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# How Has Aid for Trade Influenced the Likelihood of Graduation from Least Developed Country Status?

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### Abstract

Several econometric techniques with different degrees of sophistication have been used to assess the impact of Aid for Trade (AfT) on trade and other economic performance in recipient countries, especially at the macro level, not all of which have proved conclusive. However, this line of enquiry has not been pursued in relation to whether AfT disbursed to Least Developed Countries (LDCs) has resulted in an increased likelihood of graduation. We therefore explore the relationship between AfT expenditures and the likelihood of graduation from LDC status. Total AfT disbursements per capita to those LDCs unlikely to graduate by 2021 have been constantly higher compared to LDCs likely to graduate by 2021 in recent years. However, disbursements to LDCs likely to graduate have tended to focus on specific sectors, such as communications, business and other services, which have significantly influenced the likelihood of graduation. These sectors have significantly interacted with others, notably agriculture, tourism and mining. These results, related to structural economic transformation within and between sectors, deserve further attention related to stimulating graduation with momentum.

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JEL Classification: F1, F35, O24

Keywords: Aid for Trade, Least Developed Country, graduation, trade performance

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# 1. Introduction

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The Aid for Trade (AfT) initiative was launched at the 2005 Hong Kong World Trade Organization (WTO) Ministerial Conference to help developing countries overcome structural and capacity limitations that undermine their ability to benefit from trade opportunities. Since the launch of the initiative, total AfT disbursements to developing countries have roughly doubled, from US\$18.3 billion in 2006 to \$39.4 billion in 2015.<sup>1</sup> Proportionately, Least Developed Countries (LDCs) received \$10.5 billion in 2015, twice the amount received in 2006 prior to the financial crisis.

The Istanbul Programme of Action (IPoA) for the decade of 2011–20 was launched shortly after the AfT initiative. IPoA aims to develop the productive capacity of LDCs through a number of goals and priorities for areas of action. Specifically, it aims to enable half the LDCs to meet the criteria for graduation<sup>2</sup> by the end of the decade. This Working Paper attempts to explore the significance of AfT in influencing the likelihood that an LDC will graduate with momentum by 2021.<sup>3</sup> To the best of the authors' knowledge, such exploratory analysis has not been undertaken before.

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## 2. Graduation with momentum

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Graduation from the LDC category identifies the point when an LDC is relying on its own productive development and international markets for its subsequent growth, without counting on the maximum concessionary treatment from development partners. Rather than being an end in itself, graduation from LDC status is closely related to a country's long-term development process, in which economic growth results and contributes to the development of productive capacities as well as structural transformation, which is central to socio-economic advancement. This is what the United Nations Conference on Trade and Development (UNCTAD) (2016) defines as *graduation with momentum*.

Structural transformation entails an upgrade in the country's productivity within and across sectors' activities and helps increase resilience to exogenous shocks. This is key to addressing the root causes of underperformance and setting the foundations needed to maintain development progress beyond graduation. Poor physical infrastructure is a major constraint to faster economic growth, substantial poverty reduction and the development of productive capacities in LDCs.

The development of physical infrastructure should therefore be seen as the necessary basis for developing modern production within the economy, which will enable sustainable development. The energy sector is also of significant importance to structural transformation, particularly where access to modern energy sources is limited - which is the case in most LDCs. Falling costs for small-scale renewable energy offer a major opportunity for the transformation of these countries, particularly in the poverty-ridden rural sector (UNCTAD, 2017). Improved transportation also contributes to structural transformation, mostly by reducing costs along the supply chain.

Financial and technical support to the productive sectors and to the process of industrialisation is particularly important for diversification strategies. As highlighted in UNCTAD (2015), rural development, combining agricultural upgrading and diversification into non-farm activities, plays a central role in structural transformation in LDCs. Important inputs into the process are research and development; the development of inputs and production methods and their adaptation to local conditions; and the promotion of their uptake by domestic producers.

Figure 1. Share of ODA to LDCs for various uses, 2002–15 (% of total ODA to LDCs)



**Note:** See UNCTAD (2006) for a definition of productive capacities and the list of CRS codes used to quantify them. The 2006 data excludes multilateral debt relief. Data for LDCs excludes Equatorial Guinea as the country officially graduated from the category on 4 June 2017. 2015 is the latest available year.

