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Aid for Trade and Services Export Diversification in Recipient-Countries

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Abstract

This article examines the effect of Aid for Trade (AfT) flows on services export diversification in recipient-countries. The empirical analysis has relied on a sample of 100 recipient-countries (of which 31 Least developed countries - LDCs) over the period 2002-2014 and used the two-step system Generalized Methods of Moments (GMM) approach. It shows that total AfT flows always exert a positive effect on services export diversification over the full sample, with the magnitude of this positive effect being higher for less advanced countries such as LDCs than for relatively advanced economies. This finding also applies to the effect of the cumulated AfT flows on services export diversification. However, we find that the components of total AfT flows - namely AfT for services sectors and AfT for non-services sectors - exert a higher positive effect on services diversification in less advanced countries, notably LDCs than in relatively advanced countries. Specifically, for countries whose real per capita income exceed a certain level, these two types of capital inflows are associated with greater services export concentration. These findings have important policy implications for developing countries and notably the poorest countries among them.

Keywords: Aid for Trade; Services Export Diversification
Jel Classification: F1; F14; F35.

1. Introduction

For a long time, the services sector has been considered as the 'residual' tertiary sector of the economy, because it was deemed non-tradable, and the important sectors in the economy were mainly the primary and secondary sectors. However, in recent decades, many services that were considered as non-tradable have become tradable[1] thanks *inter alia*, to the globalization of economic activities in many services areas, including the strong and rapid development of the information and communication technologies (ICT). The services sector development has now attracted the attention of policymakers, researchers and scholars given its important contribution to global trade and investment (Mattoo and Stern, 2007). According to WTO (2019a), in 2018, the growth of the volume of world trade in commercial services growth (7.7 per cent) has outpaced the growth of the volume of world merchandise trade (3.0 per cent). Services are playing an increasing role in global and regional value chains as intermediate inputs to manufacturing[2] (phenomenon known as 'servicification') (e.g., Baldwin et al., 2015; Lanz and Maurer, 2015). In particular, the development of the services sector in developing countries contributes significantly to the growth of other important sectors in the economy (e.g., manufacturing, primary resource-based industries, as well as transportation and communication). The importance of the services sector for economic growth, poverty reduction and development, including sustainable development has been emphasized in the literature (e.g., Adlung, 2007; Balchin et al., 2016; Fiorini, and Hoekman, 2018; François and Hoekman, 2010; Hoekman, 2017; Hoekman and Mattoo, 2008; McGuire, 2002). In particular, the emerging role of the services sector as a key driver of global trade has been well discussed in the recent WTO report titled "The future of services trade" (WTO, 2019b). This report has noted that while the contribution of developing economies to trade in services grew by more than 10 percentage points between 2005 and 2017, it was mainly concentrated in five economies. Statistics from UNCTAD database[3] have also shown that since 2005, developing economies (excluding China) have experienced a higher and rapid growth rate of their commercial services exports than developed economies (although this growth rate has been declining over time in both groups of countries). For example, in 2018, commercial services grew by 8.0 per cent in developing economies (excluding China) against 6.8 per cent in developed economies. Disaggregated statistics on commercial services exports in the UNCTAD database have shown that the commercial services exports growth is driven by the expansion of 'modern[4] services exports', at a pace even higher than that of developed economies for some modern services sectors. It is also interesting to note that while the world share of commercial services of Least developed countries (LDCs) amounted to 0.7% in 2018, this group of countries experienced a strong growth by 16.2% of commercial services exports in 2018 compared to 2017 (see WTO, 2019a). From a general trend perspective, since 2005, LDCs have experienced a significant increase of their trade in commercial services share of the world trade in commercial services, although it

[1] McGuire (2002) has defined the notion of services tradability as the possibility for the cross-border delivery of final services or of individual components in the services production chain without the movement of the producer or the customers.

[2] François and Hoekman (2010) have noted that services contribute to global economic growth through input-output linkages.

[3] See the database online at: https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en

[4] There is no consensus in the literature on the distinction between 'traditional services' and 'modern services'. For example, Eichengreen and Gupta (2013b) have considered that traditional services include trade and transport, tourism, financial services and insurance, while modern services encompass communications, computer, information and other related services. Nevertheless, the authors have recognized that this distinction might not be straightforward because services such as insurance and finance could be included in either category (see Eichengreen and Poonam, 2013: page 2 - footnote 5). Sahoo and Dash (2017) (and also Sahoo and Daho, 2014 to some extent) have followed the analysis provided by Baumol (1985), Ghani and Kharas (2010) and Eichengreen and Gupta (2013a) and adopted a different categorization where traditional services include transport and travel services, while modern services encompass transportability and tradability, financial services, insurance, business processing and software services.

this share remains small (WTO, 2019b). Furthermore, UNCTAD statistics have shown that LDCs are also experiencing a significant expansion of many modern services in their export activities.

The objective of policymakers in developed and developing countries alike is to devise and implement the right policies that would help the countries better integrate into the global trading system, while minimizing the downside risks associated with such an integration into the global economy. To help in achieving this objective, the Members of the World Trade Organization (WTO) have launched, at the 2005 WTO Hong Kong Ministerial Conference, the Aid for Trade (AfT) Initiative. The main objective of this Initiative is to mobilize international resources to address the structural impediments to trade faced by developing countries and the LDCs among them. Specifically, the Hong Kong Ministerial Declaration (see WTO, 2005) provides that the AfT Initiative aims "to help developing countries, particularly LDCs 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 57 of the Declaration). Since the launch of this Initiative, the international trade and development communities, including policymakers in both donor-countries (notably developed countries – or high-income countries) and recipient-countries (mainly developing countries), as well as researchers and scholars have expressed a keen interest in the effectiveness of this Initiative[5]. This has led to numerous studies on the effectiveness of AfT flows on the economies of recipient-countries. Hence, AfT effectiveness has largely been assessed with respect to recipient-countries' trade performance, notably export performance where the latter has been measured by the exports of goods and services (or exports of goods, including manufacturing and primary goods) in constant prices or as a share of the Gross Domestic Product (GDP) (e.g., Bearce et al., 2013; Busse et al., 2012; Calì and te Velde, 2011; Gnangnon, 2019a; Ghimire et al., 2016; Helble, et al., 2012; Hoekman, and Shingal, 2017; Hühne et al., 2014a; 2014b; Hynes and Holden, 2016; Martínez-Zarzoso et al., 2017; Te Velde et al., 2013; Vijil and Wagner, 2012). The effectiveness of AfT flows has also been evaluated with respect to several macroeconomic indicators in recipient-countries. These include trade policy and tariff policy volatility (e.g., Gnangnon, 2018; Gnangnon, 2019b; Hoekstra and Koopmann, 2012), export product diversification/economic complexity (e.g., Gnangnon, 2019c, 2019d; Kim, 2019), reduction of the digital divide (e.g., Gnangnon, 2019e); whether the launch of the AfT Initiative have genuinely increased resource flows (e.g., Gnangnon, 2019f); submission of trademarks applications (e.g., Gnangnon 2019g); employment promotion (e.g., Gnangnon, 2019h) and employment diversification (e.g., Gnangnon, 2019i); trade tax revenue (e.g., Gnangnon, 2016); and FDI inflows (e.g., Lee and Ries, 2016; Ly-My and Lee, 2019). To the best of our knowledge, among those studies, in particular the ones that have looked at the effect of AfT on recipient-countries' trade performance, Hoekman and Shingal, 2017) has been among the scarce papers devoted to the analysis in detail of relationship between AfT and services exports in recipient-countries. The analysis by Hoekman and Shingal (2017) has suggested that among AfT categories, only AfT allocated for the build-up of economic infrastructure (notably transport and energy) has induced higher volumes of services trade. The other categories of AfT do not appear to influence significantly trade in services. The authors have, therefore, concluded that a disaggregated analysis of different categories of AfT was need to shed better light on how AfT can support trade in services. Martínez-Zarzoso et al. (2017) has reported that AfT tends to promote exports of goods, but not services exports. More generally, while a huge literature has been devoted to the determinants (and impact[6]) of trade flows (either both goods and services considered together or

[5] The Aid for Trade Global Review, which aims to strengthen the monitoring and evaluation of Aid for Trade to provide strong incentive to both donors and recipients for advancing the Aid for Trade agenda, represents an important forum where the international trade community and the development community could discuss the effectiveness of the AfT flows as well ways to enhance such effectiveness in recipient countries (for further information, see online at: https://www.wto.org/english/tratop_e/devel_e/a4t_e/aid4trade_e.htm)

[6] Similarly, the economic impact of services has received relatively less attention compared to that of goods, of goods and services considered together economic impact of services trade (e.g., Alege and Ogundipe, 2015; Balchin

only goods), the literature on the determinants (and impact) of trade in services is relatively limited[7]. Likewise, in contrast with the voluminous number of studies on the determinants of export product diversification[8], to the best of our knowledge, no study has been devoted to the macroeconomic factors underpinning the diversification of services exports. The importance of exploring the determinants of services export diversification is explained by the increasing and rapid internationalization of services and the aforementioned strong role that the services sector is playing in the economic and social development, as well as the positive effect of services sophistication including on economic growth (see Anand et al., 2012).

The current analysis purports to fill this void in the empirical literature not only by contributing to the understanding of some macroeconomic factors that could explain the services export diversification path in developing countries, but more importantly by investigating how AfT flows influence the diversification of services exports in these countries. Three main existing studies are closed in spirit to the issue of diversification of services exports. The first two studies have been carried out by Sahoo and Dash (2017) and Eichengreen and Gupta (2013b) who have assessed the macroeconomic determinants of services exports, including by putting emphasis on the structure of services exports where a distinction has been made between traditional services and modern services. The other study is by Anand et al. (2012) who have examined empirically both the determinants and impact of services sophistication as well as goods sophistication. The authors have underlined the importance of modern services, and the sophistication of manufactured and service exports for economic growth in countries, notably developing countries and low-income countries among the latter.

The empirical analysis is conducted over a panel dataset containing 100 AfT recipient-countries (of which 31 LDCs) over the period 2002-2014. Results based on the two-step system Generalized Methods of Moments (GMM) estimator have shown that both total AfT flows and their cumulated values over time influence positively services export diversification in recipient-countries. Less advanced countries such as LDCs appear to enjoy a higher positive effect of these resource inflows on services export diversification than do relatively advanced countries.

The rest of the article is structured as follows. Section 2 discusses the channels through which AfT flows could affect services export diversification in recipient-countries. Section 3 presents the model specification and the estimation strategy. Section 4 provides some data analysis on key variables of interest in the analysis. Section 5 presents the empirical outcomes. Section 6 undertakes a further analysis of the issue at hand, and Section 7 concludes.

