e-05)	(0.000329)	(3.59e-05)	(0.000258)	(8.90e-05)	(0.000278)	(2.50e-05)
$FinDev_{t-1}$	-0.000871**	0.000946***	-0.00169***	-0.000109	-0.000794***	0.00116***	-0.00227***	-0.000110**
	(0.000389)	(0.000234)	(0.000454)	(7.02e-05)	(0.000260)	(0.000213)	(0.000295)	(4.97e-05)
$RulesLaw_{t-1}$	0.232***	0.110***	0.171***	0.00757	0.133***	0.115***	0.0876***	0.0172***
	(0.0236)	(0.0110)	(0.0206)	(0.00537)	(0.0213)	(0.00789)	(0.0230)	(0.00449)
$RQual_{t-1}$	-0.139***	-0.107***	-0.259***	0.0315***	-0.118***	-0.0986***	-0.179***	0.0243***
	(0.0181)	(0.0105)	(0.0304)	(0.00469)	(0.0154)	(0.00797)	(0.0219)	(0.00256)
Constant	0.122*	0.126***	0.792***	0.348***	0.104**	0.0708***	0.764***	0.352***
	(0.0716)	(0.0195)	(0.0991)	(0.0147)	(0.0528)	(0.0173)	(0.0638)	(0.0135)
Observations	306	308	308	308	306	308	308	308
Countries	86	86	86	86	86	86	86	86
AR1 test (p-value)	0.0247	0.0447	0.0332	0.0041	0.0195	0.0481	0.0381	0.0046
AR2 test (p-value)	0.2967	0.4943	0.0707	0.1377	0.3180	0.5635	0.0867	0.1393
Hansen test	0.4530	0.4716	0.6405	0.3252	0.7114	0.8942	0.6910	0.6140

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis.*

Table 3: Estimation of Model (2) with Total AfT - Two-Step System GMM Approach

	ExpCon	**ExpExtMarg**	**ExpIntMarg**	**ExpQual**
	(1)	**(2)**	**(3)**	**(4)**
1-Period Lag of the dependent variable	0.970***	0.705***	0.738***	0.477***
	(0.00867)	(0.00974)	(0.0109)	(0.00973)
AfTTotal	**-1.827**	**-0.984****	**1.662**	**-0.179**
	(2.599)	**(0.496)**	**(1.703)**	**(0.407)**
lnFDI	**-0.00613*****	**-0.00232*****	**-0.00498****	**0.00304*****
	(0.00218)	**(0.000656)**	**(0.00213)**	**(0.000461)**
AfTTotal*LDC	**-3.891**	**0.440**	**-7.393*****	**1.163*****
	(2.748)	**(0.509)**	**(1.719)**	**(0.399)**
lnFDI*LDC	**0.0116*****	**0.00227*****	**0.0151*****	**-0.00115**
	(0.00287)	**(0.000794)**	**(0.00286)**	**(0.000732)**
LDC	0.0123	-0.153***	0.450***	-0.117***
	(0.0303)	(0.0191)	(0.0190)	(0.00566)
IMP_{t-1}	0.00241***	-0.000371**	0.00211***	-0.000404***
	(0.000110)	(0.000171)	(0.000133)	(6.39e-05)
$GDPCapita_{t-1}$	-4.98e-06***	-4.98e-07	5.07e-06***	-8.31e-08
	(4.81e-07)	(5.96e-07)	(8.89e-07)	(1.86e-07)
Termstrade	6.44e-05	-0.000150***	0.00277***	0.000245***
	(0.000310)	(5.26e-05)	(0.000196)	(2.13e-05)
Pop	1.71e-10	-1.17e-10	4.64e-11	1.53e-10***
	(1.91e-10)	(7.41e-11)	(1.14e-10)	(1.88e-11)
$Reer_{t-1}$	-0.000547**	-0.000408***	-0.000633**	-0.000213***
	(0.000226)	(0.000124)	(0.000260)	(3.71e-05)
$HumCap_{t-1}$	-0.000772**	-0.00121***	-0.00115*	-0.000102
	(0.000373)	(0.000406)	(0.000595)	(0.000110)
$FinDev_{t-1}$	-0.000250	0.000601**	-0.00175***	-0.000165**
	(0.000405)	(0.000253)	(0.000326)	(6.99e-05)
$RulesLaw_{t-1}$	0.240***	0.145***	0.179***	0.00939**
	(0.0192)	(0.0124)	(0.0214)	(0.00441)
$RQual_{t-1}$	-0.141***	-0.148***	-0.167***	0.0228***
	(0.0158)	(0.0121)	(0.0212)	(0.00267)
Constant	0.179***	0.281***	0.552***	0.447***
	(0.0616)	(0.0372)	(0.0658)	(0.0156)
Observations	306	308	308	308
Number of Countries	86	86	86	86
Number of Instruments	92	92	92	92
AR1 test (p-value)	0.0195	0.0486	0.0549	0.0050
AR2 test (p-value)	0.3695	0.5869	0.2207	0.1454
Hansen test (p-value)	0.6595	0.8378	0.5865	0.5809