**Source:** OECD QWIDS and CRS, data accessed in May 2017.

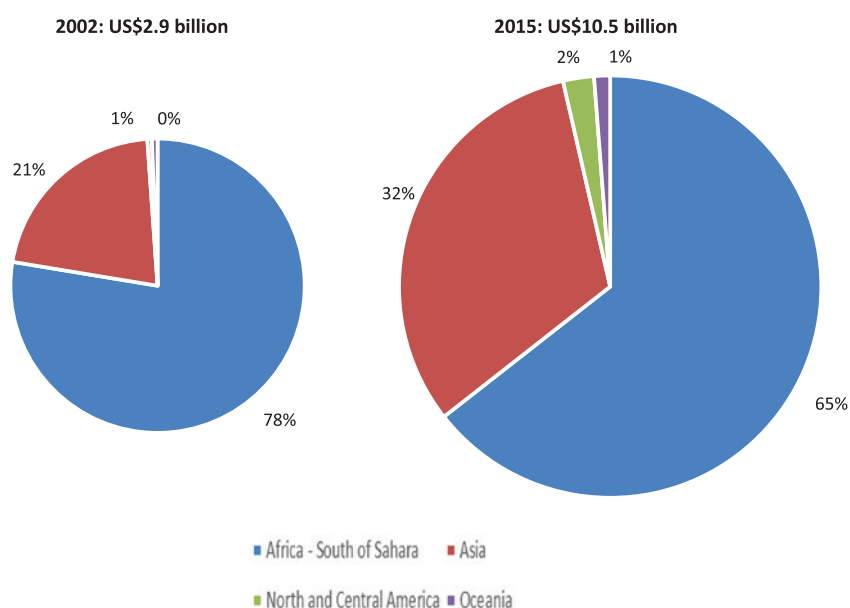
### 3. Trends in Aid for Trade to LDCs

AfT disbursements to LDCs reached US\$10.5 billion in 2015, and accounted for over a quarter of total AfT disbursements. Total real AfT disbursements tripled during the period 2002–15 and reached some \$40 billion. While the share of AfT going to LDCs has remained more or less stable over the past decade, as is

discussed later, sectoral allocations have varied substantially.

Although AfT disbursements to LDCs increased at an annual average growth rate of around 10 per cent between 2002 and 2015, they remain well below the real expenditures recorded for social infrastructure. Figure 1

Figure 2. Share of AfT disbursement to LDCs by region, 2002 and 2015 (%)



**Source:** Authors' calculations based on OECD QWIDS and CRS, data accessed in June 2017.

highlights trends in official development assistance (ODA) to LDCs for AfT, social infrastructure and productive capacity-building. AfT is a sub-component of aid for productive capacity-building. In 2015, AfT represented half the amount of ODA spent to finance social infrastructure and three-quarters of the ODA devoted to building productive capacities. Although the average annual growth rate of aid flows for the above three components has been of the order of 8–9 per cent over the past 14 years, this is still insufficient to enable LDCs to achieve the structural transformation necessary for half of them to meet the criteria for graduation by 2020, as

indicated in paragraph 28 of IPoA for the LDCs for the decade 2011–20.

Most of the AfT disbursed to LDCs between 2002 and 2015 consistently targeted African countries, but Asia's share rose from 21 to 32 per cent over this period (Figure 2). AfT to LDCs increased by a factor of 2.6 but Oceania experienced the most rapid growth rate and benefited the most as a region, with an increase in AfT of nearly six times in 2015 compared with 2002. Liberia, Myanmar and Solomon Islands (a potential future graduate) have witnessed the largest factor increases in AfT in their respective regions.

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## 4. Relevance of Aid for Trade for graduating LDCs

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The advancement of the Sustainable Development Goals (SDGs), as part of Agenda 2030, hinges on the performance of the LDCs. UNCTAD (2015) refers to 'the LDCs as the battleground where the SDGs will be won or lost'. Although there is nothing specific on LDC graduation within the SDGs, it is obvious that, unless substantial progress can be made in relation to at least some of the indicators that underpin the LDC criteria, achievement of the SDGs looks less likely. Given this, the future graduation prospects of LDCs assume particular importance.

Unlike the Millennium Development Goals, the SDGs incorporate balanced treatment of the economic, social and environmental dimensions of sustainable development. SDGs 1, 8–12 and 17, in particular, imply achieving sustainable development through the development of productive capacities, structural transformation, technological upgrading, diversification, rising productivity and job creation. It follows that, if LDCs were to fully achieve the SDGs and their targets, they would also achieve graduation with momentum (UNCTAD, 2016).

This working paper attempts to more closely scrutinise the provision of international support measures, such as AfT, in relation to their role in the graduation process of LDCs and, more specifically, the promotion of sustainable graduation with momentum. Given this, an exploratory analysis of the sectoral disbursements of AfT and their relationship to the graduation

process is undertaken. It is generally recognised that the specific disbursement mechanisms of AfT to LDCs specifically have been transformed over time through innovations such as the Enhanced Integrated Framework. Moreover, in view of the experiences of LDCs such as Samoa—which graduated in 2014—the disbursement of AfT has begun to adapt in order to take account of the loss of other international support measures induced by the graduation process.

The forthcoming (by 2021) wave of potential LDC graduates that the Committee for Development Policy has identified includes six small island developing states (Kiribati, São Tomé and Príncipe, Solomon Islands, Timor-Leste, Tuvalu and Vanuatu), two landlocked Asian countries (Bhutan and Nepal) and one African country (Angola). However, only Bhutan, Kiribati, Sao Tome and Principe and the Solomon Islands were recommended by the Committee for Development Policy, at the most recent review undertaken by the CDP, 12–19 March 2018.

Countries must meet two of the three criteria at two consecutive triennial reviews of the UN Committee for Development Policy (CDP) to be considered for graduation. At the most recent triennial review, the CDP said two more countries, Vanuatu and Angola, are scheduled for graduation over the next three years.<sup>4</sup> Nepal and Timor-Leste also met the criteria but were not recommended for graduation at this time,

due to economic and political challenges, and the decision has been deferred to the next CDP triennial review in 2021. Bangladesh, Lao People's Democratic Republic and Myanmar met the graduation criteria for the first time, whilst Tuvalu and Kiribati have been eligible for graduation for some time. Tuvalu was identified as eligible for graduation from the list of LDCs in 2012, based on its high levels of per capita income and human assets. However, because of extreme vulnerability to external shocks has resisted graduation, along with Kiribati, because existing support measures for LDCs do not adequately address this issue. The recent outcomes from the CDP meeting suggests that graduation for Tuvalu and Kiribati will be contingent on the creation of appropriate international support measures that specifically address extreme vulnerability to climate change.