2. Theoretical discussion on how AfT flows could affect services export diversification

The literature on the determinants of services trade has discussed whether the international trade theory that applies to trade in goods is also valid for services trade. Studies such as Hill (1977) and Morgan and Snowden (2007) have highlighted the existence of differences in goods and services, but according to other works such as Hindley and Smith (1984), these differences do not

et al., 2016; El Khoury and Savvides, 2006; Dash and Parida, 2013; Gabrielle, 2006; Hoekman and Shingal, 2017; Li et al., 2003; Lorde et al., 2011; Mishra et al., 2011; Thomas, 2019).

[7] Studies concerning the determinants of trade in services (notably services exports) include for example Anand et al. (2011) Choi (2010); Clarke, 2008; Eichengreen and Gupta (2013a, b); Gnangnon and Iyer, 2018; Freund and Weinhold (2002); Gani and Clemes (2013); Goswami et al. (2012); Kandilov and Grennes (2010); Karam and Zaki (2013); Kimura and Lee (2006); Morgan and Snowden (2007); Li et al. (2016); Moshirian and Sim (2003, 2005); Sahoo and Dash (2014, 2017); Sandra and Pelin (2012); Shingal (2010); Sapir and Lutz (1981); Sandeep (2011); Wong et al. (2009).

[8] Studies on these matter include for example Adityaa and Acharyya (2015); Agosin et al. (2012); Ali (2017); Amighini and Sanfilipo (2014); Bahar and Santos (2018); Gnangnon and Roberts (2017); Gnangnon (2019a, 2019b, 2019c, 2019j); Harding and Javorcik (2012); Hausmann et al. (2007); Imbs and Wacziarg (2003); Osakwe et al. (2018); Parteka and Tamberi (2013); Vardanyan (2019); and Zhu and Fu (2013).

necessarily apply to trade. This is because thanks to the development of ICT, services have become tradable, and now shared many of the goods characteristics (Bhagwati, 1984; Ghani and Kharas, 2010; Leamer and Storper, 2001). Recent studies such as Kimura and Lee (2006), van der Marel (2012) and Nyahoho (2010) have shown that many of the same basic determinants of goods trade apply also to services trade. More generally, the majority of the above-mentioned studies on the determinants of trade in services has used the classical international trade theory, especially the Heckscher-Ohlin trade theory as well as the new trade theory as framework for analysis. Against this background, the current analysis draws on studies concerning the determinants of export product diversification, notably the few ones on the effect of AfT flows on export product diversification (e.g., Gnangnon, 2019a, b; Kim, 2019) to examine the effect of AfT flows on services export diversification.

The OECD (Organization of Economic Cooperation and Development) has distinguished three main categories of AfT that are used in the empirical literature. These include AfT related to Economic Infrastructure (whose components are transport and storage, communications, and energy generation and supply); AfT allocated to strengthening productive capacity (whose components include banking and financial services, business and other services, agriculture, fishing, industry, mineral resources and mining, and tourism); and Aid dedicated to trade policy and regulations (which encompasses trade policy and regulations and trade-related adjustment interventions). For the purpose of the current study, we consider two main components of AfT, including AfT allocated to the services sector, and AfT dedicated to the non-services sectors. AfT related to the services sector include the following sub-categories: transport and storage; communications; energy generation and supply); banking and financial services; business and other services; construction and tourism. AfT allocated to the non-services sector include aid for agriculture, forestry, fishing, industry, mineral resources and mining and, finally trade policy and regulations.

In the current analysis, we argue that AfT flows could influence services export diversification in recipient-countries through their direct effect on services export baskets, as well as through their indirect effect on manufacturing exports. Before providing details on how these channels operate, we find useful to discuss how, from a theoretical perspective, manufacturing exports (or export product diversification) could positively drive services exports and eventually lead to the diversification of services exports, including from traditional services exports towards modern services exports. This preliminary discussion would lay some groundwork for the subsequent discussion on the effect of AfT on services export diversification. Some few studies have discussed the impact of goods exports, notably manufacturing exports on services exports, in light of the strong closed inter-relations between services exports and goods exports (as services could be by-products of – or inputs of - or go alongside with many traded goods, and vice versa) (Broussole, 2012; Eichengreen and Gupta, 2013a; Lennon, 2008; Lodefalk, 2012; Nordås, 2010). For example, the literature has emphasized the existence of a strong complementarity between manufacturing exports and services export. Stern and Hoekman (1987) and Deardoff (2001) have pointed out that actual cross-border traded services are by-products of international manufacturing activities or transactions. Along the same lines, researchers such as Hoekman and Mattoo (2008) and François and Hoekman (2010) have noted that international trade in services is driven positively by the use of knowledge-intensive business, financial, transport and communication services in manufacturing production. Broussole (2012) has underlined that business services export sectors depend strongly on the demand from manufacturing, both through goods exports and FDI. In addition, services-producing firms might often trade both goods and services. Likewise, the rise in the volumes of goods exports, notably manufacturing exports could result in an increase in the demand of services exports through the "network effect" (e.g., Eichengreen and Gupta, 2013a; Sahoo and Dash, 2014), whereby a country that enjoys a higher integration into the international markets of goods would likely use its networks to export its services. Eichengreen

and Gupta (2013a) and Sahoo and Dash (2014) have provided empirical support for this hypothesis. Other empirical studies have reported evidence of a positive effect of trade in goods on trade in services. For example, Ceglowski (2006), Deardorff (2001) and Kimura and Lee (2006) have shown that merchandise trade, in particular manufacturing goods influences positively services exports. Gnangnon and Shishir (2016) have demonstrated empirically that export product diversification in Least developed countries (LDCs) has exerted a positive and significant effect on these countries' exports of commercial services. Karmali and Sudarsan (2008) have found evidence that trade in goods exerts a positive effect on trade in services, although the magnitude of this effect is higher in developed countries than in developing countries.

Let us now consider the various avenues through which AfT flows could affect services export diversification in recipient countries. Gnangnon and Roberts (2017) and Gnangnon (2019a) have noted that AfT interventions align with national development strategies of recipient countries and, any effect of the AfT programmes on export diversification would be dependent on the national export strategies pursued by the governments of these countries. In light of these, we postulate that the effect of total AfT flows on services export diversification would depend on how the two major components of total AfT (i.e., AfT for the services sector and AfT for non-services sectors) influence services export diversification.

2.1. Discussion on the effect of AfT for services sectors on services export diversification

AfT targeted to the services sector could directly influence recipient-countries' services sector diversification path, but also indirectly through its effect on recipient-countries' manufacturing exports. Concerning the direct effect of AfT to the services sector on services export diversification, we further argue that if government in the recipient-countries use AfT allocated for the services sector to develop services activities where the economy already enjoys a comparative advantage, then these AfT flows would help expand existing services exports and would hence be associated with services export concentration. On the other hand, if governments in recipient countries utilize the AfT resource inflows allocated to the services sector to develop new services activities oriented towards international trade, then we should expect AfT for services sector to induce services export diversification. As for the indirect effect of AfT to the services sector on services export diversification, we hypothesize that this would take place through the impact of these capital inflows on manufacturing exports of the recipient-countries, or export product diversification, notably towards manufacturing products. The argument is that AfT to the services sectors could promote manufacturing exports in recipient-countries, and the development of manufacturing exports would in turn influence services export diversification. Ferro et al. (2014) have provided empirical evidence that aid to services has exerted a positive impact on downstream manufacturing exports of developing countries across regions and income-level groups. Specifically, a significant positive impact has been obtained for aid to the transportation, energy and banking services sectors on manufacturing exports. Moreover, the authors have found that this positive impact is mainly driven by aid allocated to transportation services in low-income countries, and for higher-income countries by aid to business services and energy.

The effect of AfT to the services sector on services export diversification could also take place through the peculiar impact of AfT flows allocated to the development of ICT in the recipient-countries. In fact, if this type of AfT translates into the development of ICT in recipient-countries, it could contribute to the promotion of services exports[9] and eventually facilitate the emergence of new services activities, and hence promote a greater services production diversification and possibly a higher level of services export diversification. At the same time, the development of ICT (thanks to AfT for ICT) through for example the improvement of the access

[9] The role of ICT in enhancing services exports has been emphasized by almost all studies that have explored the determinants of trade in services, and particularly services exports.

to the Internet in the AfT recipient-countries could encourage innovation and lead to export product diversification, which in turn could translate into higher services export diversification. In fact, greater access to the Internet could promote innovation by providing the population with a large access to knowledge information and ideas (including information on clients, suppliers and competitors for trading firms) (e.g., Arthur, 2007; Paunov and Rollo, 2016). Given the limited resources of informal firms to build knowledge networks, greater access of these firms to the Internet would generate larger gains for them (e.g., Jensen, 2007), including in terms of innovation. According to Paunov (2013) and OECD (2015a), the Internet also contributes to enhancing inclusive innovation in emerging and developing countries by increasing the number of innovating firms. As a result, through these channels, innovation can introduce new export products or expand the range of goods and services that a country can produce and export (e.g., Krugman, 1979; Dollar, 1986; Grossman and Helpman, 1989), and hence promote services export diversification. From an empirical perspective, Gnangnon (2019e) has provided empirical evidence that higher AfT inflows for ICT induce a rise in the Internet penetration rate and help reduce the internet related gap with respect to other countries in the world, although this effect has appeared to be more important for advanced AfT recipient-countries compared to relatively less advanced countries. In the meantime, Chen (2013) has demonstrated that innovation (measured by patents counts) stimulates both the extensive margins (i.e., the number of products exported from a country) and the intensive margins (i.e., the export value of each product from a country). Along the same lines, Lapatinas (2019) has examined the effect of the Internet on economic sophistication (i.e., the sophistication of exported products) and reported evidence that the Internet influences positively the sophistication of exported products. These could contribute to enhancing services export diversification. Against this background, we could genuinely expect AfT for ICT to lead to higher services export diversification.

All in all, we could expect that AfT for services sectors would induce services export diversification either directly by allowing the development of new services activities oriented toward international trade or indirectly through its positive effect on manufacturing exports or on export product diversification from primary export products towards manufacturing exports.