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis.*

Table 4: Estimation of Model (3) with Total AfT - Two-Step System GMM Approach

	ExpCon	**ExpExtMarg**	**ExpIntMarg**	**ExpQual**
	(1)	**(2)**	**(3)**	**(4)**
1-Period Lag of the dependent variable	0.942***	0.751***	0.776***	0.477***
	(0.00930)	(0.00754)	(0.0152)	(0.0118)
AfTTotal	**-4.002*** **	**-0.580*** **	**-2.876*** **	**0.152*** **
	(0.0723)	**(0.0820)**	**(0.118)**	**(0.0177)**
lnFDI	**-0.00363*** **	**0.00133*** **	**-0.00653*** **	**0.00222*** **
	(0.000793)	**(0.000370)**	**(0.000766)**	**(0.000224)**
lnFDI*AfTTotal	**0.701*** **	**-0.114*** **	**0.818*** **	**0.0451*** **
	(0.0255)	**(0.0123)**	**(0.0441)**	**(0.00396)**
IMP_{t-1}	0.00300***	-0.000539***	0.00291***	-0.000511***
	(0.000120)	(0.000122)	(0.000138)	(2.87e-05)
$GDPCapita_{t-1}$	-3.04e-06***	-1.97e-06***	7.94e-06***	-3.51e-08
	(4.22e-07)	(3.15e-07)	(6.08e-07)	(1.46e-07)
$HumCap_{t-1}$	-0.000344	0.000741***	-0.00461***	0.000546***
	(0.000333)	(0.000137)	(0.000377)	(9.32e-05)
$Reer_{t-1}$	-0.000283	-0.000275***	-0.00152***	-0.000182***
	(0.000329)	(6.55e-05)	(0.000274)	(3.43e-05)
Termstrade	5.36e-05	-0.000177***	0.00221***	6.77e-05**
	(0.000318)	(3.38e-05)	(0.000157)	(2.97e-05)
Pop	-3.40e-11	-3.16e-11	-1.33e-10	2.92e-10***
	(1.53e-10)	(4.95e-11)	(1.44e-10)	(1.47e-11)
$FinDev_{t-1}$	-0.000722***	0.00110***	-0.00169***	-0.000241***
	(0.000206)	(0.000140)	(0.000365)	(6.64e-05)
$RulesLaw_{t-1}$	0.209***	0.0848***	0.206***	0.0216***
	(0.0187)	(0.00981)	(0.0160)	(0.00375)
$RQual_{t-1}$	-0.157***	-0.0910***	-0.244***	0.0340***
	(0.0141)	(0.00957)	(0.0265)	(0.00291)
Constant	0.192***	0.0735***	0.851***	0.400***
	(0.0452)	(0.0178)	(0.0659)	(0.0122)
Observations	306	308	308	308
Number of Countries	86	86	86	86
AR1 test (p-value)	0.0220	0.0412	0.0235	0.0046
AR2 test (p-value)	0.2932	0.5247	0.0721	0.1335
Hansen test (p-value)	0.4856	0.7422	0.5837	0.3709

