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Do Donors provide higher AfT flows to Recipient-Countries that Diversify Export Products or Is It the Other Way Around?

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Abstract

This article has explored whether Aid for Trade (AfT) flows that accrue to recipient-countries depend on the latter's level of export product concentration. The analysis covers a sample of 133 countries over the period 2002-2017. The findings indicate that least developed countries (LDCs) receive higher AfT flows when they experience a rise in the level of export product concentration, while NonLDCs enjoy higher AfT flows when they diversify export products. Interestingly, higher amounts of AfT accrue to countries that diversify their export product basket towards manufacturing products, although different result patterns appear for the components of manufactured exports.

Keywords: Aid for Trade; Export product diversification; Manufactured exports.
JEL Classification: F35; F14; O14.

DISCLAIMER

This is a working paper, which represents the personal opinions of individual staff members and is not meant to represent the position or opinions of the WTO or its Members, nor the official position of any staff members. Any errors or omissions are the fault of the author. The author declares no competing interests.

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1. Introduction

At the Hong Kong Ministerial Conference of the World Trade Organization (WTO) held in 2005, WTO Members agreed to put in place the Aid for Trade (AfT) Initiative, with a view to helping developing countries better integrate into the multilateral trading system. Paragraph 57 of the Ministerial Declaration of this Conference provides that this Initiative aims to "help developing countries, particularly least developed countries[2] (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" (WTO, 2005). As noted by Gnangnon and Roberts (2017), the meaning of the expression '…..expand their trade' is unclear. This is because developing countries can expand trade, in particular exports either by increasing the number of low-valued export products (including primary commodities) or by diversifying their export product baskets, notably towards high-valued added (sophisticated) products. The international trade literature has shown that the second option (i.e., export product diversification) is relevant for economic growth and development prospects of developing countries, as the latter's exports are heavily concentrated on low value-added products. In fact, it has been demonstrated that export product diversification can promote economic growth (e.g., Aditya and Acharyya, 2013; Can and Gozgor, 2017; Hausmann et al., 2007; Herzer and Nowak-Lehmann, 2006; Hess, 2008; Mania and Rieber, 2019), reduce economic growth volatility (e.g., Hirsch and Lev, 1971; Juvenal and Monteiro, 2013; Kramarz et al. 2020; Vannoorenberghe et al., 2016), reduce the volatility of export earnings (e.g., Athukorola, 2000; Osakwe, 2007; Stanley and Bunnag, 2001), and reduce income inequality (e.g., Blancheton and Chhorn, 2018; Gnangnon, 2019a; Le et al. 2020).

In spite of the literature's emphasis on the relevance of export product diversification in developing countries, it is still not clear whether donor-countries provide higher AfT flows to countries that experience a high level of export product concentration (including on primary commodities) - with a view to helping them diversify their export product baskets -, or whether it is the other way around (i.e., if donors supply greater AfT flows to countries that are implementing policies and measures in favour of export product diversification so as to encourage them to purse their export diversification effort). The present article aims to address this question. The latter is all the more relevant that as noted above, Paragraph 57 of the WTO's Hong Kong Ministerial Declaration is silent about the genuine meaning of the expression '…..expanding their trade'.

[2] LDCs represents the category of the poorest and most vulnerable countries (to external and environmental shocks) in the world, according to the United Nations. For further information on the countries included in this group, see online at: http://unohrlls.org/about-ldcs/criteria-for-ldcs/

Additionally, to the best of our knowledge, the existing relatively limited literature on the determinants of supply of AfT flows (e.g., Gamberoni and Newfarmer, 2009; Tadasse and Fayissa, 2009; Gamberoni and Newfarmer, 2014; Lee et al 2015; Gnangnon, 2016a; 2016b; 2017, 2019b) has not addressed the issue as to the extent to which recipient-countries' level of export product concentration (diversification) matters for the amount of AfT they receive.

The theoretical effect of export product concentration (or diversification) on AfT flows can be straightforward. Gnangnon (2019c) and Kim (2019) have shown empirically that higher AfT flows can be associated with greater export product diversification in recipient-countries. Therefore, one can expect countries with a low degree of export product diversification (i.e., high level of export product concentration) to receive higher amounts of AfT flows. In this context, the higher the level of export product concentration, the higher would be the amount of AfT flows received by the recipient-countries (*Hypothesis 1*). On the other hand, donor-countries may be willing to supply higher amounts of AfT flows to countries that implement policies and measures in favour of export product diversification. Donor-countries may do so with a view to encouraging recipient-countries to pursue their export diversification's effort. In this scenario, greater export product diversification (greater export product concentration) would be associated with higher AfT flows (lower AfT amounts) (*Hypothesis 2*).

The empirical exercise has been conducted using an unbalanced panel dataset of 133 AfT recipient-countries over the period 2002-2017. The findings have indicated that LDCs receive higher AfT flows when they experience a rise in the level of export product concentration. However, NonLDCs experience greater AfT flows when they diversify export product baskets. Furthermore, countries receive higher amounts of AfT when they diversify their export products towards manufacturing products. However, this finding holds for medium-skill and high-skill intensive manufacturing exports, but the reverse is obtained for labour-intensive products.

The rest of the analysis is structured around four sections. Section 2 lays out the model specification that helps to address empirically the issue under investigation. Section 3 briefly discusses the econometric approach to perform the empirical analysis. Section 4 interprets empirical results. Sections 5 concludes.

2. Model specification

We investigate the relationship between AfT recipient-countries' level of export product diversification and the AfT inflows by drawing from the relatively limited previous empirical analyses on the determinants of AfT supply (e.g., Gamberoni and Newfarmer, 2009; Tadasse and

Fayissa, 2009; Gamberoni and Newfarmer, 2014; Lee et al 2015; Gnangnon, 2016a; 2016b; 2017, 2019b). In particular, we consider a baseline model where the main primary variable is the indicator of export product concentration (diversification), and where control variables include the real per capita income and its squared term, NonAfT flows (which represent part of the total development aid allocated to other sectors in the economy than the trade sector), a measure of trade policy, the institutional quality, and the population size.