2.2. Discussion on the effect of AfT allocated to the non-services sectors on services export diversification

Concerning the effect of AfT allocated to the non-services sector, we argue that the AfT part related to trade policy and regulations could help policymakers of recipient-countries enhance their skills on designing the appropriate trade policy (including in line with the commitments of their countries at the WTO) that would promote the integration of their economy into the multilateral trading system. The policies aiming at liberalizing the services sector (reducing barriers[10] to the supply and exports of services) could directly promote the development of services production and exports, and eventually result in services export diversification. Services liberalization policies could also contribute to services exports diversification through their positive impact on manufacturing exports (as noted above, higher performance of manufacturing exports could potentially be associated with services export diversification). In this vein, some studies have demonstrated evidence of a positive effect of liberalization of services trade policies on manufacturing export performance. For example, Miroudot et al. (2012) have obtained that services liberalization policies could help reduce trade costs, foster competition, facilitate the reallocation of resources from less productive firms to more productive ones and ultimately enhance sectoral productivity in services sectors. This could help promote services export diversification. Furthermore, Hoekman and Shepherd (2017) have shown that there is a

[10] The existence of important barriers (qualitative or non-tariff barriers) that restrict trade in services has been well emphasized in the literature (e.g., Hoekman and Braga, 1997; Findlay and Warren, 2000; Fiorini and Hoekman, 2018; François and Hoekman, 2010; Griffiths, 1975; Hoekman, 2017; Zimmerman, 1999).

productivity linkage between manufactured goods exporters and service suppliers in the same locality thanks to the possibility of supplying many services locally. Along the same lines, other studies at the microeconomic level (e.g., Arnold et al., 2011; Fernandes and Paunov, 2012; Bas and Causa, 2013) have documented the positive effects of services liberalization on manufacturing firms' productivity in several developing countries. Bas (2014) has obtained empirical evidence for India that the probability of exporting and export sales shares of firms producing in downstream manufacturing industries has increased further to the reform of upstream services sector. In particular, the author has uncovered that the initially more productive manufacturing firms in India have enjoy a strong export performance further to services liberalization. Beverelli et al. (2017) have found that lower restrictions on trade in services enhance the performance of manufacturing sectors that use services as intermediate inputs in production. This positive effect operates through institutions in importing countries, notably in countries where services trade involves foreign establishment (investment), as opposed to cross-border arms-length trade in services. Trade policies aiming at liberalizing the goods sector (thanks inter alia to AfT related to trade policy and regulations) could also help reduce administrative costs and regulatory bottlenecks to trade such as inefficient customs processes (Busse, Hoekstra, and Königer, 2012; Calì & TeVelde, 2011). This would encourage the development of manufacturing exports (e.g., Gnangnon, 2019a) as well as export product diversification (e.g., Agosin et al., 2012; Beverelli et al., 2015; Costas et al., 2008; Dennis and Shepherd, 2011; Fonchamnyo and Akame, 2017; Krugman and Venables, 1990; Osakwe et al., 2018). Finally, as border barriers to services trade adversely affect trade in goods (e.g., Nergiz and Tekin-Koru, 2019), one could expect that by helping reduce barriers to services trade, AfT related to trade policy and regulations would promote trade in goods, including manufacturing exports and ultimately result in services export diversification.

Apart from its effect on services export diversification through the AfT related to trade policy and regulations, AfT flows to the non-services sector could in general help reduce trade costs (through the build-up of hard infrastructure such as road and rail connectivity and efficient ports), enhance productive capacity in recipient-countries. These could ultimately result in export product diversification in recipient-countries. More generally, empirical studies (e.g., Gnangnon, 2019c; Hühne et al., 2014b) have reported that total AfT inflows promote manufacturing exports in recipient-countries. Additionally, Gnangnon (2019a) and Kim (2019) have also reported evidence of a positive effect of total AfT on export product diversification. In light of the positive link between goods exports (including manufacturing exports) and services exports, we could expect that by promoting manufacturing exports and export product diversification, AfT to the non-services sector and total AfT would ultimately help diversify the services export baskets in recipient-countries.

In summing up the discussion in this Section, we could be tempted to anticipate a positive effect of total AfT flows on services export diversification, including through its two main channels (AfT for the services sector and AfT allocated to the non-services sector). However, one should not rule out the possibility of a positive effect of AfT on services export concentration (i.e., a negative effect of AfT on services export diversification) in light of the discussion above. Therefore, the study of the services export diversification effect of AfT inflows is an empirical matter.

3. Model specification and econometric approach

3.1 Model specification

In the absence of a (unified) theoretical framework on the determinants of services export diversification, and as the international trade theory that applies to trade in goods could also apply to trade in services (e.g., Kimura and Lee, 2006; Nyahoho, 2010; van der Marel, 2012), we draw on the above-mentioned studies on determinants of export product diversification, and particularly

those that have explored the effect of AfT inflows on export product diversification (e.g., Gnangnon, 2019a, b; Kim, 2019) - as well as to some extent from Anand et al. (2012) - to perform the empirical analysis on the effect of AfT on services export diversification. Therefore, we consider a model specification where control variables (in addition to the AfT variable(s)) include the real per capita income (denoted "GDPC"), the population size (denoted "POP"), the level of trade openness (denoted "OPEN"), the level of human capital accumulation (denoted "EDU"), the depth of financial development (denoted "FINDEV") and the institutional and governance quality (denoted "INST").

We postulate the following model specification:

$$SEC_{it} = \alpha_0 + \alpha_1 SEC_{it-1} + \alpha_2 AfT_{it} + \alpha_3 Log(GDPC)_{it} + \alpha_4 Log(OPEN)_{it} + \alpha_5 EDU_{it} + \alpha_6 FINDEV_{it} + \alpha_7 Log(POP)_{it} + \alpha_8 INST_{it} + \mu_i + \lambda_t + \omega_{it} \qquad (1)$$

where i is the subscript associated with a given recipient-country; t denotes the time-period. The panel dataset is unbalanced and covers 100 countries (of which 31 LDCs[11]) over the period 2002-2014, based on data availability. α_0 to α_8 are parameters to be estimated. μ_i represent countries' fixed effects (unobservable time invariant characteristics that could influence services export diversification path); ε_{it} is a well-behaving error-term. λ_t are time dummies that represent global shocks affecting together all countries' services export diversification path. All variables are described in Appendix 1. Appendix 2 presents descriptive statistics on all variables used in model (1), while Appendix 3 displays the list of countries used in the analysis.

The dependent variable "SEC" is the measure of the degree of services export concentration. To measure the level of services export diversification in AfT recipient-countries, we rely on three indicators drawn from the literature on the determinants of export product diversification (e.g., Agosin et al., 2012; Cadot et al., 2011). The first indicator, and the primary one used in the current analysis is the Herfindahl index of export concentration (also referred sometimes to the Hirschman-Herfindahl index), which is the most commonly used indicator for measuring concentration: we denote this indicator "HHI". This index has been computed as the sum of the squared shares of each export line k (with amount exported) in total services exports. Values of this index range from 0 to 1. We have multiplied this indicator by 100 so as to allow its values to range between 0 and 100. Higher values of this index reflect greater services export concentration, and lower values indicate greater services export diversification. The other two measures of SEC have been used for robustness check analysis, and include the Theil index of services export diversification (denoted "THEIL"), and the total number of services export lines (denoted "LINES"). These two indicators have been computed using the following formula (for example, see Agosin et al, 2012; Cadot et al., 2011): $THEIL = \frac{1}{n}\sum_{k=1}^{n}\frac{x_k}{\mu}\ln(\frac{x_k}{\mu})$, where $\mu = \frac{1}{n}\sum_{k=1}^{n} x_k$; n represents the total number of the services export lines (k) ; and $n = LINES = \sum_{k=1}^{n} k$; x_k stands for the amount of services exports associated with the services line "k". The Theil index has been normalized so that its values also range from 0 to 100. A rise in the values of the Theil index reflect a higher level of services export concentration, while lower values indicate a greater services export diversification. To compute each of these indicators, we have used the database developed by the International Monetary Fund (IMF) (see Loungani et al., 2017) on 11 major sectors of services (categories of services). Specifically, we have used disaggregated data on services exports at the 2-digit level to compute these three indicators. Note that the analysis has considered only commercial[12] services exports (this, therefore, excludes government goods and services exports).

[11] The list of countries included in the category of LDCs, as designated by the United Nations, could be found online at: http://unohrlls.org/about-ldcs/

[12] The literature has usually classified the activities of the services sector into market and non-market services (see for example Gani and Clemes, 2013). The category of market activities encompasses producer services (e.g., banking and finance); distribution services (e.g., transport and storage); personal services (e.g., hotels and restaurants) and communications (e.g., the

The introduction of the lag of the dependent variable as a right-hand side regressor aims to capture the existence of state-dependence in recipient-countries' services export diversification path. This also follows from the empirical literature on the determinants of export product diversification, where the latter has been shown to exhibit a strong persistence over time. We believe that this also applies to services export diversification. The use of the lag of the dependent variable also allows to control for omitted variables in the model specification.

The key variable of interest in the analysis, that is, "AfT" represents our measure of AfT flows. It could be either total AfT flows (denoted "AfTTOT") or its two components highlighted in Section 2, namely AfT flows allocated to the services sector (denoted "AfTSERV") and AfT flows allocated to the non-services sector (denoted "AfTNONSERV"). Following for example, Gnangnon (2019c) and Wang and Xu (2018), AfT variables have been measured in real terms of gross disbursements (i.e., expressed in constant prices 2017, US Dollar) (see Appendix 1 for further details).

Let us now discuss the expected effects of each of the control variables highlighted above.

The real per capita income variable has been introduced in the model specification so as to take into account the extent to which the degree of services export diversification varies across countries depending on their economic development level. This variable also serves to capture economies of scale (e.g., Marvasti, 1994; Li et al., 2005; Nyahoho, 2010; Sapir and Lutz, 1981; Schulze, 1999). The existence of economies of scale could contribute to the emergence of the demand for new services and hence induce services production and export diversification. The trade theory (that incorporates monopolistic competition) developed by Krugman (1981) has shown that economies of scale is one of the main determinants of trade in general, and hence of trade in services. Linder (1961) has argued that an indication of demand structure for goods and services is the per-capita income. Helpman and Krugman (1985) have suggested that as differentiated products require capital intensive technology, one could use the increase in per-capita income as a proxy for high capital-labor ratio. Finally, if the rise in the real per capita income is associated with the diversification of export product baskets, including towards manufacturing exports, it could generate services export diversification.

The population size variable complements the real per capita income in capturing the size of the AfT recipient-country. The empirical literature on the determinants of services exports has usually posited that bigger states (reflected in their population size) enjoy have a larger share of services in GDP (e.g., Goswami et al., 2012) because a large number of services cater directly to the final consumer, and a rise in the populations induces higher demand for services, and hence an expansion of the services sector. This could result either in services production and export concentration or services production and export diversification.

Market openness, and more generally trade openness has been found as an important factor for trade in services in the relevant literature. We argue here that trade openness could promote services export diversification via the positive spillovers related to the knowledge and technology embodied in the imported goods and services, the encouragement of research, and development activities and the provision of greater access to investment and intermediate goods (e.g., Agosin et al., 2012; Grossman and Helpman, 1991; Coe and Helpman 1995; Costas et al., 2008; Yanikkaya, 2003) as well as the possibility for market extension (e.g., Dennis and Shepherd, 2011). This effect could operate directly by allowing the development of differentiated services products, or indirectly through greater export product diversification. However, if greater trade openness leads countries to further develop the goods and services activities in their sector of comparative advantage, it would result in higher export product concentration and/or greater services export concentration.

internet). The category of non-market services refers to social services, of which health, education and housing. Thus, in the current analysis, commercial services are included in the category of market services. In fact, commercial services include all services categories except government goods and services, and are sub-divided into goods-related services, transport, travel, and other commercial services (the later including financial services and other business services) (see WTO, 2019).