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis.*

Table 5: Estimation of Model (4) with Total AfT - Two-Step System GMM Approach

	ExpCon	ExpExtMarg	ExpIntMarg	ExpQual
	(1)	(2)	(3)	(4)
1-Period Lag of the dependent variable	0.974***	0.700***	0.757***	0.479***
	(0.0110)	(0.0105)	(0.0185)	(0.0121)
AfTTotal	**-3.441**	**-6.238*** **	**0.958**	**0.0719**
	(2.813)	**(0.826)**	**(2.924)**	**(0.393)**
lnFDI	**-0.00601****	**-0.00407*** **	**-0.00466****	**0.00222*** **
	(0.00249)	**(0.000747)**	**(0.00224)**	**(0.000427)**
lnFDI*AfTtotal	**0.575****	**0.587*** **	**0.0699**	**0.0460**
	(0.231)	**(0.120)**	**(0.146)**	**(0.0505)**
LDC	0.0167	-0.137***	0.266***	-0.0651***
	(0.0232)	(0.0319)	(0.0471)	(0.00930)
AfTTotal*LDC	**-1.720**	**6.256*** **	**-5.427***	**0.119**
	(2.673)	**(0.809)**	**(2.825)**	**(0.378)**
lnFDI*LDC	**0.00891*** **	**0.00593*** **	**0.0103*** **	**1.29e-07**
	(0.00324)	**(0.00108)**	**(0.00241)**	**(0.000664)**
lnFDI*AfTtotal*LDC	**1.134*** **	**-0.925*** **	**1.488*** **	**0.134*** **
	(0.177)	**(0.175)**	**(0.187)**	**(0.0420)**
IMP_{t-1}	0.00228***	-0.000413***	0.00179***	-0.000384***
	(9.24e-05)	(0.000140)	(0.000198)	(5.12e-05)
$GDPCapita_{t-1}$	-2.45e-06***	-1.17e-06**	6.09e-06***	-6.20e-07***
	(4.91e-07)	(5.75e-07)	(1.03e-06)	(1.44e-07)
Termstrade	0.000223	-0.000205***	0.00265***	0.000288***
	(0.000371)	(5.60e-05)	(0.000256)	(3.05e-05)
Pop	2.10e-10	-1.96e-10***	-2.74e-10**	2.03e-10***
	(1.48e-10)	(7.54e-11)	(1.23e-10)	(1.97e-11)
$HumCap_{t-1}$	-0.000216	-0.00114***	-0.000978	0.000182**
	(0.000396)	(0.000423)	(0.000768)	(8.39e-05)
$Reer_{t-1}$	-9.16e-05	-0.000218**	-0.000718**	-0.000256***
	(0.000268)	(0.000106)	(0.000292)	(3.73e-05)
$FinDev_{t-1}$	0.000153	0.000376	-0.00105***	-0.000171**
	(0.000271)	(0.000235)	(0.000338)	(8.27e-05)
$RulesLaw_{t-1}$	0.146***	0.158***	0.0685***	0.0268***
	(0.0157)	(0.0160)	(0.0236)	(0.00527)
$RQual_{t-1}$	-0.113***	-0.125***	-0.152***	0.0243***
	(0.0141)	(0.0135)	(0.0233)	(0.00318)
Constant	0.00754	0.292***	0.506***	0.422***
	(0.0681)	(0.0351)	(0.0742)	(0.0179)
Observations	306	308	308	308
Number of Countries	86	86	86	86
AR1 test (p-value)	0.0165	0.0363	0.0389	0.0047
AR2 test (p-value)	0.4432	0.5212	0.1833	0.1872
Hansen test (p-value)	0.9458	0.9903	0.9375	0.8796

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis.*

Table 6: Estimation of Model (3) and (4) with AfT Components Two-Step System GMM Approach