The real per capita income and its squared term aim to capture the non-linear relationship between AfT recipient-countries' development level (proxied by the real per capita income) and the amount of AfT that they receive: following Lee et al. (2015), we expect AfT amounts to decrease as recipient-countries' development level increase. Likewise, a rise in NonAfT flows may be associated with lower AfT flows to recipient-countries if donors prioritize non-trade sectors in their allocation of total amount of development aid (i.e., official development aid - ODA). At the same time, donor-countries can provide both higher AfT flows and NonAfT flows to recipient-countries if they accord importance to the development of all sectors (including both trade and non-trade related sectors) in the recipient-countries. In this case, a rise in NonAfT flows would be associated with higher AfT flows to recipient-countries (see for example, Gnangnon, 2019b). One can also expect donor-countries to supply higher AfT flows to countries that endeavour to reform their trade regimes, with a view to liberalizing their trade policies: in such a case, greater trade policy liberalization in the recipient-countries would be positively associated with AfT flows. However, recipient-countries with a low level of trade liberalization may be prioritized by donor-countries on the ground that these countries might be the ones that need the most AfT flows so as to promote trade liberalization: in this scenario, lower degree of trade liberalization would be associated with higher AfT flows (e.g., Gnangnon, 2016a; 2016b; 2017, 2019b; Lee et al 2015).

On another note, donor-countries tend to supply higher AfT flows to countries that improve their institutional and governance quality (e.g., Gnangnon, 2019b; Lee et al 2015). Therefore, we expect improvements in institutional and governance quality to be associated with greater AfT flows. Finally, the population size aims to capture the size of recipient-countries (e.g., Lee et al 2015; Gnangnon, 2016a; 2016b; 2017, 2019b).

In light of the foregoing, we postulate the following model specification:

$$Log(AfT)_{it} = \alpha_0 + \alpha_1 Log(AfT)_{it-1} + \alpha_2 Log(ECI)_{it} + \alpha_3 Log(GDPC)_{it} + \alpha_4 Log(GDPC)^2_{it} + \alpha_5 Log(NonAfT)_{it} + \alpha_6 \mathrm{Log}(\mathrm{TP})_{it} + \alpha_7 Log(POP)_{it} + \alpha_8 INST_{it} + \mu_i + \vartheta_t + \omega_{it} \quad \textbf{(1)}$$

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i and t stand respectively for the indices of the recipient-country and time-period. The analysis has used an unbalanced panel dataset containing 133 recipient-countries (of which 42 LDCs) over the period 2002-2017. To dampen the effects of business fluctuations on variables, we have followed the practice in the macroeconomic literature by using non-overlapping sub-periods of 3-year average data. These include overall 5 sub-periods: 2002-2004; 2005-2007; 2008-2010; 2011-2013; and 2014-2017 (the latter covers 4 years). μ_i represents countries' unobservable time-invariant fixed effects. ϑ_t acts for global shocks that affect together the amount of AfT flows received by all countries. ω_{it} is a well-behaving error term. α_0 to α_8 are parameters that need to be estimated.

The dependent variable "AfT" represents of total AfT flows received by a given recipient-country in a given year, and is measured by the total real gross disbursement of AfT, expressed in constant prices 2016 US Dollar. The variable "NonAfT" is the measure of NonAfT flows, and represents the part of development aid (official development aid - ODA) allocated to other sectors in the economy than the trade sector. It has been computed as the difference between the gross disbursements of total ODA and the gross disbursements of total Aid for Trade, both expressed in constant prices 2016, US Dollar).

The key variable of interest "ECI" is the indicator of export product concentration. It has been computed by the United Nations Conference on Trade and Development (UNCTAD) using the Herfindahl-Hirschmann index and its values are normalized so that they range between 0 and 1. A rise in the values if this index reflects a rise in the level of export product concentration, while declining values of the indicator (i.e., when values are moving towards zero) indicate a greater degree of export product diversification (i.e., a more homogeneously distribution of export products among a series of products).

The other variables are described in in Appendix 1, and the descriptive statistics related to all variables in model (1) are provided in Appendix 2. The list of the 133 countries, including LDCs, is presented in Appendix 3. It is worth noting that the natural Logarithm ("Log") has been applied to all variables contained in model (1), except for the variable "INST", which contains both positive and negative values.

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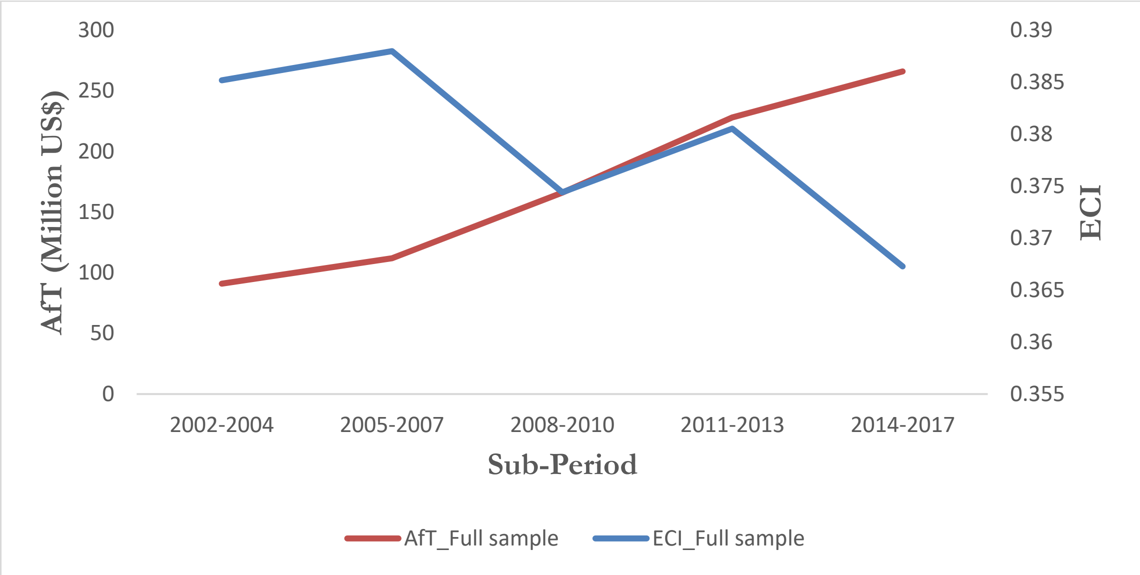
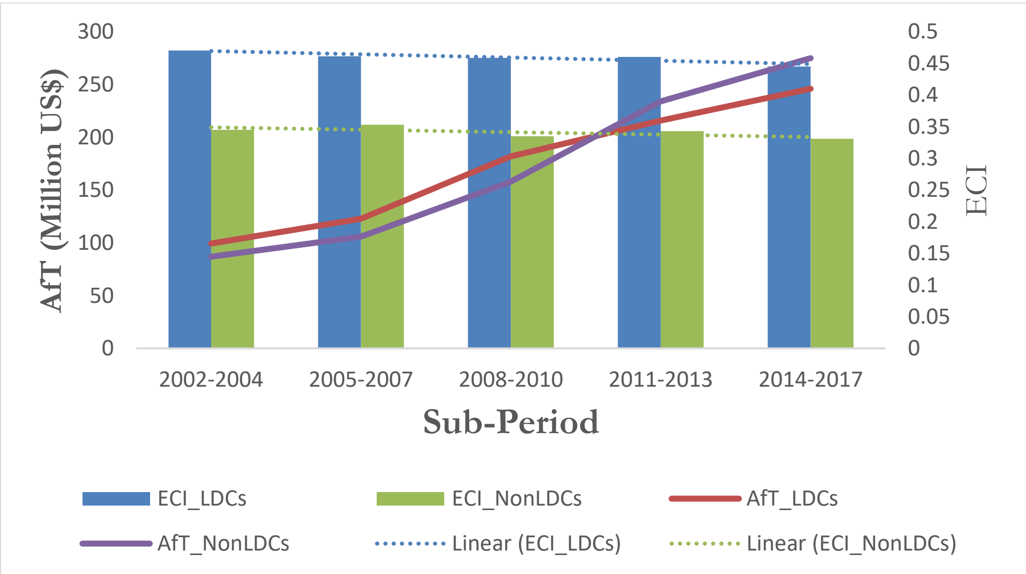
Figure 1: Evolution of ECI and AfT_over the full sample



