The Effectiveness of Aid for Trade Over Time

A thesis presented in partial fulfilment of the
requirements for the degree of

Master of Business

at Massey University
Palmerston North, New Zealand

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2021

ABSTRACT

Aid for Trade (AfT) has increased in prominence since its inception owing to its aim of improving the trade performance of developing countries. AfT not only seeks to increase developing countries' trade volumes, but to also diversify their exports, particularly towards manufactured goods. At the same time, the development community has put considerable emphasis on improving the effectiveness of aid following the Paris Declaration on Aid Effectiveness (2005). The effectiveness of AfT has received much attention from the literature to date, and positive results have been found. However, one question which has not been answered is whether the effectiveness of AfT has improved over time. This study investigates whether AfT has become more effective over time at increasing aid recipient countries' exports.

Using a gravity model for 125 aid recipient countries between 2002 and 2018, this study shows that while AfT is effective, its effectiveness has not improved over the time period of this study. The results of this study also suggest that AfT is not effective in developing countries facing the greatest economic challenges, and may in fact be having a negative impact on export performance for low-income countries and countries in Sub-Saharan Africa. The implication of this is that both donor and aid recipient countries must do more to improve the effectiveness of aid. Until improvements in the effectiveness of AfT to some countries have been made, donor countries must choose to either give AfT to where it is needed most, or where it is most effective.

ACKNOWLEDGEMENTS

There are several people that I would like to acknowledge and thank for their various contributions to this study.

Firstly, I wish to sincerely thank my supervisors, Dr. Shamim Shakur, Dr. Daniel Voica, and Professor Martin Berka, for all their invaluable input into this thesis. Carrying out such a study while abroad was no simple task, but their ongoing support, communication, and guidance helped make it possible. I am grateful for the enormous amount of time and effort they have given me and will look back on this period of my life with great satisfaction.

Secondly, I would like to thank my friends and family for their immeasurable patience and support throughout my postgraduate study. A special thanks to my mother, Lynley, and dear friend, Nick, whose ideas and suggestions have been of tremendous value.

Finally, I wish to dedicate this thesis to my beloved wife, Phương. The love, inspiration, and reassurance she has given me is truly the foundation of this research. I look forward to our next chapter in an ongoing life of learning.

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LIST OF ABBREVIATIONS

AfT	Aid for Trade
CPI	Consumer Price Index
CRS	OECD Creditor Reporting System
DAC	Development Assistance Committee
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMM	Generalised Method of Movements
IDS	International Development Statistics
LDC	Least Developed Country
ODA	Official Development Assistance
OLS	Ordinary Least Squares
OECD	Organisation for Economic Co-operation and Development
SITC	Standard International Trade Classification
UN	United Nations
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
US	United States of America
US$	United States Dollar
WB	The World Bank
WDI	World Development Indicators
WTO	World Trade Organization
2SLS	Two-Stage Ordinary Least Squares

Chapter One

INTRODUCTION

1.1 Introduction

Trade expansion is one of the key factors that support a country's income growth, which in turn enhances development (Helble et al., 2012). Trade liberalization and the elimination of tariff and non-tariff barriers may be necessary, but not sufficient, conditions to achieve greater trade expansion. Pursued without wider policy support they can be harmful to developing countries' trade performance (Calì & te Velde, 2011). Developing countries face significant structural barriers that prevent them from better integrating into the global trading system (Gnangnon, 2019). These barriers include: insufficient physical infrastructure; deficient and unreliable energy supply; poor information and communication technology infrastructure; weak production capacity; a lack of services to meet international demands; and various weaknesses in trade-related institutions. It became clear in the early 2000s that trade facilitation initiatives were needed to help developing countries overcome these barriers (Basnett et al., 2012).

To address the wide range of structural barriers facing developing countries, the World Trade Organization (WTO) members launched the Aid for Trade (AfT) Initiative in 2005. The aim was to establish a structured and enhanced approach to trade-related development assistance to help developing countries expand their trade (Basnett et al., 2012). The AfT initiative prioritises existing Official Development Assistance (ODA) categories that are seen as broadly promoting trade-related economic infrastructure, productive capacity building, and trade policy and regulations to support developing countries' national export development strategies (Gnangnon, 2019). AfT seeks to help developing countries not only increase their trade volumes, but also diversify their exports, especially towards manufactured goods. As a result, AfT has received substantial interest from donor countries and multilateral institutions culminating in AfT now making up a larger share of ODA.