	ExpCon	ExpExtMarg	ExpIntMarg	ExpQual
	(1)	(2)	(3)	(4)
	Results on Model (3) with Total AfT components			
1-year Period of the dependent variable	0.917***	0.794***	0.762***	0.609***
	(0.0141)	(0.00614)	(0.0199)	(0.0118)
AfTPol	-35.98***	-14.07***	-26.00***	-11.19***
	(7.068)	(1.742)	(9.581)	(1.129)
AfTEcoInf	-4.164***	-0.0199	-3.372***	0.241***
	(0.478)	(0.103)	(0.151)	(0.0778)
AfTProd	4.223**	0.955***	2.840**	0.844***
	(1.651)	(0.276)	(1.195)	(0.268)
lnFDI	0.00150	0.000363	0.000884	0.000736***
	(0.00105)	(0.000498)	(0.000849)	(0.000285)
lnFDI *AfTPol	7.773***	4.927***	7.518**	3.583***
	(2.289)	(1.583)	(3.588)	(0.432)
lnFDI *AfTEcoInf	1.217**	-0.486***	1.379***	-0.174***
	(0.511)	(0.0980)	(0.246)	(0.0620)
lnFDI *AfTProd	-0.895***	-0.151***	-0.658***	-0.0651***
	(0.116)	(0.0525)	(0.177)	(0.0243)
Observations-Countries	306-86	308-86	308-86	308-86
AR1 test (p-value)	0.0180	0.0475	0.0269	0.0109
AR2 test (p-value)	0.4033	0.5258	0.0958	0.1671
Hansen test (p-value)	0.9729	0.9986	0.9805	0.9334
	Results on Model (4) with Total AfT components			
	ExpCon	ExpExtMarg	ExpIntMarg	ExpQual
1-year Lag of the dependent variable	0.814***	0.592***	0.571***	0.561***
	(0.00485)	(0.00270)	(0.00490)	(0.00155)
AfTPol	-16.58***	-35.29***	2.190	-20.02***
	(4.476)	(1.356)	(5.317)	(0.378)
AfTEcoInf	-3.897***	0.212*	-3.186***	0.0133
	(0.284)	(0.108)	(0.289)	(0.0461)
AfTProd	2.604***	10.07***	-0.0696	1.989***
	(0.887)	(0.348)	(0.594)	(0.0891)
lnFDI	0.00922***	0.000486	-0.000576	0.00141***
	(0.00133)	(0.000801)	(0.00135)	(0.000173)
lnFDI *AfTPol	5.799*	5.506***	7.465	5.077***
	(3.117)	(1.557)	(4.539)	(0.513)
lnFDI *AfTEcoInf	1.212***	-0.0678	2.079***	-0.215***
	(0.189)	(0.222)	(0.171)	(0.0325)
lnFDI *AfTProd	-1.068***	-0.00496	-1.391***	-0.202***
	(0.125)	(0.128)	(0.239)	(0.0191)
lnFDI *AfTPol*LDC	13.16***	20.19***	-25.61***	0.405
	(3.855)	(1.952)	(4.850)	(0.603)
lnFDI *AfTEcoInf*LDC	1.548***	-0.0347	0.0815	0.155***
	(0.328)	(0.230)	(0.255)	(0.0449)
lnFDI *AfTProd*LDC	-1.441***	-3.616***	0.853*	-0.357***
	(0.398)	(0.223)	(0.512)	(0.0443)
LDC	-0.130***	-0.182***	0.326***	-0.0216***
	(0.0193)	(0.0103)	(0.0434)	(0.00321)
Observations-Countries	306-86	308-86	308-86	308-86
AR1 test (p-value)	0.0141	0.0344	0.0177	0.0106
AR2 test (p-value)	0.6423	0.4524	0.0956	0.1724
Hansen test (p-value)	0.3903	0.3566	0.0821	0.4413