Source: Author
Note: Total Aid for Trade (AfT) is expressed in Million US Dollars, constant 2016 prices.

Figure 2: Evolution of ECI and AfT in LDCs and NonLDCs



Source: Author
Note: Total Aid for Trade (AfT) is expressed in Million US Dollars, constant 2016 prices.

A first insight into the relationship between total AfT flows and the indicator of export product concentration is provided in Figures 1 and 2. Specifically, Figure 1 shows the development of these two indicators over the full sample, while Figure 2 does the same for sub-samples of LDCs and NonLDCs (i.e., countries in the full sample that are not classified as LDCs). Figure 1 shows a steady rise in total AfT flows from US$ 91 millions in 2002-2004 to US$266 millions in

2014-2017. At the same time, export product concentration has displayed an erratic movement, although towards the end of the period, it has declined, thereby reflecting a tendency for export product diversification (on average over the 133 countries) over the sub-period 2014-2017. Figure 2 shows a slight decline of the level of export product concentration in both LDCs and NonLDCs, although the level of export product concentration remains far higher in LDCs than in NonLDCs. These suggest that while both LDCs and NonLDCs are endeavouring to diversify (although slightly) their export products, LDCs still enjoy a higher degree of export product concentration (mainly on primary commodities) than do NonLDCs. Meanwhile, for both LDCs and NonLDCs, total AfT flows have substantially increased over time: for LDCs, these capital inflows have moved from US$ 99.4 million in 2002-2004 to US$ 246 million in 2014-2017, and for NonLDCs, they have moved from US$ 86.9 million in 2002-2004 to US$ 275 million in 2014-2017.

3. Empirical approach

Following the studies highlighted above concerning the determinants of AfT flows, in particular Lee et al. (2015) and Gnangnon (2016a; 2016b; 2017, 2019b), we employ the two-step system Generalized Methods of Moments (GMM) approach - suggested by Blundell and Bond (1998) - to estimate the dynamic model (1) as well as all its variants described below. This econometric estimator allows to estimate a system of equations, which includes an equation in levels along with an equation in difference, and where lagged levels of the regressors are used as instruments in the equation in difference, while lagged differences of the regressors are used as instruments in the equation in levels. The two-step system GMM approach has the advantage of addressing the endogeneity bias associated with the presence of the one-dependent variable as a regressor in model (1) (Nickell bias - see Nickell, 1981), given in particular the limited time period (5 sub-periods) relatively to the large number of countries (133 countries) in the sample. Additionally, this estimator allows to handle the reverse causality problems from the dependent variable to many regressors, including the variables "ECI", "TP", "NonAfT", "INST" and possibly the variables "GDPC" and its squared term. In this light, in all regressions based on the two-step system GMM approach, we have considered the variables "ECI", "TP", "NonAfT", "INST" as endogenous, the variables "GDPC" and its squared term as predetermined, and the variable "POP" as exogenous. To illustrate the bi-directional causality issue, while we are expecting the level of export product diversification to influence the amount of AfT received by a given country, the literature has also shown that higher AfT flows also influence the level of export product diversification (Gnangnon, 2019c; Kim, 2019). Similarly, Gnangnon (2018) has uncovered that

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AfT interventions are associated with greater trade policy liberalization, which leads to the simultaneity bias between AfT flows and the trade policy variable. Concerning the institutional and governance quality variable, Gnangnon (2020) has found that AfT flows can influence regulatory policy quality - hence the reverse causality from AfT flows to the variable capturing the institutional and governance quality.

The consistency of the two-step system GMM estimator is evaluated by means of three standard tests, including the Arellano-Bond (AB) test of first-order serial correlation in the error term (denoted AR(1)), the AB test of no second-order (denoted AR(2)) in the error term (we should fail to reject the nil hypothesis of each of these two tests), and the Sargan/Hansen test of over-identifying restrictions (OID), which determines the validity of the instruments used in the regressions. Additionally, to meet the rule of thumb that requires the number of instruments to be lower than the number of countries used in the regressions (otherwise, the afore-mentioned tests would be less powerful - see Roodman, 2009), we have also reported the number of countries used in the regressions. The regressions have used a maximum of 3 lags of the dependent variables as instruments, and a maximum of 3 lags of endogenous variables as instruments.

Even though the two-step system GMM approach is our preferred estimator for conducting the empirical analysis, we find useful to start the empirical analysis by estimating the static specification of model (1) (i.e., model (1) without the one-period lag of the dependent variable) using standard estimators, including the within fixed effects (denoted "FE") and the the feasible generalized least squares (FGLS) estimators. The results of these estimations are presented in Table 1.