The Paris Declaration on Aid Effectiveness (2005) was agreed upon at a similar point in time as the AfT Initiative. It aims to achieve greater mutual accountability between donor and aid recipient

countries based on a shared agenda, clear objectives, commitments from both parties, and an emphasis on results (OECD, 2008). This has led to a substantial emphasis on assessing the effectiveness of AfT at the global, national, and project level. The AfT literature thus attempts to assess whether the theoretical grounds and aims of the AfT initiative, combined with the core principles and objectives of the Paris Declaration, can be supported by empirical evidence.

1.2 Aims and Objectives

The aim of this study is to quantitatively analyse and determine whether AfT has become more effective over time at increasing aid recipient countries' exports. To achieve this aim, this study has three objectives: First, to identify whether AfT is effective at increasing aid recipient countries' exports; Second, to determine whether AfT has become more effective over time at increasing aid recipient countries' exports; Third, to assess whether AfT is effective in developing countries facing the greatest challenges in the global trading system.

1.4 Thesis Outline

In examining the changes in the effectiveness of AfT over time, this study is structured as follows: Chapter 2 presents a review of the academic literature relating to the theoretical and empirical aspects of AfT and its impact on international trade, as well as the various ways the effectiveness of AfT has been assessed. This chapter also looks at who has benefited from AfT and how, and in what ways the three AfT subcategories have impacted on trade. Chapter 3 discusses the data, methodology and technical aspects of the gravity model used in this study, while Chapter 4 presents and interprets the empirical results. Chapter 5 concludes, summarizing the findings, discussing relevant policy implications, and suggesting areas of future research.

Chapter Two

LITERATURE REVIEW

2.1 Introduction

This chapter considers the literature examining the effectiveness of Aid for Trade (AfT) on aid recipient countries' trade performance. Foreign aid remains an important income source for most low-income countries, and its impact remains vital for economic and social development (Arellano et al., 2009; Gounder, 1994, 1995; Hudson, 2015). Since its launch in 2005, aid going towards AfT has substantially increased in volume and yet the ongoing trade difficulties facing developing countries persist. This has made AfT an important topic within the broad debate on aid effectiveness. Identifying the extent to which AfT is effective and how it can be improved to enhance economic diversification and empowerment can lead to greater stability and development outcomes (Gounder, 2015; OECD & WTO, 2019).

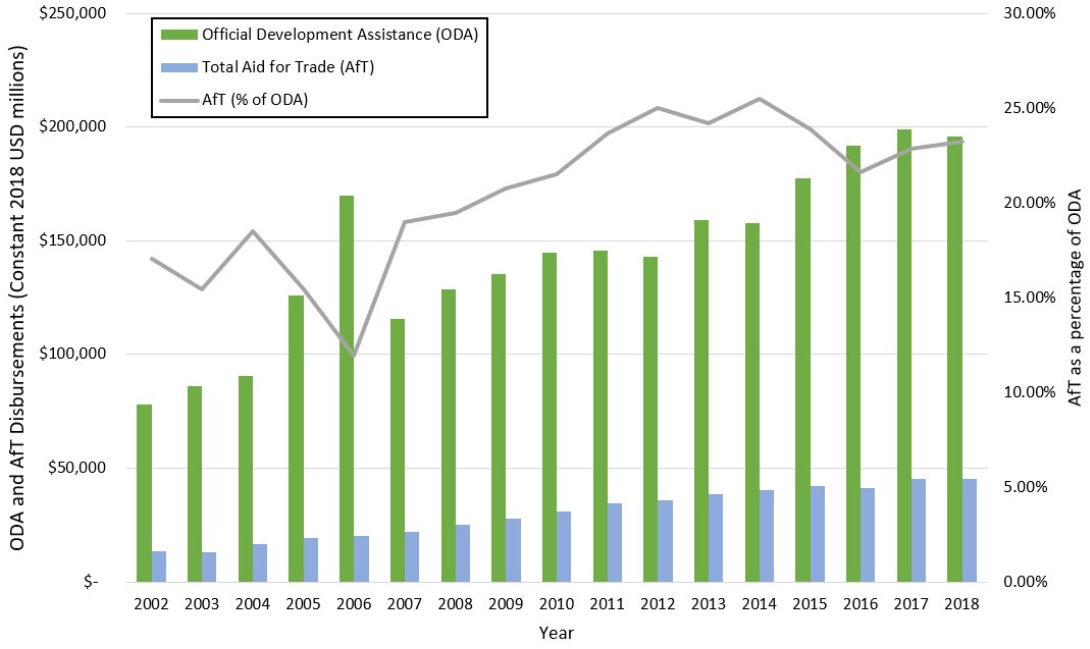
Trade flows are vital for developing countries as they can be a powerful engine for economic growth, poverty reduction, and development (Hallaert, 2009). Harnessing this power has been an ongoing problem for many developing countries, especially the least developed countries (LDCs) whose share of world trade is still below 1 per cent (Hallaert, 2009; OECD & WTO, 2019). Most of the LDCs continue to rely on a small number of primary commodities for their exports, making them extremely vulnerable to external shocks. Developing countries also face unique challenges in the global trading system and market access alone is considered insufficient (Vijil & Wagner, 2012).