An educated workforce has been highlighted as an important determinant of services exports, even more than for goods exports (e.g., Sahoo and Dash, 2017; Anand et al, 2012). Following Agosin et al. (2012) (for the case of export product diversification), we argue that an improvement in human capital, and hence of the skills of the educated workforce would translate into services export diversification if this workforce is used in newly developed services activities oriented towards international trade. In contrast, if the educated workforce is employed to expand the production and export of existing services activities, then higher education would result in a higher degree of services export concentration. Incidentally, if human capital accumulation is associated with export product diversification (and higher manufacturing or highly sophisticated[13] export products), then it could induce a higher level of services export diversification through the channels described in section 2. Similarly, if better education induces a higher degree of export product concentration notably on primary commodities, which is the goods sector of comparative advantage in many developing countries, then it could ultimately result in a higher level of services export concentration.

The financial sector development also appears virtually in all studies on the determinants of services trade (notably services exports) as an important factor (e.g., Sahoo and Dash, 2017). The effect of the financial development depth on services export diversification would depend on whether financing-dependent firms use the financial resources to develop more differentiated products and services. In the event these firms concentrate their financial resources on existing goods and services activities where the economy already enjoys a competitive advantage, then greater financial development would be associated with export product concentration and/or services export concentration (see also Agosin et al., 2012 for the case of the effect of financial development on export product diversification).

Finally, the institutional and governance quality plays an important role in promoting trade in services (e.g., Gani and Clemes, 2016) including through the promotion of trade in goods, notably manufacturing exports and export product diversification (e.g., Amighini and Sanfilipo, 2014; Faruq, 2011; Hausmann et al., 2007; Zhu and Fu, 2013). In light of this, we could expect better institutional and governance quality to result in services export diversification if they permit trading firms to develop new goods and services activities. Conversely, improvement in the quality of institutions and governance could generate services export concentration if such an improvement results in the expansion of existing goods and services activities.

We have applied the natural logarithm to the variables "GDPC", "OPEN" and "POP" so as to reduce their high skewness.

3.2. Estimation strategy

The empirical analysis uses the two-step system Generalized Methods of Moments (GMM) estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998) for dynamic panels with a small-time dimension and large cross-section. This estimator is widely used in the macro-empirical literature, and particularly in many of the above-mentioned studies concerning the determinants of export product diversification. The appropriateness of this estimator is assessed by means of the Arellano-Bond test of first-order serial correlation in the error term (denoted AR(1)), the Arellano-Bond test of no second-order autocorrelation in the error term (denoted AR(2)) and the Sargan-Hansen test of over-identifying restrictions (OID), which determines the joint validity of the instruments used in the estimations. Although not recommended by the proponents of the two-step system GMM estimator, we have also reported the test of no third-order autocorrelation in the error term (denoted AR(3)), as the absence of such autocorrelation could reflect the lack of omitted variables problem in the model specification. Finally, we report the number of instruments used in the regressions as the rule of thumb provides

[13] Lapatinas and Litina (2018) have shown that countries with populations that exhibit high-intellectual quotient produce and export more sophisticated products.

that a higher number of instruments than the number of countries may reduce the power of the afore-mentioned tests (e.g., Bowsher, 2002; Roodman, 2009). In the regressions based on the two-step system GMM approach, the AfT variables and the variable "OPEN" have been considered as endogenous, while the variables "FINDEV", "EDU" and "INST" have been considered as predetermined.

The empirical analysis is conducted as follows. From Tables 1 to 3, the analysis relies on the primary measure of services export concentration, i.,e the HHI indicator. In columns [1] to 3] of Table 1, we report the outcomes of the estimation of model (1) specifications respectively where the variable "AfT" is measured respectively by "AfTTOT", "AfTSERV" and "AfTNONSERV". These allow examining the effect of both total AfT flows and its two main components on services export diversification. Estimates reported in Table 2 arise from the estimations of the same model specifications (whose results are reported in Table 1) but in which we introduce a dummy ("LDC") capturing the sub-sample of LDCs that is interacted with the AfT variable. Results in this Table allow examining whether there is a differentiated effect of AfT flows on services export diversification in LDCs versus NonLDCs. Results in Table 3 allows considering the effect of the cumulated AfT flows on services export diversification over the full sample as well as in LDCs versus NonLDCs. To perform this analysis, we follow Gnangnon (2019c) as well as Wang and Xu (2018) and construct a variable capturing the cumulated AfT flows over time. This computation has been made for total AfT flows (the variable is denoted "CUMAfTTOT") as well as for its two components denoted "CUMAfTSERV" for the cumulated AfT flows allocated to the services sector, and "CUMAfTNONSERV" for the cumulated AfT flows allocated to the non-services sector. Results of the estimations of these different model specifications are displayed in Table 3. Finally, for robustness check analysis, we use the indicators "THEIL" and "LINES" as dependent variables to examine the effect of total AfT flows (as well as the cumulated total AfT flows) on services export diversification over the full sample as well as over LDCs versus NonLDCs.

4. Data analysis

This section provides a first insight into the statistical relationship between the two key variables of interest in the analysis, namely "HHI" and "AfTTOT" variables. Figures 1 to 3 present the developments of these two variables over time, respectively for the full sample, and the sub-samples of LDCs and NonLDCs. Figure 4 and 5 show the correlation pattern (in the form of scatter plot) between these two variables respectively over the full sample, and the sub-samples of LDCs and NonLDCs.

Figure 1 shows a declining trend of HHI, which shows that over time, AfT recipient-countries tend to diversify their services exports. In particular, the values of this indicator have moved from 34.2 in 2002 to 29.9 in 2014. This trend seems to be driven by the developments of HHI in NonLDCs (see Figure 3). For LDCs (see Figure 2), HHI has increased from 26.8 in 2003 to 33 points in 2006, and slightly declined over time to reach 27.1 points in 2011. From 2011 to 2014, this index has fluctuated and tended to rise between 2013 and 2014.

At the same time, we observe across the three Figures that amounts of AfT for services have largely been higher than the amounts of AfT for non-services sectors. Over the full sample, total real AfT flows have consistently risen over time from US$ millions 90.9 in 2002 to US$ millions 275.4 in 2014, and AfT for services has also consistently increased from US$ millions 50.7 in 2002 to US$ millions 208 in 2014. At the same time, after a fall between 2002 and 2003, AfT for non-services sectors has steadily increased from US$ millions 31.2 in 2003 to US$ millions 70.7 in 2011, and slightly declined to reach US$ millions 67.4 in 2014. The patterns concerning the evolution of AfT for services and non-services sectors observed over the full sample have also been observed over the sub-samples of LDCs (see Figure 2) and NonLDCs (see Figure 3). However, it appears when comparing the values of these two types of AfT flows in LDCs and NonLDCs, that LDCs have enjoyed higher amounts of AfT for non-services sectors compared to NonLDCs, whereas

the latter have benefitted from higher amounts of AfT for services sector compared to LDCs. For example, in 2014, the average amount of AfT for services and AfT for non-services sectors amounted respectively to US$ millions 160.4 and US$ millions 84.9 in LDCs against respectively US$ millions 230.6 and US$ millions 50.1 in NonLDCs.

Figures 4 and 5 show a negative correlation patterns between HHI and AfT variables over the full sample as well as over the sub-samples of LDCs and NonLDCs. It could be noted from the graphs in Figure 5 that the negative correlation is higher in magnitude for LDCs than for NonLDCs.

5. Discussion of empirical results

To start with, we note across all columns of Tables 1 to 4 that the coefficient of the one-period lag of the dependent variable is always positive and statistically significant at the 1% level. This, therefore, indicates the persistence of the indicator of services export concentration over time (i.e., services export concentration or diversification exhibits a state dependence path) and hence highlights the relevance of considering a dynamic model to examine the effect of AfT flows on services export diversification in recipient-countries. We now examine the outcomes of the diagnostic tests that help evaluate the appropriateness of the two-step system GMM as estimator for the empirical analysis. These outcomes are reported at the bottom of Tables 1 to 4. We observe that these results are fully satisfactory, as the p-values of the AR(1) test are always lower than 0.01, and the p-values relating to AR (2) and AR(3) tests are all higher than 0.10. In addition, across all columns of these Tables, the OID test has displayed p-values always higher than 0.10, and the number of instruments is always lower than the number of countries used in the full sample. In light of all these findings, we conclude that the two-step system GMM estimator is genuinely appropriate to carry out the empirical analysis.

We now turn to estimates reported in Table 1. They indicate that both total AfT flows and each of its components exert, on average, a negative and significant effect (at the 1% level) on services export concentration over the full sample. In other words, both total AfT flows, and AfT for services as well as AfT for non-services sectors induce a greater diversification of services exports. In terms of the magnitude of these effects, we obtain that a 100 per cent increase in total AfT flows (i.e., doubling the amount of total AfT flows) leads to a decrease in the values of the index HHI by 2.3 points in the full sample. Similarly, doubling the amounts of AfT for services sectors and AfT for non-services sectors induce a fall in the values of HHI respectively by 1.46 points and 1.84 points over the full sample. Therefore, it appears that AfT for non-services sectors exerts a slightly higher effect on services export diversification than AfT for services. Estimates related to control variables across the three columns of the Table suggest that countries with higher per capita income tend to enjoy a higher degree of services export diversification. This is due to the negative and significant effect of the real per capita income on services export concentration. While trade openness influences positively services export diversification, the education level and financial development appear to be positively associated with services export concentration. Finally, better institutional and governance quality is not significantly associated (at the 10% level) with services export concentration in columns [1] and [2], but this variable appears to positively affect services export concentration in column [3]. It is worth recalling that all the estimates represent average effects over the full sample, any may therefore reflect differentiated effects across countries (or sub-samples) in the full sample. This leads us to consider estimates reported in Table 2, which allow assessing the effect of AfT flows in LDCs versus NonLDCs. Results in column [1] of this Table indicate that total AfT flows exert a higher positive effect on services export diversification in LDCs than in NonLDCs. This outcome applies to AfT for services (see column [2]) and AfT for non-services sectors ((see column [3]). The net effect of total AfT flows, AfT for services and AfT for non-services sectors on services export concentration for LDCs amount respectively to -5.6 (= -0.637-4.964), -3.208 and -3.13 (=-0.487-2.640). These results

suggest that both total AfT flows as well as its two components exert a positive effect on services export diversification in LDCs. Additionally, AfT for services appears to exert a slightly higher positive effect (in terms of magnitude) on services export diversification than does AfT for non-services sectors. For NonLDCs, AfT allocated to non-services sectors does not appear to influence significantly services export diversification (although this non-statistically significant effect might reflect differentiated effects across countries within NonLDCs, as the latter could be positive and statistically significant, negative and statistically significant, or statistically nil). However, the magnitude of the effect of total AfT flows and AfT for services sectors on services export concentration amounts respectively to -0.64 and -0.49 for NonLDCs. These outcomes suggest that AfT variables induce a higher level of services export diversification in LDCs than in NonLDCs. Results concerning control variables across columns [1] to 3] are broadly consistent with those contained in Table 1, with the exception here that in contrast with estimates in Table 1, trade openness appears to exert a positive impact on services export concentration over the full sample. The differences in the effect of trade openness on services export concentration in Tables 1 and 2 might reflect the fact that this effect may vary across sub-samples, and eventually depend on the amount of AfT that accrue to recipient-countries. However, the current article does not intend to address these issues, which could be the subject of another study. Incidentally, while the population size does not appear to exert a significant effect on services export concentration across the three columns of Table 1, we obtain in Table 2 that this variable exerts a positive and significant effect on services export diversification. This signifies that countries with a larger population tend to enjoy a higher level of services export diversification than countries with a relatively lower population size.