As for the empirical analysis based on the two-step system GMM approach, we proceed as follow. First, we report in column [1] of Table 2 the results arising from the estimation of the dynamic model (1). We check the robustness of the results associated with the effect of export product concentration on total AfT flows by estimating two other variants of model (1) in which the variable "ECI" is replaced with three different variables, namely the total number of export products, denoted "NUMB", the share (%) of manufactured exports in total export products, denoted "SHMAN", and finally an index of export product diversification, denoted "EDI". This index has been calculated using the Finger-Kreinin measure of similarity in trade, as the absolute deviation of the country's export structure from the world's export structure. Values of export product diversification range between 0 and 1, with lower values reflecting greater convergence of a country's export product structure towards the world's export structure, and values closed to 1 indicating greater divergence from the world's export product pattern. In light of the above-mentioned discussion concerning the effect of export product concentration on total AfT flows,

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we can also expect that if export product diversification induced higher AfT flows, then we might also obtain a positive effect of the total number of export products as well as the share of manufactured exports in total export products on total AfT flows. Similar, a greater convergence of a recipient-country's export product structure towards the world's export product structure should be associated with higher AfT flows. Results of the estimation of these three specifications of model (1) are presented in columns [2] to [4] of Table 2. Column [5] to [8] contain the outcomes of the estimations of four different variants of model (1) that allow assessing the differentiated effect of "ECI" (and alternatively "NUMB" "SHMAN" and "EDI") on total AfT flows in LDCs and NonLDCs. These variants of model (1) include model (1) - with each of these four variables - where a dummy variable LDC (that takes the value "1" if a country is considered as an "LDC", and "0", otherwise) along with its interaction respectively with the variable "ECI", "NUMB" and "SHMAN", are introduced in the specifications of model (1). It is important to emphasize that while in these model specifications, the natural logarithm has been applied to the variable "NUMB" because of its high skewness, as well as to the variable "EDI", this is not the case for the variable "SHMAN" because the latter is expressed in terms of ratio.

Results in Table 3 display estimations' outcomes that help deepen the findings obtained in column [3] of Table 2 (concerning the effect of the share of manufactured exports in total export products on total AfT flows) by examining how the components of the share of manufactured exports in total export products affect total AfT flows. These components include the share (in %) of labour-intensive and resource-intensive manufactures exports in total export products, denoted "LABOUR"; or the share (in %) of export of low-skill and technology-intensive manufactures in total export products, denoted "LOW"; the share (in %) of export of medium-skill and technology-intensive manufactures in total export products, denoted "MEDIUM"; and the share (in %) of export of high-skill and technology-intensive manufactures in total export products, denoted "HIGH". To obtain these results, we estimate different other specifications of model (1) that contain each of these components in replacement of the variable "ECI" (the natural logarithm has not been applied to these components of "SHMAN"). Finally, we report in Table 4 the estimations' outcomes that allow examining how export product diversification, including towards manufacturing export products influences total AfT flows. These outcomes arise from the estimations of other variants of model (1) in which the variable measuring the share of manufactured exports in total export products (as well as each of its components highlighted above) is interacted with the variable "ECI".

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4. Interpretation of empirical results

Starting with results in Table 1, we note from the two columns of this Table that, at least at the 5% level, export product diversification induces higher AfT flows. This seems to confirm the *hypothesis 2* described in section 1. The magnitude of the effect of export product concentration on total AfT flows amounts to -0.32 (for the result based on the FE estimator) and -0.23 (for the result based on the FGLS approach). Concerning control variables, we obtain across the two columns of this Table that a rise in total AfT flows is positively driven by higher NonAfT flows, greater trade policy liberalization, a rise in the population size, and improvements in institutional and governance quality. However, we obtain in column [1] (results based on the FE estimator) that the non-linear relationship between real per capita income and AfT flows is the reverse of the non-linear pattern obtained in column [2] (results based on the FGLS approach). However, these results are likely biased due to the potential reverse causality issues highlighted in the previous section, as well as because of the omission of the one period lag of the dependent variable (which generates an omitted variable bias). These lead us to turn to the results based on the two-step system GMM approach reported in Tables 2 to 4.

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Table 1: Effect of export product concentration on AfT flows
Estimators: FE and FGLS

	FE	FGLS with panel-specific AR(1)
Variables	**Log(AfT)**	**Log(AfT)**
	(1)	**(2)**
Log(ECI)	-0.316**	-0.234***
	(0.143)	(0.0162)
Log(GDPC)	-2.021***	2.368***
	(0.537)	(0.259)
$[\text{Log(GDPC)}]^2$	0.173***	-0.183***
	(0.0251)	(0.0174)
Log(NonAfT)	0.396***	0.556***
	(0.0847)	(0.0238)
Log(TP)	0.862***	0.167**
	(0.0997)	(0.0815)
Log(POP)	2.148***	0.257***
	(0.442)	(0.0131)
INST	0.323***	0.321***
	(0.0753)	(0.0122)
Constant	-22.55***	-5.187***
	(3.941)	(1.024)
Observations - Countries	590 - 132	587 - 129
Within R-squared	0.3608	
Pseudo R-squared		0.8902

*Note: *p-value < 0:1; **p-value < 0:05; ***p-value < 0:01. Robust Standard errors are in parenthesis. For the Random effects estimator, standard errors are clustered at the country level. The Pseudo R2 has been computed for the regression based on the FGLS estimator as the correlation coefficient between the dependent variable and its predicted values. Time dummies have been included in the regressions based on the random effects estimator and the FGLS estimator.*

The outcomes associated with the diagnostic tests that allow assessing the consistency of this estimator are provided at the bottom of all columns of Tables 2 to 5. All outcomes meet the expectations (described in the previous section): the p-values related to the AR(1) test amount all to 0; the p-values related to the AR(2) test are all higher than 0.10, and the p-values associated with the OID test are also higher than 0.10. Furthermore, the number of instruments used in the regressions is consistently lower than the number of countries in the analysis. Incidentally, across all these columns, the one-period lag of the dependent variable displays positive and significant coefficients at the 1% level, thereby confirming the state dependent nature of AfT flows found in previous studies on the determinants of AfT flows. This underlines the need for considering the

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dynamic specification of model (1) in the analysis. Overall, based on these results, we conclude that the two-step system GMM estimator is appropriate for conducting the empirical analysis.