Despite these controversies and in view of the research question addressed in this paper, we include reference to all ten of the aforementioned LDCs because they have begun to hit the graduation thresholds established by the UN system in 1971. Notwithstanding some of the issues regarding the future classification of these LDCs as they proceed to hit some of the graduation criteria, for the analysis in this paper we classify them as forthcoming 'graduates' because our interest is in the role of AfT in influencing the likelihood of graduation.

#### 4.1 Descriptive statistics

Overall, the group of LDCs likely to graduate by 2021 received approximately 6 per cent of the total AfT to LDCs at both the beginning and the end of the observation period (2002–04 and 2013–15), indicating that no major shift

**Table 1. AfT disbursements to LDCs by sector and selected components (% of AfT to the separate groupings)**

	LDCs		LDCs likely to graduate by 2021 <sup>a</sup>		LDC unlikely to graduate by 2021 <sup>b</sup>	
	2002–04	2013–15	2002–04	2013–15	2002–04	2013–15
II.1. Transport & Storage	36.21	31.05	23.53	34.72	37.04	30.79
<i>of which road transport</i>	30.44	23.75	15.99	20.86	31.38	23.95
II.2. Communications	2.26	1.76	5.82	1.46	2.04	1.79
II.3. Energy	12.19	23.64	25.77	25.72	11.33	23.50
<i>of which Energy policy and administrative management</i>	1.08	5.37	2.19	11.95	1.01	4.90
<i>of which Electric power transmission and distribution</i>	5.68	8.58	5.10	6.00	5.72	8.77
II.4. Banking & Financial Services	10.55	4.97	11.66	10.55	10.48	4.57
II.5. Business & Other Services	3.20	4.20	5.30	2.58	3.07	4.32
III.1.a. Agriculture	20.17	25.72	18.22	15.46	20.31	26.44
<i>of which Agricultural development</i>	5.76	10.24	2.81	5.58	5.95	10.57
III.1.b. Forestry	2.05	1.06	4.39	1.36	1.90	1.03
III.1.c. Fishing	1.57	0.74	2.36	1.48	1.52	0.69
III.2.a. Industry	6.37	2.85	1.95	4.97	6.65	2.70
III.2.b. Mineral Resources & Mining	4.60	1.18	0.55	0.18	4.86	1.25
<i>of which Mineral/mining policy &amp; admin. mgmt</i>	2.96	0.89	0.33	0.15	3.13	0.94
III.3.a. Trade Policies & Regulations	0.61	2.50	0.17	1.07	0.64	2.60
III.3.b. Tourism	0.22	0.33	1.17	0.47	0.15	0.32

<sup>a</sup> Angola, Bhutan, Kiribati, Nepal, São Tomé and Príncipe, Solomon Islands, Timor-Leste, Tuvalu and Vanuatu.

<sup>b</sup> All LDCs less countries listed under <sup>a</sup>.

**Source:** Authors' calculations based on OECD QWIDS and CRS, data accessed in May 2017.



occurred in terms of aggregate AfT to the two groups. However, a difference in AfT disbursements becomes visible between the group of those LDCs likely to graduate by 2021 and those unlikely to do so when data is examined by sector.

At the sectoral level, AfT to transport and storage increased over time for those LDCs likely to graduate by 2021, moving from 24 to 35 per cent of the total AfT disbursements going to this sub-group. The share of AfT disbursements to energy accounted for a quarter of the total for the whole period under consideration. The industrial sector in this group of countries received an average of US\$33 million in 2013–15, equivalent to 5 per cent of the total AfT going to the group and to some \$0.60 per capita—which is double the amount received by those LDCs unlikely to graduate by 2021.

Overall, energy and transport and storage accounted for 55 per cent of total AfT disbursements to LDCs in 2013–15, followed by agriculture (26 per cent). Interestingly, AfT disbursements to the remaining sectors either remained stable or decreased over time. They currently account for less than 3 per cent of total AfT disbursements to LDCs. Trade performance and competitiveness are affected by both international transport costs and internal transport costs. Means to decrease the latter and to ‘rejuvenate’ the domestic production process through improved access to modern energy and enhanced electrification are welcomed in an LDC context.

Furthermore, funds directed towards the banking and financial services also seem to have played an influential role in LDCs likely to graduate by 2021 (accounting for around 11 per cent of the total). While such flows may have increased the likelihood of graduating through the income criteria, we have not explored this aspect in further detail at the current time. A closer look at the data does reveal that aid to formal sector financial intermediaries to Nepal (US\$93 million) accounted for over 90 per cent of total aid to the above group of countries in 2015. In sum, AfT disbursements to those nine LDCs<sup>5</sup> likely to graduate by 2021 have primarily targeted productive and distributive sectors—key to enable sustainable and sustained development pre- and post-graduation.