Turning now to estimates presented in Table 3, we observe that the cumulated total AfT flows (as well as cumulated AfT flows for services sector and cumulated AfT flows for non-services sectors) influence positively and significantly (at the 1% level) services export concentration over the full sample (see results in columns [1] to [3]). A doubling of the cumulated values of total AfT flows generates a fall in the values of HHI by 6.11 points. Likewise, a 100 per cent change in the cumulated values of AfT for services results in a 1.9-point fall in the values of HHI, and a 100 per cent change in the cumulated values of AfT for non-services sectors induces a -5.2 points decrease in the values of HHI. This suggests that over the full sample, the cumulated AfT flows for non-services sectors exert a higher positive effect on services export diversification than the cumulated values of AfT for services. In columns [4] to [6], we find that the cumulated total AfT flows, along with the cumulated AfT flows for services and the cumulated AfT for non-services sectors exert a lower effect on services export concentration in LDCs than in NonLDCs. The net effects of the cumulated total AfT flows on services export product concentration in NonLDCs and LDCs are respectively -4.02 and -6.8 (= -4.019-2.763). The net effect of the cumulated AfT flows for services sectors on services export product concentration in LDCs amounts to -4.101, while for NonLDCs (taken as a whole), it is not statistically significant at the 10% level. The net effects of the cumulated total AfT flows on services export product concentration in NonLDCs and LDCs are respectively 4.5 and -8 (= -4.494-3.516). All these outcomes clearly indicate that the cumulated AfT flows (be the latter total AfT or its components) benefit much more to LDCs in terms of services export diversification than to NonLDCs. The estimates related to control variables are consistent with those reported in Tables 1 and 2.

Finally, let us examine the estimations' outcomes displayed in Table 4, which allow checking the robustness of the previous findings that are based on the HHI indicator. These results focus mainly on the effect of total AfT flows and the cumulated total AfT flows on services export product concentration over the full sample as well as over LDCs versus NonLDCs, using alternative measures of services export concentration, namely the Theil index and the total number of services export lines. Specifically, results in columns [1] and [2] allow exploring over the full sample the effect of AfT flows and the cumulated AfT flows on services export concentration

measured by the Theil index. Similarly, results in columns [3] and [4] allow examining, over the full sample, the effect of AfT flows and the cumulated AfT flows on services export concentration measured by the total number of services export lines. Columns [5] and [6] display estimates that permit to evaluate the effect of AfT flows and the cumulated AfT flows on services export concentration measured by the Theil index in LDCs versus NonLDCs. Finally, estimates in columns [7] and [8] report the outcomes that help assess the effect of AfT flows and the cumulated AfT flows on services export concentration, measured by the total number of services export lines in LDCs versus NonLDCs. Results in columns [1] and [2] suggest a negative and statistically significant (at the 1% level) of the variables capturing respectively total AfT flows and cumulated total AfT flows. It is worth underlining that the coefficient of the total AfT flows variable (in column [1]) – which amounts to -2.078 – is similar to the one reported in column [1] of Table 1. These confirm our previous findings that total AfT flows and the cumulated AfT flows influence positively services export diversification in the full sample. The estimates in column [4] and [5] indicate for the full sample, a positive and significant effect (at the 1% level) of total AfT flows and the cumulated AfT flows on the number of services export lines. These outcomes also confirm the previous findings that AfT flows and the cumulated AfT spur services export concentration. As for results in columns [5] and [6], we obtain that both total AfT flows and the cumulated total AfT flows exert a positive and significant effect of similar magnitude on services export diversification in LDCs and NonLDCs alike. This is because the coefficients of the interaction variables between each of these variables and the "LDC" dummy are not statistically significant at the 1% level, whereas the coefficients of the total AfT flows and the cumulated AfT flows variables are negative and statistically significant at the 1% level. Finally, results in columns [7] indicate that total AfT flows exert a higher positive effect on the total number of services export lines in LDCs than in NonLDCs, with the net effect of total AfT flows on the number of services export lines in LDCs amounting to 0.052 (= 0.0139+0.0380), while that of NonLDCs is given by 0.014. The cumulated total AfT flows exerts, on average, no significant effect (at the 10% level) on the total number of services export lines in NonLDCs, while it influences positively and significantly the total number of services export lines in LDCs (see column [8]).

6. Further analysis

The peculiar non-statistically significant effect of AfT for services on services export diversification on NonLDCs prompts us to examine how these effects evolve across countries in the full sample. In fact, the estimates related to these effects, and reported in Tables 2 to 4 represent average effects for the group of NonLDCs (also for LDCs), and might, therefore, not fully reflect the fact that the estimates related to these effects may hold different signs, magnitudes and statistically significance across countries in these two categories. To perform the analysis, we use the two-step system GMM approach to estimate different variants of model (1) in which we include the interaction between each AfT variable and the real per capita income. To save space, we have reported the results of the variables of interest in Table 5, as the full regressions' results could be obtained upon request. Note that all estimations here pass successfully the diagnostic tests that help assess the validity of the estimator. It is also worth recalling that the values of the real per capita income range between US$ 221.1 and US$ 21087.4 (see Appendix 2). We observe in this Table that across columns [1] to [5], the coefficient of the relevant AfT variable (or the related cumulated AfT variable) is negative and statistically significant at the 1% level, while the related interaction variable "VAR" shows a positive and statistically significant at the 1% level. The combination of the two outcomes in each column, therefore, suggests that AfT flows (either total AfT or its components) as well as their cumulated values tend to induce services export diversification up to a threshold of countries' real per capita income, above which they are associated with services export concentration. These confirm the previous findings that AfT flows (including total AfT flows and its components) exert a higher positive effect on services export

diversification in poor countries, including LDCs than in NonLDCs. Here, we find clearly that for NonLDCs, the effect varies across countries depending on countries' development level. The threshold of the real per capita income variable above which the AfT effect on services export concentration could change sign has been reported at the bottom of Table 5, across columns [1] to [5]. While in columns [1], [3] and [5], we obtain a threshold that falls within the range of the values of the real per capita income in the full sample, it appears that in columns [2] and [4], the threshold largely exceeds the maximum value of real per capita income in the full sample (which is US$ 21087.4). Therefore, we conclude that irrespective of countries' development levels, the cumulated total AfT flows as well as the cumulated AfT for services always exert a positive and significant effect on services export diversification, and the magnitude of this effect is higher for less developed countries than for relatively advanced economies in the sample. Finally, we note from column [6] that irrespective of their income level, recipient-countries enjoy the same magnitude of the positive effect of cumulated AfT for non-services sectors on services export diversification.

7. Conclusion

The current analysis investigates the effect of AfT flows on services export diversification in recipient-countries. The analysis relies on a panel dataset that includes 100 countries (of which 31 LDCs) over the period 2002-2014. Results suggest that over the full sample, AfT flows as well as its two components, namely AfT for services sectors and AfT for non-services sectors exert a positive and significant effect on services export diversification. Similarly, over the full sample, the cumulated AfT flows (for total AfT and its two components) influence positively and significantly services export diversification. However, these effects appear to vary across countries, as less advanced countries such as LDCs tend to experience a higher positive effect of total AfT flows (or each of its two components) on services export diversification than relatively advanced economies included in the category of NonLDCs. These findings have important implications, in light of the increasing relevance of the services sector for economic growth and development in developing countries, including the LDCs among them. These findings clearly highlight the need for scaling-up of AfT flows, including AfT for services sectors so as to help developing countries, notably LDCs – which are the poorest among them - to diversify their services exports in a context where services are becoming the new engines of economic growth and development in these countries.

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TABLES and APPENDICES

Table 1: Effect of AfT on services exports diversification
Estimator: Two-Step System GMM

VARIABLES	HHI	HHI	HHI
	(1)	(2)	(3)
HHI_{t-1}	0.312***	0.367***	0.323***
	(0.0101)	(0.0102)	(0.00787)
Log(AfTTOT)	-2.319***		
	(0.306)		
Log(AfTSERV)		-1.458***	
		(0.196)	
Log(AfTNONSERV)			-1.842***
			(0.186)
Log(GDPC)	-5.041***	-2.307***	-2.629***
	(0.608)	(0.570)	(0.516)
Log(OPEN)	-0.911***	-1.398***	-1.297***
	(0.273)	(0.276)	(0.347)
EDU	0.0459***	0.0195*	0.0230*
	(0.00985)	(0.0104)	(0.0136)
FINDEV	0.0146***	0.0237***	0.0222***
	(0.00415)	(0.00332)	(0.00436)
Log(POP)	-0.417	0.294	-0.442
	(0.313)	(0.372)	(0.391)
INST	-0.0258	0.199	0.878***
	(0.272)	(0.247)	(0.163)
Constant	93.20***	40.20***	64.26***
	(11.16)	(10.02)	(12.49)
Observations - Countries	667-100	666-100	667-100
Number of Instruments	93	93	93
AR1 (P-Value)	0.0065	0.0056	0.0093
AR2 (P-Value)	0.8192	0.7632	0.9486
AR3 (P-Value)	0.7744	0.8509	0.5372
OID (P-Value)	0.6008	0.7062	0.6235

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust standard errors are in parenthesis. In the two-step system GMM estimations, the variables "AfTTOT", "AfTSERV", "AfTNONSERV" and "OPEN" have been considered as endogenous. The variables "FINDEV", "EDU" and "INST" have been considered as predetermined. Time dummies have been included in the regressions.*

Table 2: Effect of AfT on of services export diversification in LDCs versus NonLDCs
Estimator: Two-Step System GMM