2.2 The Aid for Trade Initiative

The Aid for Trade Initiative was launched with the aim of tackling the vulnerabilities and challenges facing developing countries when trying to expand trade, diversify their economies, and maximise their economic potential (OECD & WTO, 2019). To achieve this, the AfT Initiative seeks to assist in trade strategy and negotiations, policy development, implementing outcomes, improving infrastructure to enhance competitiveness, developing capacity to address standards,

and improve regional integration and competitiveness (Gounder, 2015). Based on what AfT hopes to achieve in theory, donors have substantially increased their aid to recipient countries.

Figure 2.1 ODA and AfT Disbursement Trends, 2002-2018



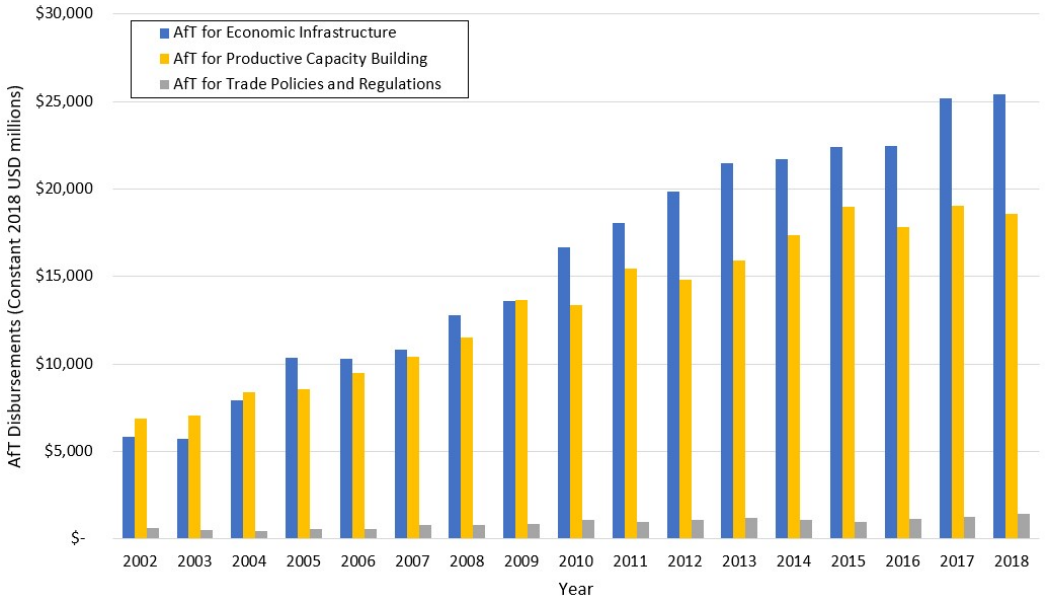
Source: Author's calculation using the OECD CRS database.

Figure 2.1 shows that annual AfT flows have increased to US$45.5 billion in 2018 from US$19.4 billion since its inception in 2005. With such a significant share of ODA being directed to AfT, assessing the effectiveness of this aid has become an important area in the foreign aid literature. Despite substantial emphasis being placed on aid effectiveness following the Paris Declaration, early literature did not find substantial evidence that past attempts to support export development were a success (Vijil & Wagner, 2012). However, more recent literature suggests that AfT may be having a positive impact in improving developing countries' trade performance (Gnangnon & Roberts, 2017; Hühne et al., 2014, 2015; Kim, 2019; Martínez-Zarzoso et al., 2017; Pettersson & Johansson, 2013; Vijil & Wagner, 2012; Wang & Xu, 2018). This research endeavours to address the following: who benefits from AfT, how and to what extent they benefit; and the effectiveness of the three main AfT subcategories.

Although the AfT initiative was formally established in 2005, the OECD sector codes that make up AfT existed well before then. Hence this study and the AfT literature, in general, make use of data prior to 2005. The three main subcategories of AfT are economic infrastructure, productive

capacity building, and trade policies and regulations. These make up 52.4, 43.3, and 4.3 per cent respectively of total AfT disbursements from the Development Assistance Committee (DAC) member countries in 2018.