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Table 2: Effect of export product concentration on AfT flows
***Estimator*:** Two-step system GMM

Variables	Log(AfT)	Log(AfT)	Log(AfT)	Log(AfT)	Log(AfT)	Log(AfT)	Log(AfT)	Log(AfT)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Log(AfT)_{t-1}$	0.483***	0.530***	0.539***	0.476***	0.497***	0.530***	0.525***	0.515***
	(0.0385)	(0.0367)	(0.0397)	(0.0383)	(0.0376)	(0.0303)	(0.0347)	(0.0344)
Log(ECI)	-0.396***				-0.751***			
	(0.0876)				(0.0996)			
Log(NUMB)		0.343***				0.323***		
		(0.0886)				(0.102)		
SHMAN			0.00773***				0.0111***	
			(0.00257)				(0.00250)	
Log(EDI)				-1.234***				-2.607***
				(0.352)				(0.410)
[Log(ECI)]*LDC					0.763***			
					(0.246)			
[Log(NUMB)]*LDC						-0.100		
						(0.107)		
SHMAN*LDC							-0.0136***	
							(0.00366)	
[Log(EDI)]*LDC								3.764***
								(0.616)
LDC					1.722***	0.296	1.223***	1.661***
					(0.337)	(0.523)	(0.200)	(0.252)
Log(GDPC)	3.894***	2.785***	4.161***	4.322***	4.959***	3.868***	4.602***	4.776***
	(0.678)	(0.566)	(0.745)	(0.706)	(0.815)	(0.489)	(0.807)	(0.594)
$[Log(GDPC)]^2$	-0.256***	-0.188***	-0.277***	-0.295***	-0.314***	-0.264***	-0.290***	-0.312***
	(0.0446)	(0.0372)	(0.0482)	(0.0459)	(0.0505)	(0.0315)	(0.0507)	(0.0388)
Log(NonAfT)	0.469***	0.512***	0.377***	0.390***	0.374***	0.451***	0.403***	0.314***

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	(0.0503)	(0.0531)	(0.0525)	(0.0486)	(0.0464)	(0.0437)	(0.0443)	(0.0460)
Log(TP)	-0.987***	-0.902***	-0.479	-0.506	-0.768***	-0.855***	-0.602**	-0.618**
	(0.261)	(0.277)	(0.312)	(0.330)	(0.270)	(0.241)	(0.282)	(0.298)
Log(POP)	0.187***	0.0453	0.174***	0.319***	0.165***	0.0305	0.210***	0.260***
	(0.0396)	(0.0464)	(0.0395)	(0.0458)	(0.0504)	(0.0376)	(0.0383)	(0.0532)
INST	0.259***	0.268***	0.222***	0.219***	0.292***	0.328***	0.306***	0.225***
	(0.0480)	(0.0418)	(0.0473)	(0.0345)	(0.0474)	(0.0296)	(0.0393)	(0.0389)
Constant	-13.06***	-9.594***	-14.87***	-14.80***	-17.55***	-11.93***	-18.09***	-16.91***
	(2.481)	(2.309)	(2.933)	(2.760)	(3.491)	(2.250)	(3.194)	(2.401)
Observations - Countries	483 - 132	483 - 132	481 - 132	483 - 132	483 - 132	483 - 132	481 - 132	483 - 132
Number of Instruments	76	76	76	76	85	85	85	85
AR1 (P-Value)	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001
AR2 (P-Value)	0.6273	0.5014	0.8019	0.6626	0.7264	0.5798	0.8282	0.5907
OID (P-Value)	0.6183	0.4933	0.6191	0.4205	0.7937	0.3881	0.6121	0.8177

*Note: *p-value < 0,1; **p-value < 0,05; ***p-value < 0,01. Robust Standard errors are in parenthesis. The variables "ECI", "NUMB", "SHMAN", "EDI", "TP", "NonAfT", "INST" and the interaction variables have been considered as endogenous. The variables "GDPC" and its squared term have been considered as predetermined. The interaction variables have also been considered as endogenous. The other variables have been considered as exogenous. Time dummies have been included in the regressions. The latter have used a maximum of 3 lags of the dependent variables as instruments, and a maximum of 3 lags of endogenous variables as instruments.*

We now take up results in Table 2. We observe that greater export product diversification is associated with higher AfT flows. This is because the coefficient of the variable "ECI" (in Logs) is negative and significant at the 1% level. Interestingly, the magnitude of the impact amounts here to -0.40, which, in absolute value, is slightly higher than the one obtained in column [1] of Table 1 (result based on the FE estimator). Thus, a 1 percentage decrease in the index of export product concentration induces a rise in total AfT flows by 0.4 percentage. The outcomes in columns [2] to [4] of Table 2 confirm the previous findings, as the rise in the total number of export products, the increase in the share of manufacturing exports in total export products, and a convergence of a recipient-country's export products structure towards the world's export product structure are associated with greater AfT flows. This is because the coefficients of the variables "NUMB" (in Logs) and "SHMAN" are positive and significant at the 1% level, while the coefficient of "EDI" (in Log) is negative and significant at the 1% level. Specifically, a 1 percentage increase in the total number of export products leads to a 0.34 percentage rise in total AfT flows. Likewise, an increase in the share of manufacturing exports in total export products by 1 per cent leads to a rise in total AfT flows by 0.773 per cent [=0.00773*100]. A 1 percentage decrease in the index EDI is associated with a rise in total AfT flows by 1.23 percentage. Estimates in column [5] show a positive and significant coefficient (at the 1% level) of the interaction variable "[Log(ECI)]*LDC", while concurrently, the coefficient of the variable "[Log(ECI)]" is negative and significant at the 1% level. These suggest that export product concentration induces a higher positive effect on total AfT flows in LDCs than in NonLDCs, and the net effect of export product concentration on total AfT flows in LDCs and NonLDCs amounts respectively to 0.012 (=-0.751+0.763) and -0.751. Thus, donor-countries supply higher AfT flows to LDCs that experience a high level of export product concentration (notably on primary commodities) so as to help them promote export product diversification. NonLDCs receive higher AfT flows if they endeavour to diversify their export product baskets. Results in column [6] indicate a positive and significant coefficient of the variable "NUMB" (in Logs) and a non-significant coefficient of the interaction variable "[Log(NUMB)]*LDC". These signify that the rise in the total number of export products induces a rise in total AfT flows allocated to both AfT LDCs and NonLDCs, with the magnitude of this impact being the same and amounting to 0.32. Results in column [7] show a positive and significant coefficient (at the 1% level) of the variable "SHMAN", and a negative and significant interaction term of the interaction variable "SHMAN*LDC". These suggest that the rise in the share of manufacturing exports in total export products results in higher AfT flows to NonLDCs than to LDCs. The net effect of the share of manufacturing exports in total export products on total AfT