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust Standard Errors are in parenthesis. Given that several variables are considered as endogenous here, we use as exogenous all the variables (with one-year lagged values) that we considered previously as predetermined.*

APPENDICES

Appendix 1: Definition and Source of variables

Variables	Definition	Sources
ExpCon	This is the Overall Export Concentration Index. It is calculated using the Theil Index and following the definitions and methods used in Cadot et al. (2011). The Overall Export Concentration Index is the sum of the intensive (within) and extensive (between) components described below. A rise in this index signifies an increase in the degree of overall export concentration.	Details on the calculation of this Index could be found online: International Monetary Fund's Diversification Toolkit – See: https://www.imf.org/external/np/res/dfidimf/diversification.htm
ExpIntMarg	This is the Export Concentration at the intensive margins, the first component of the Overall Export Concentration Index. It is the within Theil Index and is calculated following the definitions and methods used in Cadot et al. (2011). A rise in this index signifies an increase in the degree of export concentration at the intensive margin.	Details on the calculation of this Index could be found online: International Monetary Fund's Diversification Toolkit – See: https://www.imf.org/external/np/res/dfidimf/diversification.htm
ExpExtMarg	This variable represents the Export Concentration at the extensive margins, the second component of the Overall Export Concentration Index. It is the between Theil Index and is calculated following the definitions and methods used in Cadot et al. (2011). A rise in this index signifies an increase in the degree of export concentration at the extensive margin.	Details on the calculation of this Index could be found online: International Monetary Fund's Diversification Toolkit – See: https://www.imf.org/external/np/res/dfidimf/diversification.htm
ExpQual	This variable represents the Index of overall export quality. A rise in this index signifies the improvement of export quality.	Details on the methodology used to calculate this index could be found in Henn, Papageorgiou and Spatafora (2013, 2015). Data are available online:International Monetary Fund's Diversification Toolkit – See: https://www.imf.org/external/np/res/dfidimf/diversification.htm
LDC	Dummy variable which takes the value "1" when a country is an LDC and "0", otherwise.	Author
AfTTotal	Total Aid for Trade received by a Recipient country, in % of Recipient country's GDP	Database of Hühne, Meyer and Nunnenkamp (2014) [See below the description on the computation of this variable]
AfTPol	Aid for Trade dedicated to Trade Policies and Regulations, in % of Recipient country's GDP	Database of Hühne, Meyer and Nunnenkamp (2014) [See below the description on the computation of this variable]
AfTEcoInf	Aid for Trade dedicated to Economic Infrastructure, in % of Recipient country's GDP	Database of Hühne, Meyer and Nunnenkamp (2014) [See below the description on the computation of this variable]
AfTProd	Aid for Trade dedicated to Building Productive Capacity, in % of Recipient country's GDP	Database of Hühne, Meyer and Nunnenkamp (2014) [See below the description on the computation of this variable]
Termstrade	Net barter terms of trade index (2000 = 100)	WDI 2014
Pop	Total Population	WDI 2014

RulesLaw ; RQual	RulesLaw = Index of Rules of Law; RQual = Index of Regulatory Quality. These two indices capture institutional quality of a given country.	The Worldwide Governance Indicators, 2014 Update. **Source**: Daniel Kaufmann, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: A Summary of Methodology, Data and Analytical Issues". World Bank Policy Research Working Paper No. 5430 - http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130
REER	Real Effective Exchange Rate, (2005 = 100)	Data computed by CERDI – An increase this variable means an "appreciation" and a decrease means "depreciation"
FinDev	Measure of Financial development	This variable is measured by the ratio of private credit provided by banks and other financial institutions to GDP (expressed in percent). Data are drawn from the database of Beck et al. (2000), updated in 2013. The missing data are obtained from the WDI 2014.
HumCap	School Enrolment, secondary (% gross)	WDI 2014
GDPCapita	GDP per capita (constant 2005 US$)	WDI 2014
IMP	Imports of goods and services (% of GDP)	WDI 2014
InFDI	Inward FDI flows, in % of GDP	UNCTAD Data

Note on the computation of AfT variables in the database of Hühne, Meyer and Nunnenkamp (2014): The content of this note has been drawn from the Online Appendix of the article of the authors.