It is important to note that AfT disbursements to those LDCs unlikely to graduate by 2021 have also targeted transport and storage

(which accounts for 31 per cent of the total of the group) and energy (which has doubled its share over time, receiving 24 per cent of disbursements in 2013–15, up from 11 per cent in 2002–04). However, in comparison with resources disbursed to LDCs likely to graduate, AfT disbursements to agriculture, and to agricultural development in particular, have increased over time in recent years for those countries less likely to graduate. This could be explained by the presence of large agricultural producer countries in this group, and is to be welcomed if it leads to an upgrading and diversification process. Surprisingly, funds to mineral resources and mining have fallen over time, maybe as part of a strategy aimed at diversifying these countries’ economies. Worryingly, AfT disbursements to industry have halved over time, from 7 per cent in 2002–04 to 3 per cent in 2013–15.

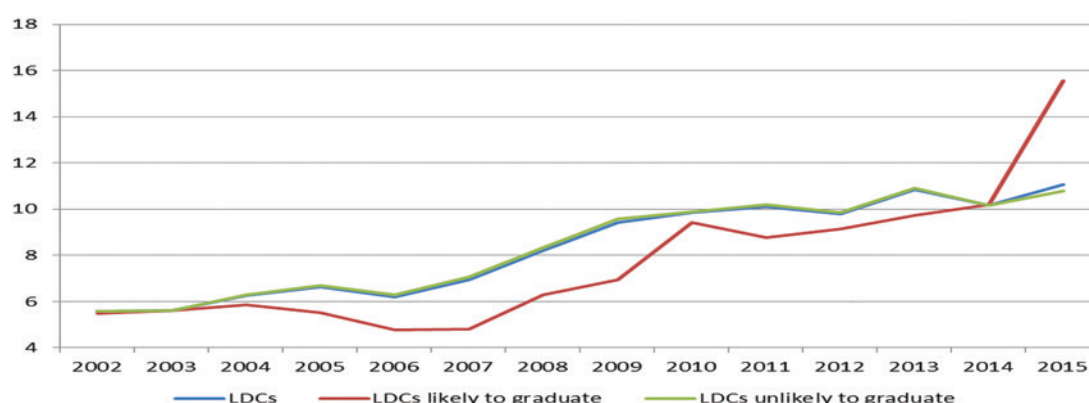
## 4.2 Per capita allocations

Total AfT disbursements per capita to the average LDC and to those LDCs unlikely to graduate by 2021 have been constantly higher than those to the LDCs that are likely to graduate by 2021, except for in the year 2015 (Figure 3). On average, AfT per capita to LDCs has almost doubled over time, from US\$6 per person in 2002–04 to \$11 per person in 2002–15 (see Table 2), with a steady increase over time.

When groups of countries are disaggregated into those likely or unlikely to graduate by 2021, a similar trend is visible, except for in the more recent years, when per capita AfT to those likely to graduate increased to reach an average of some US\$12 per person. Interestingly, real AfT disbursements per capita to finance energy activities in LDCs tripled over time, amounting to some \$2.50 in 2013–15. Furthermore, per capita AfT to the energy sector going to those LDCs likely to graduate by 2021 doubled over time, from \$1.50 per person in 2002–04 to \$3 per person in 2013–15.

Across the entire period of 2002–15, average AfT per capita received by the likely graduates was less than that received by non-likely graduates. However, a more disaggregated sectoral analysis reveals that there are three sectors in which the likely graduates received more AfT per capita than did the non-likely graduates over the period analysed: communications, fishing and tourism. This allocation

Figure 3. AfT disbursements per capita, 2002–15 (US\$)



**Note:** For country groupings see note to Figure 1.

**Source:** OECD QWIDS and CRS, data accessed in May 2017, and UNCTADStat for population data.

Table 2. Real AfT disbursements per capita, 2002–04 and 2013–15 (US\$)

	Total AfT		AfT to energy	
	2002–04	2013–15	2002–04	2013–15
LDC	5.82	10.69	0.71	2.52
LDCs likely to graduate by 2021	5.65	11.83	1.46	3.02
LDCs unlikely to graduate by 2021	5.83	10.62	0.66	2.49

**Note:** For country groupings see note to Figure 1.

**Source:** OECD QWIDS and CRS, data accessed in May 2017, and UNCTADStat for population data.

could be explained by the composition of the two groups and the relatively higher presence of small island developing states in the group of forthcoming LDC graduates (Table 3). If we compare trends at the beginning of the period (2002–04) and the end of the period (2013–15) for the group likely to graduate, it is interesting to note that AfT per capita received in transport and storage, energy, banking and financial services, business and other services, agriculture, industry, and trade policies and regulation almost doubled. This reflects the increasing importance of these sectors for graduating countries in the reference period.

The ultimate goal of AfT is to help developing countries overcome structural and capacity

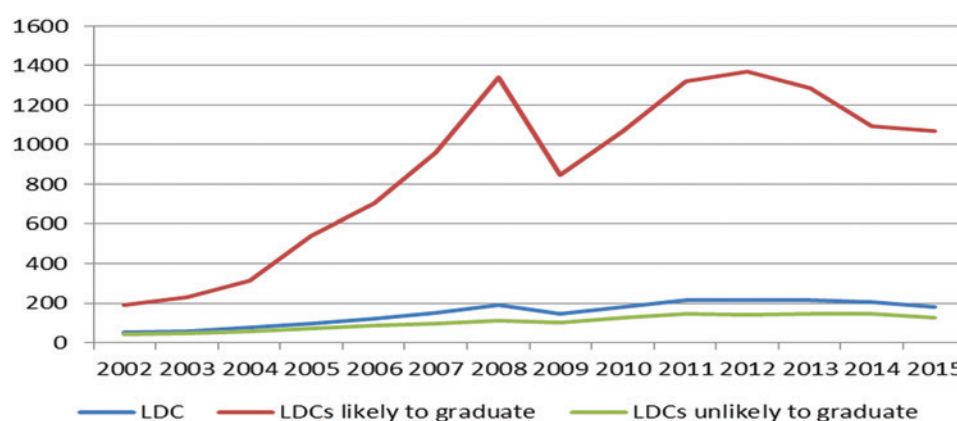
Table 3. AfT disbursements per capita, 2002–15 (US\$)