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flows in LDCs and NonLDCs amounts respectively to -0.0025 (=0.0111-0.0136) and 0.0111. These indicate that a rise in the share of manufacturing exports in total export products leads to higher AfT flows in NonLDCs, but a decline in AfT flows allocated to LDCs, although the magnitude of this fall in AfT flows to LDCs is small. Finally, estimates in column [8] of Table 2 show a positive and significant (at the 1% level) of the interaction variable "[Log(EDI)]*LDC", and a negative and significant coefficient (at the 1% level) of "[Log(EDI)]". Thus, a greater divergence of recipient-countries' export product structure from the world's export product structure exerts a higher positive effect on AfT flows to LDCs than to NonLDCs. The net effect of the variable "EDI" (in Logs) on total AfT flows in LDCs and NonLDCs amounts respectively to 1.157 (=-2.607+3.764) and -2.607. These signify that greater divergence of LDCs' export product structure from the world's export product structure leads to higher AfT flows to these countries (this is likely to help LDCs diversify their export product baskets so that the structure of the latter be similar to that of the world). Conversely, NonLDCs enjoy a rise in total AfT flows when their export product structure converges towards that of the world. These findings are fully consistent with those obtained in column [5] of Table 2.

The outcomes concerning control variables are quite similar across all columns of Table 2. They suggest that higher NonAfT flows, lower level of trade policy liberalization, the increase in the population size, and an improvement in the institutional and governance quality are associated with a rise in total AfT flows. The specific outcome related to the trade policy variable indicates that donor-countries tend to provide higher AfT flows to countries that have not liberalized their trade regimes in order to help them further liberalize their trade policies. On another note, we obtain, as expected that, the real per capita income is non-linearly associated with AfT flows, whereby as the real per capita income rises (in particular beyong a turning point), countries concerned receive lower AfT flows. In other words, less developed countries tend to receive higher amounts of AfT than do relatively advanced countries. With few exceptions, these outcomes concerning the control variables are confirmed in all other Tables, i.e., Tables 2 to 4.

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Table 3: Effect of components of manufacturing exports share on AfT flows
Estimator: Two-step system GMM

Variables	Log(AfT)	Log(AfT)	Log(AfT)	Log(AfT)	Log(AfT)
	(1)	(2)	(3)	(4)	(5)
$Log(AfT)_{t-1}$	0.532***	0.523***	0.469***	0.492***	0.445***
	(0.0387)	(0.0381)	(0.0389)	(0.0339)	(0.0248)
LABOUR	0.00487				
	(0.00386)				
LOW		-0.00871**			-0.0134***
		(0.00392)			(0.00290)
MEDIUM			0.0108**		0.00266
			(0.00425)		(0.00380)
HIGH				0.0286***	0.0181***
				(0.00492)	(0.00283)
Log(GDPC)	3.555***	3.039***	3.585***	4.198***	3.583***
	(0.752)	(0.662)	(0.690)	(0.665)	(0.519)
$[Log(GDPC)]^2$	-0.234***	-0.200***	-0.242***	-0.289***	-0.249***
	(0.0483)	(0.0423)	(0.0439)	(0.0432)	(0.0329)
Log(NonAfT)	0.466***	0.497***	0.427***	0.368***	0.408***
	(0.0504)	(0.0495)	(0.0452)	(0.0513)	(0.0401)
Log(TP)	-0.134	-0.365	-0.510*	-0.192	0.00867
	(0.292)	(0.289)	(0.291)	(0.295)	(0.219)
Log(POP)	0.143***	0.142***	0.249***	0.189***	0.195***
	(0.0379)	(0.0415)	(0.0400)	(0.0402)	(0.0296)
INST	0.231***	0.294***	0.306***	0.245***	0.353***
	(0.0414)	(0.0457)	(0.0434)	(0.0435)	(0.0320)
Constant	-15.17***	-12.55***	-13.03***	-14.82***	-13.10***
	(2.902)	(2.450)	(2.671)	(2.500)	(1.994)
Observations - Countries	481 - 132	481 - 132	481 - 132	481 - 132	481 - 132
Number of Instruments	76	76	76	76	94
AR1 (P-Value)	0.0001	0.0000	0.0001	0.0001	0.0001
AR2 (P-Value)	0.8133	0.7261	0.6921	0.7371	0.6982
OID (P-Value)	0.4626	0.4684	0.3573	0.4709	0.2552

*Note: *p-value < 0,1; **p-value < 0,05; ***p-value < 0,01. Robust Standard errors are in parenthesis. The variables "ECI", "TP", "NonAfT", "SHMAN", "INST" and the interaction variables have been considered as endogenous. The variables "GDPC" and its squared term have been considered as predetermined. The other variables have been considered as exogenous. Time dummies have been included in the regressions. The latter have used a maximum of 3 lags of the dependent variables as instruments, and a maximum of 3 lags of endogenous variables as instruments.*

Let us consider now results in Table 3. The estimate associated with the variable "LABOUR" in column [1] of the Table is not significant at the conventional levels, even though it is positive. This indicates that the share of labour-intensive and resource-intensive manufactured exports in total export products does not affect significantly total AfT flows. Likewise, the rise in the share of export of low-skill and technology-intensive manufactures in total export products leads to lower AfT flows to recipient-countries, while the increase in the share of export of medium-skill and technology-intensive manufactures in total export products, and the rise in the share of export of high-skill and technology-intensive manufactures in total export products are positively associated with AfT flows. This is because the coefficients of the variables "MEDIUM" and "HIGH" are positive and significant at the 1% level. These findings indicate that donor-countries supply higher AfT flows to recipient-countries that make effort to increase exports of medium-skill and technology-intensive manufactures as well as exports of high-skill and technology-intensive manufactures. However, recipient-countries that increase their exports of low-skill and technology-intensive manufactures receive lower amounts of AfT from donor-countries. These findings are, to some extent, confirmed in column [5] of Table 3 in which we include all three variables "LOW", "MEDIUM" and "HIGH" in the model specification. In fact, we obtain that a rise in exports of low-skill and technology-intensive manufactures is associated with lower AfT flows, while a rise in exports of high-skill and technology-intensive manufactures induces an increase in total AfT flows. Conversely, there is no significant effect of exports of medium-skill and technology-intensive manufactures on total AfT flows.