The authors collect aid data from both the OECD-DAC's International Development Statistics (IDS). The latter contains two databases: the project-based Creditor Reporting System (CRS) and the Aggregate DAC statistics on the geographical distribution of financial flows. Following Michaelowa and Weber (2007) and Kretschmer, Hübler and Nunnemkamp (2013), they combine these two databases to arrive at a sector-specific disbursements of AfT.

From the CRS database, they take sector-specific commitments of AfT by donor j to recipient I in sector s and year t, denoted by aft_{sjit}^{comCRS}. These data on commitments are adjusted to mitigate two potential biases: a potential upward bias as commitments tend to exceed actual disbursements to the extent that donors tend to renege on earlier pledges; and a potential downward bias due to underreporting of project-based aid in the CRS (underreporting has become less serious over time, but cannot be ruled out from the early 1990s).

The first bias is taken into account by multiplying with the ratio of total aid disbursements over total aid commitments by donor j to recipient i in year t as available from DAC statistics. The second bias is accounted for by multiplying with the ratio of total aid commitments from DAC statistics over the accumulated project-based commitments as given in the CRS.

The authors follow the practice in the relevant literature and assume that both biases would affect aid in all specific sectors to the same extent.

By aggregating over all donors j, they obtain sector-specific disbursements of AfT as follows: $aft_{sit} = \sum_j aft_{sjit}^{comCRS} \frac{aft_{jit}^{disbDAC}}{\sum_s aft_{sjit}^{comCRS}}$

The sectors *s* of AfT conform with the official OECD-WTO initiative (OECD, 2006): **Trade Policies and Regulations (CRS Code 331)**; **Economic Infrastructure**, consisting of Transport and Storage (210), Communications (220), and Energy Generation and Supply (230); and **Building Productive Capacity,** consisting of Banking and Financial Services (240), Business and Other Services (250), Agriculture (311), Forestry (312), Fishing (313), Mineral Resources and Mining (322), Industry (321), and Tourism (332).

Appendix 2: Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
ExpCon	433	3.586	1.181	1.631	6.290
ExpExtMarg	435	0.481	0.567	-0.039	2.622
ExpIntMarg	435	3.113	1.022	1.407	5.825
ExpQual	435	0.773	0.152	0.264	1.026
AfTTotal	435	0.004	0.021	0.000	0.240
AfTPol	435	0.000	0.003	0.000	0.057
AfTEcoInf	435	0.003	0.017	0.000	0.213
AfTProd	435	0.002	0.009	0.000	0.118
lnFDI	435	3.878	4.887	-6.537	46.231
IMP	433	42.153	26.935	8.721	331.516
GDPCapita	433	4661.485	7488.404	145.869	57249.480
Termstrade	406	106.917	25.692	24.042	208.778
Pop	435	5.01E+07	1.78E+08	69841.33	1.33E+09
HumCap	387	62.224	28.941	5.608	120.418
Reer	430	108.119	44.296	58.520	640.300
FinDev	433	36.791	36.133	1.949	263.890
RulesLaw	435	-0.323	0.754	-1.801	1.525
RQual	434	-0.201	0.716	-2.106	1.645

Appendix 3: List of countries used in the analysis

Entire Sample: Albania, Algeria Angola Argentina Bahrain Barbados Belize Benin Bolivia Brazil Bulgaria Burkina Faso Burundi Cambodia Cameroon Central African Republic Chad Chile China Colombia Congo, Rep. Costa Rica Cyprus Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Fiji Gabon Ghana Guatemala Guinea Hungary India Indonesia Iran Israel Jordan Kenya Korea, Rep., Kuwait Laos Lebanon Libya Malawi Malaysia Mali Malta Mauritius Mexico Mongolia Morocco Mozambique Nepal Nicaragua Niger Nigeria Oman Pakistan Panama Papua New Guinea Paraguay Peru Philippines Poland Qatar Romania Rwanda Samoa Senegal Seychelles South Africa St. Lucia Sudan Syria Thailand Togo Tunisia Turkey Uganda Uruguay Yemen Zimbabwe

Sub-sample of LDCs: Angola Benin Burkina Faso Burundi Cambodia Central African Republic Chad Djibouti Equatorial Guinea, Guinea Laos Malawi Mali Mozambique Nepal Niger Rwanda Samoa Senegal Sudan Togo Uganda Yemen.