VARIABLES	HHI	HHI	HHI
	(1)	(2)	(3)
HHI_{t-1}	0.289***	0.320***	0.284***
	(0.0112)	(0.0139)	(0.00936)
Log(AfTTOT)	-0.637**		
	(0.257)		
LDC*Log(AfTTOT)	-4.964***		
	(0.411)		
Log(AfTSERV)		0.276	
		(0.219)	
LDC*Log(AfTSERV)		-3.208***	
		(0.259)	
Log(AfTNONSERV)			-0.487***
			(0.179)
LDC*Log(AfTNONSERV)			-2.640***
			(0.403)
LDC	106.4***	78.71***	59.88***
	(8.039)	(4.973)	(7.381)
Log(GDPC)	-3.728***	-0.682	-1.385*
	(0.585)	(0.595)	(0.719)
Log(OPEN)	2.016***	2.672***	0.987***
	(0.362)	(0.336)	(0.345)
EDU	0.0569***	0.0717***	0.0530***
	(0.00925)	(0.00835)	(0.0104)
FINDEV	0.0163***	0.0175***	0.00813
	(0.00514)	(0.00357)	(0.00514)
Log(POP)	-2.802***	-3.543***	-2.305***
	(0.507)	(0.412)	(0.421)
INST	0.506**	-0.0321	0.613***
	(0.222)	(0.238)	(0.191)
Constant	108.1***	79.48***	71.33***
	(13.02)	(11.18)	(13.47)
Observations - Countries	667-100	666-100	667-100
Number of Instruments	94	94	94
AR1 (P-Value)	0.0071	0.0048	0.0161
AR2 (P-Value)	0.6431	0.5526	0.9843
AR3 (P-Value)	0.9179	0.9402	0.6095
OID (P-Value)	0.7159	0.7513	0.7939

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust standard errors are in parenthesis. In the two-step system GMM estimations, the variables "AfTTOT", "AfTSERV", "AfTNONSERV" and "OPEN" have been considered as endogenous. The variables "FINDEV", "EDU" and "INST" have been considered as predetermined. Time dummies have been included in the regressions.*

Table 3: Effect of Cumulative AfT on services export diversification in the Full Sample, as well as in LDCs versus NonLDCs
Estimator: Two-Step System GMM

	Effect over the full sample			***Effect LDCs versus NonLDCs***		
VARIABLES	**HHI**	**HHI**	**HHI**	**HHI**	**HHI**	**HHI**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
HHI_{t-1}	0.281***	0.322***	0.299***	0.262***	0.288***	0.246***
	(0.0104)	(0.00923)	(0.0113)	(0.0135)	(0.0146)	(0.0119)
Log(CUMAfTTOT)	-6.109***			-4.019***		
	(0.438)			(0.439)		
Log(CUMAfTSERV)		-1.900***			0.423	
		(0.275)			(0.286)	
Log(CUMAfTNONSERV)			-5.164***			-4.494***
			(0.606)			(0.485)
LDC*Log(CUMAfTTOT)				-2.763***		
				(0.340)		
LDC*Log(CUMAfTSERV)					-4.101***	
					(0.220)	
LDC*Log(CUMAfTNONSERV)						-3.516***
						(0.334)
LDC				69.41***	100.8***	88.19***
				(7.441)	(5.015)	(7.041)
Log(GDPC)	-7.264***	-2.962***	-7.321***	-6.324***	-1.615**	-5.365***
	(0.535)	(0.427)	(0.685)	(0.697)	(0.683)	(0.704)
Log(OPEN)	1.266***	0.417	0.887**	3.959***	3.938***	5.395***
	(0.468)	(0.392)	(0.351)	(0.502)	(0.371)	(0.399)
EDU	0.0267***	-0.00528	0.0121	0.0653***	0.0562***	0.0539***
	(0.00930)	(0.00962)	(0.00949)	(0.0104)	(0.0106)	(0.00951)
FINDEV	0.0164***	0.0137***	0.0301***	0.0184***	0.0106**	0.0248***
	(0.00456)	(0.00403)	(0.00422)	(0.00424)	(0.00430)	(0.00349)
Log(POP)	-1.676***	-1.521***	-1.979***	-4.380***	-5.030***	-5.553***
	(0.475)	(0.511)	(0.406)	(0.592)	(0.511)	(0.561)

INST	0.983***	-0.284	1.519***	0.891***	-0.0199	1.025***
	(0.225)	(0.238)	(0.239)	(0.257)	(0.281)	(0.238)
Constant	217.3***	110.4***	202.9***	228.2***	121.1***	257.4***
	(10.22)	(10.61)	(17.04)	(11.49)	(10.82)	(12.25)
Observations - Countries	655-97	667-100	655-97	655-97	667-100	655-97
Number of Instruments	93	93	93	94	94	94
AR1 (P-Value)	0.0072	0.0088	0.0093	0.0102	0.0081	0.0148
AR2 (P-Value)	0.7709	0.9110	0.9291	0.6943	0.7793	0.7878
AR3 (P-Value)	0.7286	0.5919	0.6141	0.8479	0.8578	0.7775
OID (P-Value)	0.4481	0.3765	0.5849	0.5949	0.5813	0.4960

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust standard errors are in parenthesis. In the two-step system GMM estimations, the variables "AfTTOT", "AfTSERV", "AfTNONSERV" and "OPEN" have been considered as endogenous. The variables "FINDEV", "EDU" and "INST" have been considered as predetermined. Time dummies have been included in the regressions.*

Table 4: Robustness check: Effect of Cumulative AfT on services export diversification in the Full Sample, as well as in LDCs versus NonLDCs
Estimator: Two-Step System GMM

VARIABLES	THEIL	THEIL	Log(LINES)	Log(LINES)	THEIL	THEIL	Log(LINES)	Log(LINES)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
One-Period Lag of the Dependent Variable	0.484***	0.466***	0.597***	0.593***	0.491***	0.457***	0.578***	0.553***
	(0.0168)	(0.0127)	(0.0156)	(0.0145)	(0.0158)	(0.0156)	(0.0140)	(0.0124)
Log(AfTTOT)	-2.078***		0.0492***		-3.381***		0.0139***	
	(0.615)		(0.00408)		(0.725)		(0.00474)	
Log(CUMAfTTOT)		-2.879***		0.0554***		-3.953***		-0.00544
		(0.752)		(0.00932)		(0.813)		(0.0108)
LDC*Log(AfTTOT)					1.161		0.0380**	
					(0.878)		(0.0157)	
LDC*Log(CUMAfTTOT)						-0.544		0.0360***
						(0.599)		(0.00746)
LDC					-28.34	-5.629	-0.983***	-1.127***
					(17.98)	(14.18)	(0.299)	(0.142)
Log(GDPC)	-1.158	-3.643***	0.168***	0.116***	-2.420**	-6.915***	0.110***	0.0188
	(1.189)	(1.060)	(0.0160)	(0.0150)	(1.218)	(0.934)	(0.0158)	(0.0165)
Log(OPEN)	-0.526	0.130	-0.0606***	-0.0431***	-1.690	-2.480**	-0.0916***	-0.0921***
	(0.646)	(0.716)	(0.00806)	(0.00699)	(1.153)	(1.168)	(0.00981)	(0.00786)
EDU	-0.0438***	-0.0432**	-0.000123	0.000153	-0.0593***	-0.0882***	-0.000954***	-0.000775***
	(0.0160)	(0.0178)	(0.000141)	(0.000140)	(0.0167)	(0.0245)	(0.000231)	(0.000107)
FINDEV	-0.0104	-0.0138*	-0.000310**	-0.000544***	-0.0104	-0.00285	-0.000292***	-0.000166
	(0.0118)	(0.00728)	(0.000123)	(0.000104)	(0.0120)	(0.0100)	(9.94e-05)	(0.000138)
Log(POP)	-0.425	-2.930***	0.0307***	0.00246	1.032	-0.498	0.0643***	0.0709***
	(0.691)	(1.028)	(0.00658)	(0.00860)	(1.110)	(1.182)	(0.00920)	(0.00772)
INST	-2.257***	-2.544***	-0.0390***	-0.0330***	-2.121***	-2.043***	-0.0343***	-0.0334***
	(0.517)	(0.422)	(0.00591)	(0.00512)	(0.614)	(0.510)	(0.00400)	(0.00386)
Constant	92.05***	169.9***	-2.157***	-1.295***	96.21***	167.9***	-1.528***	-0.606*
	(22.68)	(21.56)	(0.230)	(0.239)	(22.54)	(25.82)	(0.257)	(0.334)

Observations-Countries	665-100	653-97	667-100	655-97	665-100	653-97	667-100	655-97
Number of Instruments	93	93	93	93	94	94	94	94
AR1 (P-Value)	0.0001	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0001
AR2 (P-Value)	0.3997	0.3542	0.6689	0.9017	0.3757	0.3638	0.7065	0.9003
AR3 (P-Value)	0.1106	0.1077	0.7774	0.8525	0.1110	0.1087	0.7981	0.8351
OID (P-Value)	0.3504	0.3269	0.5448	0.2812	0.3070	0.2958	0.7687	0.4502

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust standard errors are in parenthesis. In the two-step system GMM estimations, the variables "AfTTOT", "AfTSERV", "AfTNONSERV", their respective cumulated values and "OPEN" have been considered as endogenous. The variables "FINDEV", "EDU" and "INST" have been considered as predetermined. Time dummies have been included in the regressions.*

Table 5: Summary of the results concerning the effect of AfT variables their cumulated values on services export diversification for varying development levels

Estimator: Two-Step System GMM

	Log(AfTTOT)	Log(CUMAfTTOT)	Log(AfTSERV)	Log(CUMAfTSERV)	Log(AfTNONSERV)	Log(CUMAfTNONSERV)
	(1)	(2)	(3)	(4)	(5)	(6)
VAR	-10.81***	-16.71***	-4.410***	-14.53***	-5.755***	-3.452**
	(1.553)	(1.706)	(0.985)	(1.001)	(1.370)	(1.678)
INTER	1.067***	1.201***	0.449***	1.361***	0.586***	-0.0774
	(0.169)	(0.184)	(0.111)	(0.112)	(0.157)	(0.198)
Turning Point of "GDPC"	US$ 25114.7	US$ 1102846.9	US$ 18431.7	US$ 43302.8	US$ 18413.1	n.a.