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Table 4: Interaction effect between ECI and the components of manufacturing exports share on AfT flows
Estimator: Two-step system GMM

Variables	Log(AfT)	Log(AfT)	Log(AfT)
	(1)	(2)	(3)
$Log(AfT)_{t-1}$	0.448***	0.422***	0.393***
	(0.0329)	(0.0298)	(0.0114)
Log(ECI)	-0.185	-0.636***	-0.306***
	(0.119)	(0.101)	(0.0437)
[Log(ECI)]*SHMAN	-0.00589**		
	(0.00296)		
[Log(ECI)]*[LABOUR]		0.0322***	
		(0.00621)	
[Log(ECI)]*[LOW]			0.0137***
			(0.00207)
[Log(ECI)]*[MEDIUM]			-0.0120***
			(0.00134)
[Log(ECI)]*[HIGH]			-0.00882**
			(0.00395)
SHMAN	-0.00493		
	(0.00389)		
LABOUR		0.0385***	
		(0.00815)	
LOW			0.00605***
			(0.00151)
MEDIUM			-0.0140***
			(0.00157)
HIGH			-0.00297
			(0.00527)
Log(GDPC)	5.815***	4.074***	3.666***
	(0.596)	(0.553)	(0.264)
$[Log(GDPC)]^2$	-0.388***	-0.276***	-0.257***
	(0.0392)	(0.0354)	(0.0175)
Log(NonAfT)	0.464***	0.444***	0.384***
	(0.0411)	(0.0396)	(0.0186)
Log(TP)	-0.893***	0.0752	-0.505***
	(0.197)	(0.221)	(0.0591)
Log(POP)	0.161***	0.185***	0.223***
	(0.0279)	(0.0259)	(0.0151)
INST	0.286***	0.307***	0.344***
	(0.0402)	(0.0353)	(0.0137)
Constant	-18.97***	-16.23***	-10.43***
	(2.226)	(2.164)	(0.837)
Observations - Countries	481 - 132	481 - 132	481 - 132
Number of Instruments	94	94	130
AR1 (P-Value)	0.0001	0.0002	0.0001
AR2 (P-Value)	0.7348	0.7816	0.5942

OID (P-Value)	0.4166	0.3954	0.3575

*Note: *p-value < 0,1; **p-value < 0,05; ***p-value < 0,01. Robust Standard errors are in parenthesis. The variables "ECI", "TP", "NonAfT", "SHMAN", "INST" and the interaction variables have been considered as endogenous. The variables "GDPC" and its squared term have been considered as predetermined. The other variables have been considered as exogenous. Time dummies have been included in the regressions. The latter have used a maximum of 3 lags of the dependent variables as instruments, and a maximum of 3 lags of endogenous variables as instruments.*

Turning to Table 4, we obtain from column [1] that countries that diversify their export products basket towards manufacturing products experience a rise in AfT inflows. This is because the coefficient of the interaction variable "[Log(ECI)]*SHMAN" is negative and significant at the 5% level, while the coefficient of the variable "[Log(ECI)]" is not significant at the conventional levels. Results in column [2] suggest a positive and significant (at the 1% level) interaction term related to the variable "[Log(ECI)]*[LABOUR]". Hence, countries with a high level of export concentration on labour-intensive and resource-intensive manufactured products receive higher AfT flows, probably with a view to helping them diversify their export products towards higher value-added (sophisticated) products. The outcomes displayed in column [3] of the same Table suggest that the interaction variable "[Log(ECI)]*[LOW]" exhibits a positive interaction term, which is significant at the 1% level. At the same time, the coefficient of the variables "[Log(ECI)]*[MEDIUM]" and "[Log(ECI)]*[HIGH]" show negative and significant coefficients, at least at the 5% level. Based on these results, we do conclude that countries with a high level of export concentration on low-skill and technology-intensive manufactures enjoy a rise in AfT flows. This finding is consistent with the one obtained in column [2] of Table 4 concerning the interaction between "ECI" and "LABOUR" variables. These findings reveal that diversification of export products towards medium-skill and technology-intensive manufactures and towards high-skill and technology-intensive manufactures is associated with greater AfT inflows.

5. Conclusion

The current paper has examined whether the AfT amounts that accrue to recipient-countries depend on these countries' level of export product concentration. The analysis has shown that countries that diversify export products receive a higher amount of total AfT. However, for LDCs, the higher the level of export product concentration, the higher is the AfT amount that these countries receive. These outcomes suggest that donor-countries provide higher AfT flows to LDCs with a view to allowing them to diversify their export products basket. This is, however in contrast with the findings concerning NonLDCs that receive higher AfT flows when they further diversify their export product baskets. The analysis has additionally shown that countries that

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diversify their export products towards manufacturing products enjoy higher AfT flows. However, the picture is slightly different when one looks at the components of total manufacturing exports share of total export products. Specifically, donor-countries supply higher AfT flows to countries that concentrate their exports on labour-intensive and resource-intensive manufactured products, or on low-skill and technology-intensive manufactured products. This finding is in line with the finding according to which LDCs (whose export products are heavily concentrated on primary commodities) receive higher AfT flows when they experience a rise in export product concentration. In fact, LDCs' manufactured exports are intensive in labour skills as well as in low-skilled workers. On the other hand, countries (this is likely the case for many NonLDCs) that diversify their export product towards medium-skill and technology-intensive manufactures, and high-skill and technology-intensive manufactures, experience a rise in AfT flows.

The analysis suggests, at least, that donor-countries should pursue their effort of supplying higher AfT flows to LDCs, given that these countries are the most in need of development aid flows, in particular AfT flows.