	LDCs likely to graduate by 2021	LDCs unlikely to graduate by 2021
Overall AfT per capita	4.63	9.08
Transport and storage	1.58	3.14
<b>Communications</b>	<b>0.17</b>	<b>0.15</b>
Energy	1.11	1.59
Banking and financial services	0.32	0.50
Business and other services	0.16	0.51
Agriculture	0.80	2.27
Forestry	0.12	0.12
<b>Fishing</b>	<b>0.11</b>	<b>0.10</b>
Industry	0.16	0.34
Mineral resources and mining	0.03	0.16
Trade policies and regulation	0.04	0.18
Tourism	0.03	0.02

**Note:** LDCs exclude Equatorial Guinea.

**Source:** Authors' calculations based on OECD QWIDS and CRS, accessed in June 2017, and UNCTADStat for population data.

Figure 4. Merchandise trade exports per capita, 2002–15 (US\$)



**Note:** For country groupings see note to Figure 1.

**Source:** Authors' calculations based on UNCTADStat.

limitations that undermine their ability to benefit from trade opportunities. Total merchandise trade exports per capita to those LDCs likely to graduate in 2021 are statistically correlated (correlation index equal to 53) to AfT disbursements. Such LDCs increased their merchandise

trade exports per capita over time from US\$200 per person in 2002 to \$1,066 in 2015, while the group of LDCs unlikely to graduate by 2020 increased merchandise trade exports per capita from \$43 to \$127 during the same time period.

## 5. Quantitative analyses

In the past, several econometric techniques with different degrees of sophistication have been used to assess the impact of AfT on trade and other economic performance in recipient countries, especially at the macro level (Cali et al., 2011; Razzaque and te Velde, 2013; Winters and Xavier, 2015), not all of which have proved conclusive. The research methods deployed include gravity model specifications, difference-in-difference estimations, panel data estimations and various econometric regression techniques. Generally, findings concur that AfT can be effective, with a positive and economically relevant impact.<sup>6</sup> However, by focusing specifically on whether AfT in LDCs has resulted in an increased likelihood of graduation, the model deployed in this study marks a departure from those used in earlier studies. The overarching research question we explored is: How have AfT expenditures influenced the likelihood of graduation from LDC status?

A logistic regression model is deployed in order to explore the influence of per capita AfT disbursements on the likelihood of graduation at an aggregate level. Then influence of

disbursements at the sectoral level on the likelihood of graduation is explored. In relation to the model selected, while the effects of sample size on the robustness of inferences derived from binary outcome models have been noted within the literature (Bergtold et al., 2017), it is generally agreed that a sample size of a minimum of 10 countries within each category is required. The number of samples within our category of 'graduate' countries (nine) falls slightly short of this number. Moreover, we have to confront the fact that, within this group, Tuvalu is an obvious outlier in terms of AfT disbursed per capita across all of the sectoral assessments. We could have excluded Tuvalu from our analysis, but this would reduce our sample size even more (D'Agostino et al., 1990). Some posit that this would not adversely affect results, but we prefer to avoid this. In order to expand our sample size and the explanatory power of the model deployed, we therefore pool the sample across all of the periods for which AfT data is available for all LDCs: 2002–15.

At this point, it is important to underscore some of the challenges in the interpretation

Table 4. Correlations

		Graduate	LogTotalPC
<b>Graduate</b>	Pearson Correlation	1	.110**
	Sig. (2-tailed)		.004
	N	672	672
<b>LogTotalPC</b>	Pearson Correlation	.110**	1
	Sig. (2-tailed)	.004	
	N	672	672

Note: \*\*, Correlation is significant at the 0.01 level (2-tailed).

of these results. The data exhibits a fairly high degree of kurtosis—an expected result in cases of very small sample sizes. This applies across the sectoral distribution of AfT resources and it is driven by the presence of some very large outliers within the data (and within the non-graduate group). These challenges, make our analysis exploratory. We recognise that each LDC will have a rich history of AfT experiences with different types of disbursement mechanisms, which deserve far deeper analyses than this paper can undertake.

As it cannot be assumed the observations in panel data are independently distributed across time, and serial correlation of regression residuals becomes an issue. Unobserved factors, while acting differently on the various cross-sectional units, may have a lasting effect upon the same statistical unit when followed through time. To control for this problem, fixed country  $i$  and time  $t$  effects are introduced. This has several advantages since it enables us to examine cross-section-specific series as individual time series or as part of a larger set of series. This allows us to expand our sample size considerably so as to include 14 observations for each of the 47 LDCs, which enables us to have 672 observations overall, and 110 observations for our 9 graduate countries (Table 4).