*Note: *p-value<0.1; **p-value<0.05; ***p-value<0.01. Robust standard errors are in parenthesis. "VAR" denotes the concerned variable, i.e., each of the variable (in Log) listed in the first row. The variable "INTER" represents the estimate (and standard deviation) of the interaction of the variable "VAR" with the variable "Log(GDPC)". It is also worth noting that these estimates are obtained from regressions based on the two-step system GMM estimator, where the variables "AfTTOT", "AfTSERV", "AfTNONSERV", their respective cumulated values and the variable "OPEN" have been considered as endogenous. The variables "FINDEV", "EDU" and "INST" have been considered as predetermined. Time dummies have been included in the regressions. The results concerning the control variables are similar to those reported in Table 1. The full outcomes of the estimations could be obtained upon request.*

Appendix 1: Definition and Source of variables

Variables	Definition	Sources
HHI	This is the Herfindahl index, which is also referred sometimes to as the Hirschman-Herfindahl index. It has been calculated as the sum of the squared shares of each export line k (with amount exported) in total services exports. Values of this index range from 0 to 1. We have multiplied this indicator by 100 so that its values range between 0 and 100. Higher values of this index reflect greater services export concentration, and lower values indicate greater services export diversification.	Author's calculation based on data extracted from the database developed by the International Monetary Fund (IMF) on the international trade in services (see online at: https://data.imf.org/?sk=07109577-E65D-4CE1-BB21-0CB3098FC504) - See also Loungani et al. (2017). The data used to compute the HHI indicator are sectoral data on services exports at 2-digit level, which is the maximum digit-level of disaggregated data available on services. In particular, we have relied on 11 major sectors of services (categories of services) – at the 1-digit level - and used the disaggregated data on services exports for sub-sectors at the 2-digit level. For the 11 major services sectors and the related sub-sectors covered in the analysis, see Loungani et al. (2017: page 20, Table 1).
THEIL	This variable represents the Theil index of services export concentration. It has been calculated using the following formula (for example, see Agosin et al, 2011; Cadot et al., 2011): $THEIL = \frac{1}{n}\sum_{k=1}^{n}\frac{x_k}{\mu}\ln(\frac{x_k}{\mu})$, where $\mu = \frac{1}{n}\sum_{k=1}^{n} x_k$ n represents the total number of the (services) export lines (k) $n = \sum_{k=1}^{n} k$; x_k stands for the amount of services exports associated with the services line "k".	Author's calculation based on the same data (extracted from the IMF database on the international trade in services) used to compute the HHI indicator described above.
LINES	This is the total number of services export lines for a given country per year. $LINES = n = \sum_{k=1}^{n} k.$	Author's computation based on services exports data (at the 2-digit level) described above.
AfTTOT	This is the real Gross disbursements of total Aid for Trade (expressed in constant prices 2017, US Dollar).	Author's calculation based on data extracted from the OECD/DAC-CRS (Organization for Economic Cooperation and Development/Donor Assistance Committee)-Credit Reporting System (CRS). Hence, total Aid for Trade data is computed on the basis the OECD/DAC-CRS database and covers the following

		categories (the CRS Codes are in brackets): transport and storage (210); communications (220); and energy generation and supply (230); banking and financial services (240); business and other services (250); agriculture (311); forestry (312); fishing (313); industry (321); mineral resources and mining (322); construction (323); tourism (332); and trade policy and regulations and trade-related adjustment (331).
AfTSERV	This is the real Gross disbursements of Aid for Trade allocated to the Services Sector (expressed in constant prices 2017, US Dollar).	Author's calculation based on data extracted from the OECD/DAC-CRS. Aid for Trade allocated to the Services Sector has been computed on the basis of data covering the following categories (the CRS Codes are in brackets): transport and storage (210); communications (220); energy generation and supply (230); banking and financial services (240); business and other services (250); construction (323) and tourism (332).
AfTNONSERV	This is the real Gross disbursements of Aid for Trade allocated to other sectors than the Services Sector (expressed in constant prices 2017, US Dollar).	Author's calculation based on data extracted from the OECD/DAC-CRS. Aid for Trade allocated to the Services Sector has been computed on the basis of data covering the following categories (the CRS Codes are in brackets): agriculture (311); forestry (312); fishing (313); industry (321); mineral resources and mining (322); and trade policy and regulations and trade-related adjustment (331).
GDPC	Per capita Gross Domestic Product (constant 2010 US$)	World Development Indicators (WDI), 2019
OPEN	This is the measure of trade openness suggested by Squalli and Wilson (2011). It is calculated as the measure of trade openness (the variable "OPEN" previously described) adjusted by the proportion of a country's trade level relative to the average world trade (see Squalli and Wilson, 2011: p1758).	Authors' calculation based on data extracted from the WDI
EDU	This is the average of the gross primary school enrollment (%), gross secondary school enrollment (%), and gross tertiary school enrollment (%).	Author's calculation based on data collected from the WDI.
FINDEV	This is the indicator of financial development. It is a composite index of four indicators of financial development, which are the liquid liabilities (% GDP); the private credit by deposit money banks and other financial institutions (% GDP); the bank deposits (% GDP); and the financial system deposit (% GDP). The "FD"	Author's calculation based on data on the four indicators from the World Bank's Financial Structure dataset developed by Beck et al. (2000; 2009) and Čihák et al. (2012) and updated in June 2017.

	indicator has been computed by relying on the factor analysis approach, including the Principal Component Analysis that allows to extract a common factor from the above-mentioned four indicators of financial development. Higher values of "FINDEV" reflect higher depth of financial development, and lower values indicate lower level of financial development.	
POP	This is the measure of the total Population	WDI, 2019
INST	This is the variable representing the institutional and governance quality in a given country. It has been computed by extracting the first principal component (based on factor analysis) of the following six indicators of governance. These indicators include a measure of political stability and absence of violence/terrorism; the regulatory quality; an index of rule of law index; the government effectiveness index; the index of Voice and Accountability; and the index of corruption. Higher values of this index are associated with better governance and institutional quality, while lower values reflect worse governance and institutional quality.	Data on the components of the variable "INST" has been collected from World Bank Governance Indicators (WGI) developed by Kaufmann, Kraay and Mastruzzi (2010) and recently updated.

Appendix 2: Descriptive statistics on variables used in the analysis

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
HHI	1,227	30.89728	16.28974	0	100
THEIL	1,217	70.10701	24.21304	0	100
LINES	1,300	11.84538	5.976856	0	26
AfTTOT	1,267	1.67e+08	2.88e+08	24884	2.79e+09
AfTSERV	1,269	1.17e+08	2.25e+08	-1673966	2.43e+09
AfTNONSERV	1,271	4.99e+07	8.14e+07	4386	9.82e+08
CUMAfTTOT	1,245	9.04e+08	1.69e+09	4958	1.75e+10
CUMAfTSERV	1,271	6.25e+08	1.26e+09	4958	1.30e+10
CUMAfTNONSERV	1,247	3.17e+08	5.13e+08	4958	5.15e+09
FINDEV	1,281	.4747975	.3373363	0	100
EDU	783	200.0562	48.05218	50.87354	299.668
GDPC	1,300	4216.176	4204.718	221.0964	21087.35
OPEN	1,295	.0012707	.00293	2.74e-09	.02502
POP	1,300	3.73e+07	1.24e+08	78295	1.30e+09
INST	1,295	-.9213127	1.454338	-4.271168	3.256572

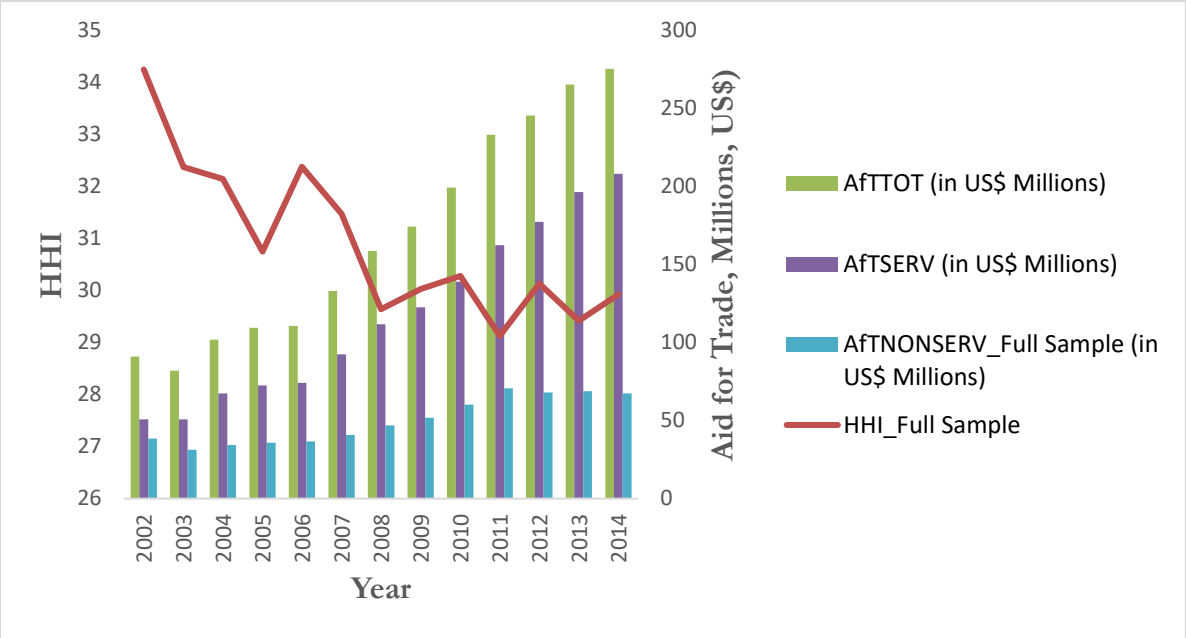
Appendix 3: List of countries contained in the Entire Sample

Entire sample				**LDCs**
Afghanistan	Gambia, The	Morocco	Turkey	Afghanistan
Albania	Georgia	Mozambique	Uganda	Angola
Algeria	Ghana	Myanmar	Ukraine	Bangladesh
Angola	Grenada	Namibia	Uruguay	Benin
Antigua and Barbuda	Guatemala	Nepal	Vanuatu	Bhutan
Argentina	Guinea	Nicaragua	Venezuela	Burkina Faso
Armenia	Guinea-Bissau	Niger	West Bank and Gaza	Burundi
Bangladesh	Guyana	Nigeria		Cambodia
Barbados	Honduras	Oman		Comoros
Belarus	India	Pakistan		Congo, Democratic Republic of the
Belize	Indonesia	Panama		Gambia, The
Benin	Iran	Paraguay		Guinea
Bhutan	Jamaica	Peru		Guinea-Bissau
Botswana	Jordan	Philippines		Lao P.D.R.
Brazil	Kazakhstan	Rwanda		Lesotho
Burkina Faso	Kenya	Saudi Arabia		Madagascar
Burundi	Kyrgyz Republic	Senegal		Malawi
Cabo Verde	Lao P.D.R.	Serbia		Mali
Cambodia	Lebanon	Seychelles		Mauritania
Cameroon	Lesotho	South Africa		Mozambique
Chile	Macedonia, FYR	Sri Lanka		Myanmar
Colombia	Madagascar	St. Lucia		Nepal
Comoros	Malawi	Sudan		Niger
Congo, Democratic Republic of the	Malaysia	Swaziland		Rwanda
Congo, Republic of	Mali	Tajikistan		Senegal
Costa Rica	Mauritania	Tanzania		Sudan
Croatia	Mauritius	Thailand		Tanzania
Dominican Republic	Mexico	Timor-Leste		Timor-Leste