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APPENDICES

Appendix 1: Definition and Source of variables

Variables	Definition	Sources
ECI	This is the Export Product Concentration Index. It is calculated using the Herfindahl-Hirschmann Index and its values are normalized so that they range between 0 and 1. An index value closer to 1 indicates a country's exports are highly concentrated on a few products. On the contrary, values closer to 0 reflect exports are more homogeneously distributed among a series of products.	United Nations Conference on Trade and Development (UNCTAD) Database. See online: http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=120
AfT	This is the total real gross disbursements of Aid for Trade (expressed in constant prices 2016, US Dollar).	Author's calculation based on data extracted from the database of the OECD/DAC-CRS (Organization for Economic Cooperation and Development/Donor Assistance Committee)-Credit Reporting System (CRS). Aid for Trade data cover the following three main categories (the CRS Codes are in brackets): Aid for Trade for Economic Infrastructure, which includes: transport and storage (210), communications (220), and energy generation and supply (230); Aid for Trade for Building Productive Capacity, which includes banking and financial services (240), business and other services (250), agriculture (311), forestry (312), fishing (313), industry (321), mineral resources and mining (322), and tourism (332); and Aid for Trade policy and regulations, which includes trade policy and regulations and trade-related adjustment (331).
NonAfT	This is the measure of the development aid allocated to other sectors in the economy than the trade sector. It has been computed as the difference between the gross disbursements of total official development aid (ODA) and	Author's calculation based on data extracting from the OECD/DAC-CRS database.

	the gross disbursements of total Aid for Trade (both being expressed in constant prices 2016, US Dollar).	
EDI	The export diversification index is computed by measuring the absolute deviation of the export structure of a country from world's export structure. This index is a modified Finger-Kreinin measure of similarity in trade. The diversification index takes values between 0 and 1. A value closer to 1 indicates greater divergence from the world pattern.	United Nations Conference on Trade and Development (UNCTAD) Database. See online: http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=120
SHMAN	Share (%) of manufactured exports in total export products	Author's calculation based on data from the UNCTAD database.
LABOUR	This variable measures the share (in %) of labour-intensive and resource-intensive manufactures in total export products.	Author's calculation based on data from the UNCTAD database.
LOW	This variable measures the share (in %) of export of Low-skill and technology-intensive manufactures in total export products.	Author's calculation based on data from the UNCTAD database.
MEDIUM	This variable measures the share (in %) of export of Medium-skill and technology-intensive manufactures in total export products.	Author's calculation based on data from the UNCTAD database.
HIGH	This variable measures the share (in %) of export of High-skill and technology-intensive manufactures in total export products.	Author's calculation based on data from the UNCTAD database.
TP	Trade Policy of the domestic economy (Domestic Trade Policy). It is measured by the Trade Freedom Score; This is a component of the Economic Freedom Index. It is composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. This score is graded on a scale of 0 to 100, with a rise in its value indicating lower trade barriers, i.e., higher trade liberalization, while a decrease in its value reflects rising trade protectionism.	Heritage Foundation (see Miller et al., 2019)
GDPC	Per capita Gross Domestic Product (constant 2010 US$)	WDI
POP	This is the measure of the total Population	WDI

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 3: Descriptive statistics on variables

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
AfT	646	1.72e+08	3.16e+08	42499.3	2.99e+09
ECI	658	0.379	0.209	0.071	0.946
NUMB	658	141.666	75.299	5.333	256.500
EDI	658	0.720	0.107	0.369	0.924
SHMAN	656	33.105	26.749	0.116	94.881
LABOUR	656	12.184	17.809	0.003	92.566
LOW	656	5.339	9.036	0.024	71.752
MEDIUM	656	6.169	7.901	0.038	68.892
HIGH	656	9.412	11.478	0.020	67.819
NonAfT	646	5.66e+08	7.39e+08	5236286	6.63e+09
GDPC	655	4103.287	4150.173	204.989	21112.720
TP	610	68.226	11.385	22.800	89.200
INST	659	-1.103	1.466	-4.391	3.159
POP	659	4.17e+07	1.58e+08	70106.33	1.38e+09

Appendix 3: List of countries contained in the full Sample

Entire sample				LDCs	
Afghanistan	Cuba	Lesotho	Sao Tome and Principe	Afghanistan	Solomon Islands
Albania	Djibouti	Liberia	Saudi Arabia	Angola	Sudan
Algeria	Dominica	Libya	Senegal	Bangladesh	Tanzania
Angola	Dominican Republic	Madagascar	Serbia	Benin	Timor-Leste
Argentina	Ecuador	Malawi	Seychelles	Bhutan	Togo
Armenia	Egypt, Arab Rep.	Malaysia	Sierra Leone	Burkina Faso	Uganda
Azerbaijan	El Salvador	Maldives	Solomon Islands	Burundi	Vanuatu
Bangladesh	Equatorial Guinea	Mali	South Africa	Cambodia	Yemen, Rep.
Barbados	Eritrea	Mauritania	Sri Lanka	Central African Republic	Zambia
Belarus	Eswatini	Mauritius	St. Lucia	Chad	
Belize	Ethiopia	Mexico	St. Vincent and the Grenadines	Comoros	
Benin	Fiji	Micronesia, Fed. Sts.	Sudan	Congo, Dem. Rep.	
Bhutan	Gabon	Moldova	Suriname	Djibouti	
Bolivia	Gambia, The	Mongolia	Tajikistan	Eritrea	
Bosnia and Herzegovina	Georgia	Montenegro	Tanzania	Ethiopia	
Botswana	Ghana	Morocco	Thailand	Gambia, The	
Brazil	Guatemala	Mozambique	Timor-Leste	Guinea	
Burkina Faso	Guinea	Myanmar	Togo	Guinea-Bissau	
Burundi	Guinea-Bissau	Namibia	Tonga	Haiti	
Cabo Verde	Guyana	Nepal	Trinidad and Tobago	Kiribati	
Cambodia	Haiti	Nicaragua	Tunisia	Lesotho	
Cameroon	Honduras	Niger	Turkey	Liberia	
Central African Republic	India	Nigeria	Turkmenistan	Madagascar	
Chad	Indonesia	North Macedonia	Uganda	Malawi	
Chile	Iran, Islamic Rep.	Oman	Ukraine	Mali	
China	Jamaica	Pakistan	Uruguay	Mauritania	

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Colombia	Jordan	Panama	Uzbekistan	Mozambique	
Comoros	Kazakhstan	Papua New Guinea	Vanuatu	Myanmar	
Congo, Dem. Rep.	Kenya	Paraguay	Venezuela, RB	Nepal	
Congo, Rep.	Kiribati	Peru	Vietnam	Niger	
Costa Rica	Kyrgyz Republic	Philippines	Yemen, Rep.	Rwanda	
Cote d'Ivoire	Lao PDR	Rwanda	Zambia	Senegal	
Croatia	Lebanon	Samoa	Zimbabwe	Sierra Leone	