We first pool the sample of panel data and undertake the exploratory analysis. We then utilise fixed effects in order to control for time variance and country-specific factors. We

find the same results obtained for the pooled Ordinary Least Squares (OLS) model as for the fixed effects model. This results from little intra-panel correlation in the data. Nonetheless, in order to avoid omitted variable bias, we present the results for the fixed effect model.<sup>7</sup>

### 5.1 Model

A binary logit model is used because the resulting elasticities allow for a more intuitive interpretation. The model deployed is as follows:

$$\text{logit}(\pi) = \alpha + \beta_1 \text{AfT}_{it} + \varepsilon$$

We specify the dichotomous outcome variable, coded as = 1 if LDCs are likely to graduate by 2021, and use  $\pi$  to denote the probability that the country will therefore graduate. The likelihood of not graduating is therefore  $(1 - \pi)$ . We sum total AfT received across all sectors and across all periods 2002–15. We control for population by dividing total AfT disbursements by total population (for each year). We then take the log in order to account for the high degree of variance within the sample. Country and time (year) are fixed effects.

### 5.2 Results

We analyse the extent to which the likelihood of graduation from LDC status changes for every additional US\$1 of AfT per capita received. The results presented in Table 5 suggest a positive significant effect of additional AfT expenditure,

Table 5. Influence of AfT per capita on graduation from LDC status

	B	S.E.	Wald	Sig.	Exp(B)
LogTotalPC	.289	.103	7.864	.005	1.335
Constant	-.626	.358	3.049	.081	.535

per capita, on the likelihood of graduation from LDC status.

The coefficient in Table 5 is the odds ratio Exp (B), which can be interpreted in terms of the change in odds resulting from a unit change in the predictor(s). If the value is greater than 1 it indicates that, as the predictor increases, the odds of the outcome also increase (and the converse would apply if the value is less than 1). Essentially, this is a measure of association between the response variable (likelihood of graduation) and the explanatory variable  $\beta_1 total_{lnAft}$ . The result presented in Table 5 suggests that, for every additional US\$1 spent on AfT per capita, the likelihood of graduation increases by 2.8 per cent, and this is significant.

### 5.3 Sectoral results

Given this result, we next proceed to explore the effects of additional AfT disbursements at the sectoral level on the likelihood of graduation from LDC status. In order to achieve this objective, we use the following model:

$$\begin{aligned} \text{logit}(\pi) = & \alpha + \beta_1 \text{transport}_{it} + \beta_2 \text{communications}_{it} \\ & + \beta_3 \text{energy}_{it} + \beta_4 \text{business}_{it} \\ & + \beta_5 \text{banking}_{it} + \beta_6 \text{agriculture}_{it} \\ & + \beta_7 \text{forestry}_{it} + \beta_8 \text{fishing}_{it} \\ & + \beta_9 \text{industry}_{it} + \beta_{10} \text{mineral}_{it} \\ & + \beta_{11} \text{trade}_{it} + \beta_{12} \text{tourism}_{it} + \varepsilon \end{aligned}$$

We use the natural logarithm of observations for the period 2002–15. The estimated results

are presented in Table 6. While a number of results in the table are significant, there is a need for some caution, given the interpretation of the coefficients in the case of energy, agriculture, industry, mineral resources and trade policies—given the negative sign. Given this, the elasticities for communications and business and other services are far more intuitive: not only are the results significant but also the coefficient is positive.

Results suggest that AfT disbursements within the communications and business and other related services have exerted a significant and positive effect on the likelihood of graduation from LDC status. While the results regarding disbursements to conventional sectors such as agriculture, industry, energy and transportation are less encouraging, we do not take these at face value. Instead, the interaction between sectoral disbursements on the enabling environment, such as energy and transportation, related to enhanced connectivity through communications and businesses and other services sectors, clearly deserves far greater attention.

### 5.4 Interaction effects

We introduce interaction terms in order to explore the relation with other sectors and the subsequent influence on the likelihood of graduation. We conceptualise the interaction in terms of the positive significant effect on the log odd. Results suggest the interaction between communications and agriculture and tourism

Table 6. Influence of AfT sectoral disbursements on graduation from LDC status

	B	S.E.	Wald	df	Sig.	Exp(B)
Transportation	-.122	.179	.464	1	.496	.885
<b>Communications</b>	<b>.365</b>	<b>.160</b>	<b>5.223</b>	<b>1</b>	<b>.022</b>	<b>1.440</b>
Energy	-.323	.155	4.325	1	.038	.724
Banking and financial services	.008	.154	.003	1	.959	1.008
<b>Business and other services</b>	<b>.351</b>	<b>.163</b>	<b>4.645</b>	<b>1</b>	<b>.031</b>	<b>1.421</b>
Agriculture	-.911	.181	25.236	1	.000	.402
Forestry	.085	.176	.232	1	.630	1.088
Fishing	-.198	.144	1.881	1	.170	.820
Industry	-.268	.134	4.005	1	.045	.765
Mineral resources and mining	-.340	.145	5.530	1	.019	.712
Trade policies and regulation	-.279	.140	3.969	1	.046	.757
Tourism	-.039	.150	.066	1	.797	.962
Constant	-.946	.248	14.526	1	.000	.388

sectors is the strongest (in terms of subsequent influence on graduation), and particularly so in the case of agriculture (Table 7). Interestingly, a similar situation arises in relation to the interaction between business and other services and agriculture and mining (Table 8). These are the only significant interactions. These

findings serve to further substantiate the role of increased AfT disbursements within these two sectors and key enabling services (communications and business and other services) as significantly interacting with the agriculture, tourism and mining sectors and influencing the likelihood of graduation from LDC status.