Appendix 4: Pairwise Correlation

	ExpCon	ExpExtMarg	ExpIntMarg	ExpQual	AfTTotal	AfTPol	AfTEcoInf
ExpCon	1.0000						
ExpExtMarg	0.5099*	1.0000					
ExpIntMarg	0.8734*	0.0281	1.0000				
ExpQual	-0.5741*	-0.1928*	-0.5482*	1.0000			
AfTTotal	0.0986*	0.0093	0.1114*	0.0012	1.0000		
AfTPol	0.0857*	0.1232*	0.0298	-0.0048	0.6649*	1.0000	
AfTEcoInf	0.0690	-0.0212	0.0908*	0.0043	0.9271*	0.4205*	1.0000
AfTProd	0.0964*	0.0035	0.1161*	0.0009	0.7116*	0.5791*	0.6525*
lnFDI	0.0576	-0.1217*	0.1443*	-0.0129	-0.0446	-0.0454	-0.0383
IMP	0.0920*	-0.1775*	0.2148*	0.0193	0.0402	-0.0148	0.0427
GDPCapita	-0.0071	0.1386*	-0.0826*	0.1709*	-0.0888*	-0.0671	-0.0700
Termstrade	0.3121*	0.1952*	0.2534*	-0.1931*	0.0495	0.1214*	0.0091
Pop	-0.2527*	-0.1018*	-0.2371*	0.0486	-0.0538	-0.0333	-0.0441
HumCap	-0.4064*	-0.1715*	-0.3715*	0.4526*	-0.0111	-0.0927*	0.0142
Reer	0.1141*	0.0737	0.0878*	-0.0244	-0.0421	-0.0271	-0.0327
FinDev	-0.4663*	-0.2247*	-0.4085*	0.4517*	-0.0914*	-0.0815*	-0.0597
RulesLaw	-0.4080*	-0.1474*	-0.3810*	0.5181*	0.0489	-0.0613	0.0871*
RQual	-0.5546*	-0.1959*	-0.5306*	0.5528*	-0.0697	-0.0795*	-0.0366

Appendix 4: Pairwise Correlation (Continued)

	AfTProd	lnFDI	IMP	GDPCapita	Termstrade	Pop	HumCap	Reer	FinDev	RulesLaw	RQual
AfTProd	1.0000										
lnFDI	-0.0260	1.0000									
IMP	0.0362	0.6954*	1.0000								
GDPCapita	-0.0922*	0.0682	0.0657	1.0000							
Termstrade	0.0479	-0.0570	-0.1968*	0.1276*	1.0000						
Pop	-0.0555	-0.0836*	-0.1781*	-0.0992*	-0.0455	1.0000					
HumCap	-0.0423	0.1094*	0.0869*	0.5361*	0.0097	-0.0216	1.0000				
Reer	-0.0297	-0.1347*	-0.1124*	-0.0565	0.0009	-0.0149	-0.0277	1.0000			
FinDev	-0.0916*	0.1166*	0.1630*	0.3637*	-0.0938*	0.1560*	0.4838*	-0.0099	1.0000		
RulesLaw	0.0113	0.0625	0.1319*	0.5282*	-0.0288	0.0036	0.6628*	-0.1620*	0.5984*	1.0000	
RQual	-0.1027*	0.0347	0.0245	0.4358*	-0.0474	-0.0230	0.6100*	-0.2682*	0.5845*	0.8286*	1.0000