Ecuador	Moldova	Togo		Togo
Egypt	Mongolia	Tonga		Uganda
El Salvador	Montenegro, Rep. of	Tunisia		Vanuatu

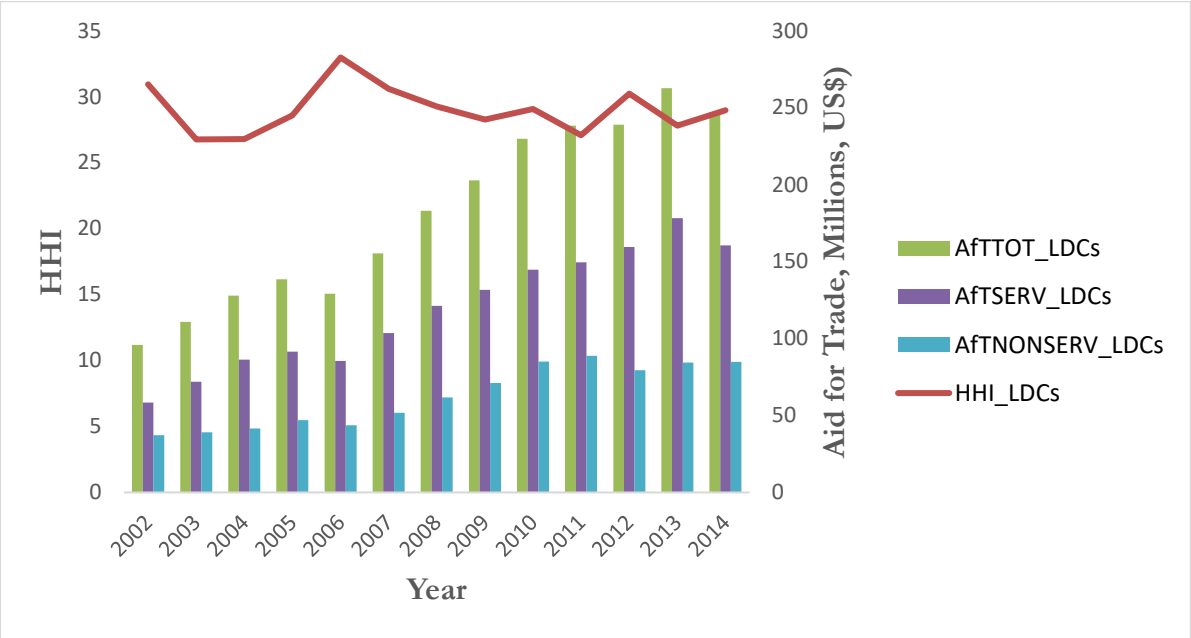
FIGURES

Figure 1: Evolution of AfT variables and "HHI"_ Full Sample



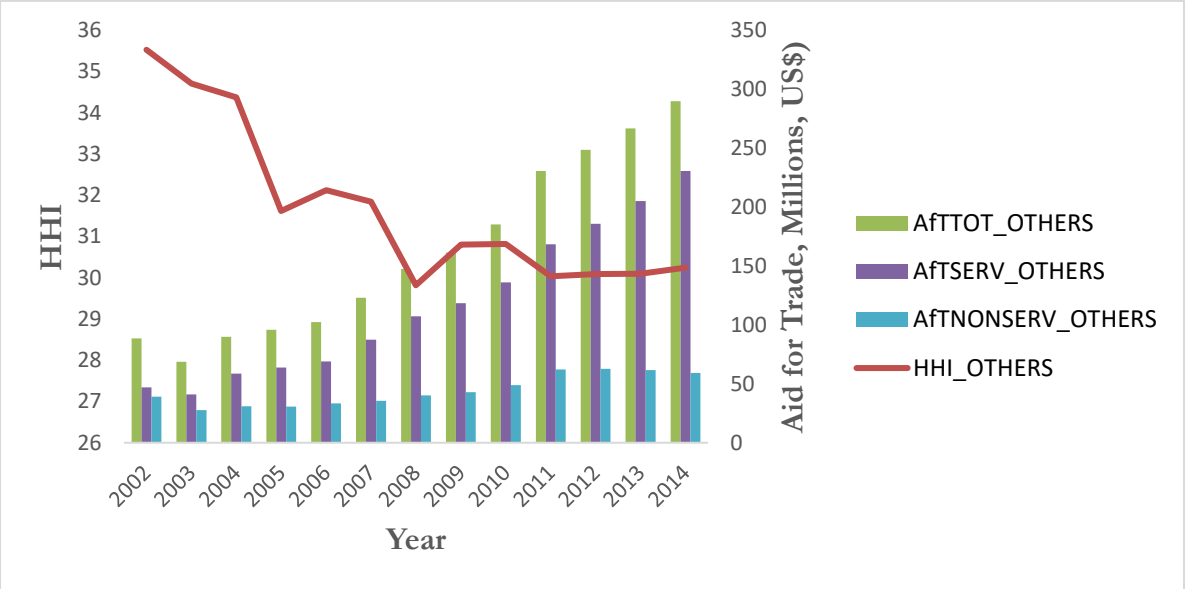
Source: Author
Note: the category "OTHERS" represent the group of NonLDCs.

Figure 2: Evolution of AfT variables and "HHI"_ Sub-sample of LDCs



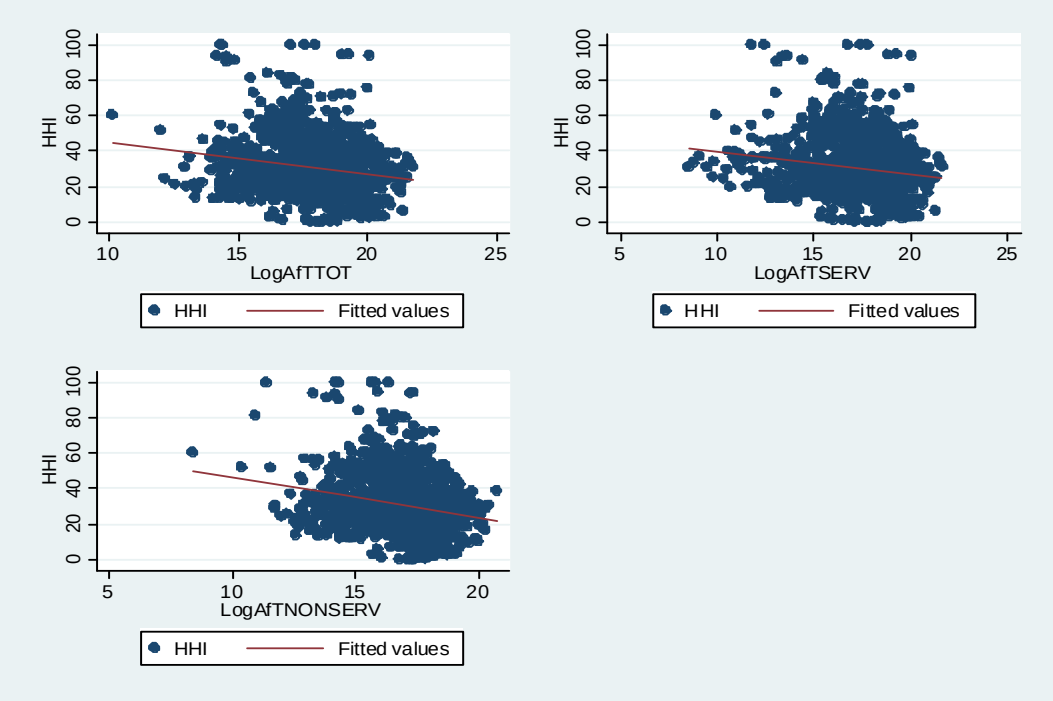
Source: Author
Note: the category "OTHERS" represent the group of NonLDCs.

Figure 3: Evolution of AfT variables and "HHI"_ Sub-sample of Other Countries in the Sample



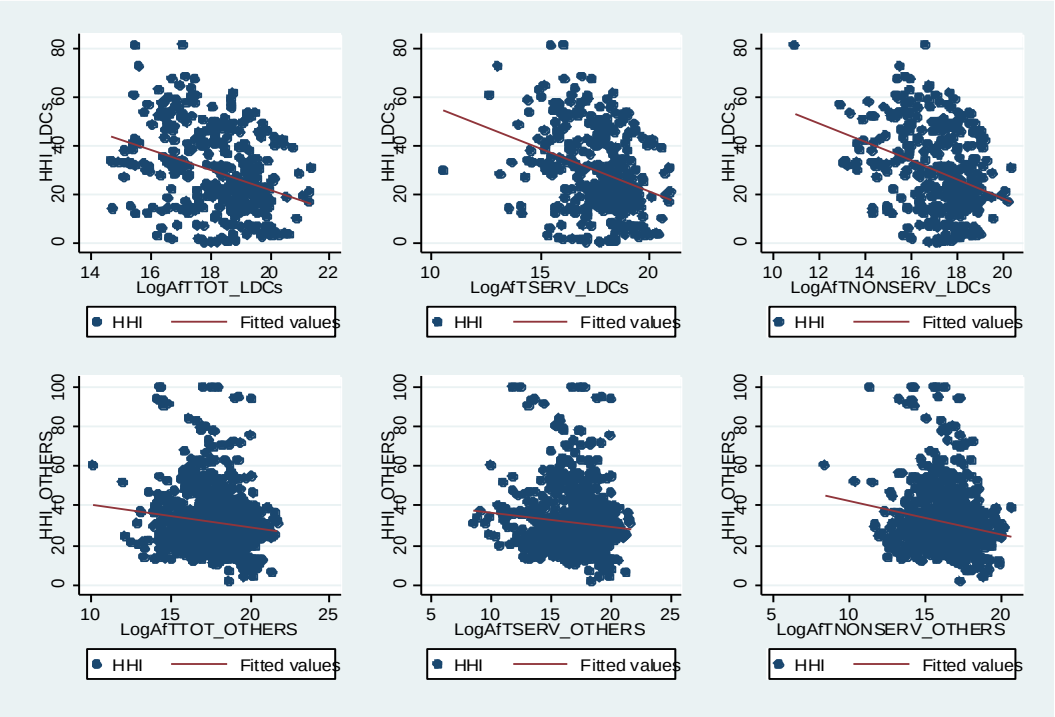
Source: Author
Note: the category "OTHERS" represent the group of NonLDCs.

Figure 4: Correlation pattern between AfT variables and "HHI" over the Entire Sample



Source: Author

Figure 5: Correlation pattern between AfT variables and "HHI" over the sub-samples of LDCs and Other Countries



Source: Author