**Table 7. Interaction effects of communications**

	B	S.E.	Wald	df	Sig.	Exp(B)
Comm*Trans	-.619	.169	13.485	1	.000	.538
Comm*Energy	.106	.172	.379	1	.538	1.112
Comm*Bank	.162	.145	1.256	1	.262	1.176
Comm*Buss	-.196	.163	1.440	1	.230	.822
<b>Comm*Agr</b>	<b>.733</b>	<b>.186</b>	<b>15.577</b>	<b>1</b>	<b>.000</b>	<b>2.081</b>
Comm*For	-.424	.209	4.104	1	.043	.654
Comm*Fish	.141	.163	.750	1	.386	1.151
Comm*Ind	.003	.143	.000	1	.983	1.003
Comm*Min	.062	.169	.136	1	.712	1.064
Comm*Trade	-.095	.145	.433	1	.511	.909
<b>Comm*Tour</b>	<b>.349</b>	<b>.143</b>	<b>5.952</b>	<b>1</b>	<b>.015</b>	<b>1.417</b>
Constant	-1.737	.123	200.983	1	.000	.176

**Table 8. Interaction effects of business services**

	B	S.E.	Wald	df	Sig.	Exp(B)
Bus*Tran	-.699	.182	14.755	1	.000	.497
Bus*Ener	-.374	.178	4.409	1	.036	.688
Bus*Bank	.161	.211	.587	1	.444	1.175
<b>Bus*Agr</b>	<b>.654</b>	<b>.207</b>	<b>9.935</b>	<b>1</b>	<b>.002</b>	<b>1.923</b>
Bus*For	.119	.155	.589	1	.443	1.126
Bus*Fish	-.164	.170	.934	1	.334	.849
Bus*Ind	-.193	.152	1.630	1	.202	.824
<b>Bus*Min</b>	<b>.520</b>	<b>.181</b>	<b>8.279</b>	<b>1</b>	<b>.004</b>	<b>1.682</b>
Bus*Trade	-.229	.151	2.306	1	.129	.796
Bus*Tour	.033	.141	.055	1	.815	1.034
Constant	-1.481	.124	141.750	1	.000	.227

**Note:** a, Variable(s) entered on Step 1: BusTran, BusEner, BusBank, BusAgr, BusFor, BusFish, BusInd, BusMin, BusTrade, BusTour.



## 6. Concluding remarks

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LDCs face a number of structural and economic constraints to their development and growth. Several factors need to be addressed in order to upgrade their capacity to graduate sustainably and with momentum. However, to date, the relationship between AfT resources and the likelihood of graduation from LDC status has not been explored in a systematic way.

While Africa remains the largest recipient of AfT, LDCs in Asia and Oceania have increased their share over time. For those LDCs most likely to graduate by 2021, the share of AfT going to transport and storage has increased over time. The industrial sector in this group of countries has received double the aid received by those LDCs unlikely to graduate. However, AfT to agriculture has increased over time to those countries unlikely to graduate. This indicates particular patterns of trade specialisation that deserve further attention, particularly in view of donors' efforts to enhance export diversification. It is also interesting to note that the group likely to graduate has received more aid per capita for banking and financial services in recent years compared with the other group.

Overall, the results bode well for LDCs. This is because the ultimate aim of AfT is to expand trade capacity, and the group of countries likely to graduate have quadrupled their merchandise exports compared with an increase of three times for those unlikely to graduate over 2002–15. Moving beyond the descriptive analysis and

proceeding to explore the influence of AfT on the likelihood of graduation from LDC status, it is clear that an increase in AfT disbursements per capita exerts a positive significant influence on the likelihood of graduation from LDC status. At the sectoral level, interesting results arise with regards to the interaction between sectoral disbursements. The interaction between sectoral disbursements on the enabling environment, related to enhanced connectivity through communications and businesses and other services sectors, clearly deserves far greater attention.

However, other important caveats are also urged in the interpretation of results. The LDCs likely to meet the graduation threshold by 2021 have higher gross national income per capita, and score higher on the Human Assets Index, but, crucially, they also have higher Economic Vulnerability Index scores. These results serve to reinforce the fact that, although these forthcoming graduates have been able to achieve a higher economic growth trajectory than the non-graduates, which includes improvements in human capital, they have not yet satisfactorily experienced any reduction in structural economic vulnerability. In order to really achieve sustainable graduation with momentum, there is a need for much more careful consideration of the implications of these results for the provision of fit for purpose 21<sup>st</sup> century international support measures, including related to the provision and effective targeting of AfT.

### Goodness of fit Indicators: AfTpc and likelihood of graduation

#### Goodness of fit<sup>a</sup>

	Value	df	Value/df
Deviance	598.174	670	.893
Scaled Deviance	598.174	670	
Pearson Chi-Square	677.971	670	1.012
Scaled Pearson Chi-Square	677.971	670	
Log Likelihood <sup>b</sup>	-299.087		
Akaike's Information Criterion (AIC)	602.174		
Finite Sample Corrected AIC (AICC)	602.191		
Bayesian Information Criterion (BIC)	611.194		
Consistent AIC (CAIC)	613.194		

**Dependent Variable:** graduate

**Model:** (Intercept), LogTotalPC

<sup>a</sup>Information criteria are in smaller-is-better form.

<sup>b</sup>The full log likelihood function is displayed and used in computing information criteria.

#### Omnibus test<sup>a</sup>

Likelihood Ratio Chi-Square	df	Sig.
7.381	1	.007

**Dependent Variable:** graduate

**Model:** (Intercept), LogTotalPC

<sup>a</sup>Compares the fitted model against the intercept-only model.

#### Tests of model effects

Type III		
Wald Chi-Square	df	Sig.
3.049	1	.081
7.864	1	.005

**Dependent Variable:** graduate

**Model:** (Intercept), LogTotalPC

### Goodness of fit indicators: AfT and sectoral distribution

#### Goodness of Fit<sup>a</sup>

	Value	df	Value/df
Deviance	478.197	659	.726
Scaled Deviance	478.197	659	
Pearson Chi-Square	614.138	659	.932
Scaled Pearson Chi-Square	614.138	659	
Log Likelihood <sup>b</sup>	-239.099		
Akaike's Information Criterion (AIC)	504.197		
Finite Sample Corrected AIC (AICC)	504.750		
Bayesian Information Criterion (BIC)	562.830		
Consistent AIC (CAIC)	575.830		

**Dependent Variable:** graduate

**Model:** (Intercept), TransportampStorageTotal, CommunicationsTotal, EnergyTotal, BankingampFinancialServicesTotal, BusinessampOtherServicesTotal, AgricultureTotal, ForestryTotal, FishingTotal, IndustryTotal, MineralResourcesampMiningTotal, TradePoliciesampRegulationsTotal, TourismTotal

<sup>a</sup>Information criteria are in smaller-is-better form.

<sup>b</sup>The full log likelihood function is displayed and used in computing information criteria.

#### Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	127.357	12	.000
	Block	127.357	12	.000
	Model	127.357	12	.000



## Tests of model effects

Source	Type III		
	Wald Chi-Square	df	Sig.
(Intercept)	14.526	1	.000
Transport amp Storage Total	.464	1	.496
Communications Total	5.223	1	.022
Energy Total	4.325	1	.038
Banking amp Financial Services Total	.003	1	.959
Business amp Other Services Total	4.645	1	.031
Agriculture Total	25.236	1	.000
Forestry Total	.232	1	.630
Fishing Total	1.881	1	.170
Industry Total	4.005	1	.045
Mineral Resourcesamp Mining Total	5.530	1	.019
TradePoliciesamp Regulations Total	3.969	1	.046
Tourism Total	.066	1	.797

**Dependent Variable:** graduate

**Model:** (Intercept), Transport amp Storage Total, Communications Total, Energy Total, Banking amp Financial Services Total, Business amp Other Services Total, Agriculture Total, Forestry Total, Fishing Total, Industry Total, Mineral Resources amp Mining Total, Trade Policies amp Regulations Total, Tourism Total

## Notes

- 1 This paper was developed between September and December 2017.
- 2 LDC criteria:
  - a. Income criterion, based on a three-year average estimate of gross national income (GNI) per capita for the period 2011–13, based on the World Bank Atlas method (under US\$1,035 for inclusion, above \$1,242 for graduation as applied in the 2015 triennial review).
  - b. Human Assets Index (HAI) based on indicators of (a) nutrition: percentage of population undernourished; (b) health: mortality rate for children aged five years or under; (c) education: gross secondary school enrolment ratio; and (d) adult literacy rate.
  - c. Economic Vulnerability Index (EVI) based on indicators of (a) population size; (b) remoteness; (c) merchandise export concentration; (d) share of agriculture, forestry and fisheries; (e) share of population in low elevated coastal zones; (f) instability of exports of goods and services; (g) victims of natural disasters; and (h) instability of agricultural production.

To become eligible for graduation, a country must reach threshold levels for graduation for at least two of the aforementioned three criteria, or its GNI per capita must exceed at least twice the threshold level (\$2,484 in the 2015 triennial review), and the likelihood that the level of GNI per capita is sustainable must be deemed high. Source: <http://unohrrls.org/about-ldcs/criteria-for-ldcs/>
- 3 The year 2021 was chosen, rather than the more intuitive year 2020, because in the former there will be a revision of the LDC category by the Committee for Development Policy.
- 4 See: <https://news.un.org/en/story/2018/03/1005072>
- 5 Although Kiribati and Tuvalu have already met the graduation thresholds for a future graduation, it is possible that the decision on their actual graduation will eventually be delayed, in light of their existing vulnerabilities (UNCTAD, 2016).
- 6 The first paper that provided clear evidence that AfT facilitation had a statistically significant negative impact on the cost of trading was by Cali and te Velde (2008). They found that a 100 per cent increase in AfT was associated with a decrease in the costs of importing by 5 per cent. This cost-reducing effect is robust to controlling for other relevant factors as well as to using different indicators of cost of trading (e.g. costs of exporting and time for importing).
- 7 The time fixed effect coefficient is not significant in any of the regressions, whilst the country fixed effect coefficient perfectly predicts binary response success. Perfect prediction is a problem which is very common in applications, especially in short and very short panels. Essentially this means, the country fixed effect is dropped.

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