Figure 2.2 Aid for Trade Disbursements from All Donors by Category, 2002-2018



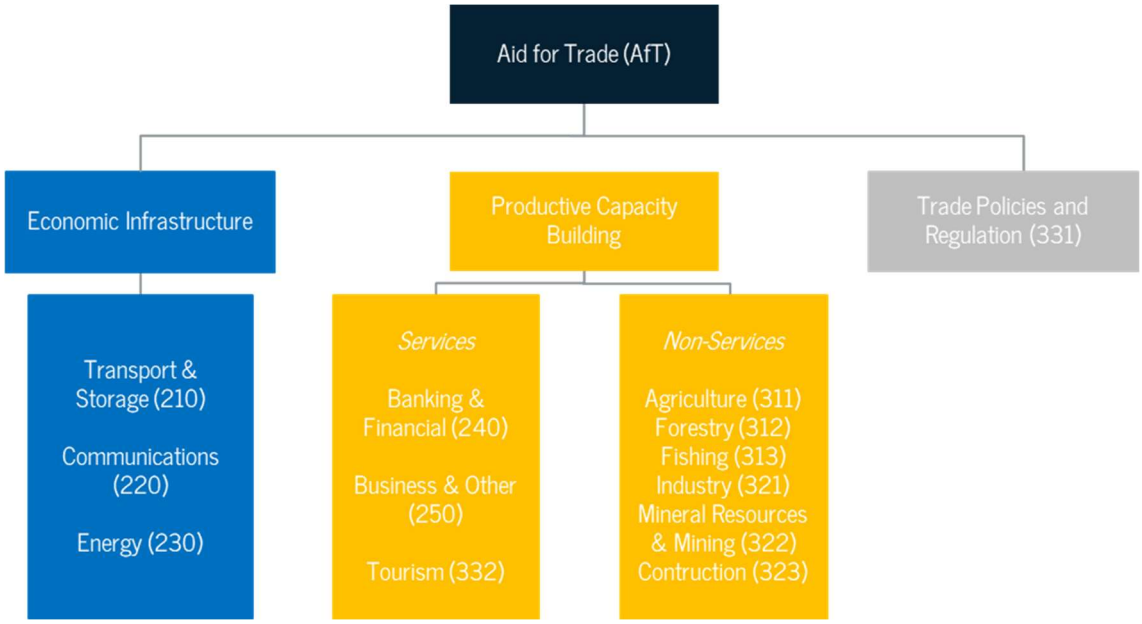
Source: OECD Development Committee's International Development Statistics (IDS) online database.

AfT for economic infrastructure receives the greatest share of funding and is an important channel through which AfT has had a significant impact on developing countries. Poor infrastructure results in higher costs of trade and longer transport times. This adversely affects developing counties firms' ability to compete internationally, especially those from LDCs. AfT for economic infrastructure is viewed favourably by many recipients and donors with US$25.4 billion being disbursed by donors in 2018, having increased nearly fivefold since 2002 (see Figure 2.2). The main infrastructure areas are transport, energy, and communications (see Figure 2.3), all of which improve economic activity and increase economic diversification.

Weak goods and services production capacity is a major problem in developing countries when trying to meet international demand, making AfT for productive capacity building a fundamental part of AfT (Gnangnon, 2019). As a result, this AfT category receives the second highest share of AfT funding. AfT disbursements for productive capacity building were at US$6.9 billion in 2002, more than doubling to US$18.6 billion in 2018 (see Figure 2.2). Aid to this category goes to both service and non-service sectors. The service sectors included are banking and financial services,

business and other services, and tourism. The non-service sectors are agriculture, forestry, fishing, industry, mineral resources and mining, and construction, with most AfT for building productive capacity going toward non-service sectors and agriculture in particular (Martínez-Zarzoso et al., 2017).

Figure 2.3 Aid for Trade Subcategories and OECD CRS Codes



Source: Author's own illustration based on OECD Development Committee's International Development Statistics (IDS) online database.

Receiving the least amount of donor funding out of the three subcategories, evidence suggests that AfT for trade policy and regulations has a strong positive impact on recipient exports (Busse et al., 2012; Helble et al., 2012; Martínez-Zarzoso et al., 2017; Wang & Xu, 2018). In 2002, funding stood at US$614 million, reaching US$1.4 billion in 2018, making up merely 3.13 per cent of total AfT (see Figure 2.2). AfT for trade policies and regulations aims to increase exports by assisting recipient countries' participation in multilateral trade negotiations, supporting the implementation of multilateral trade agreements, and improving general trade policy, technical standards, customs regimes, and tariff structures (Helble et al., 2012).

As AfT disbursements steadily increase each year, the WTO continue to promote it as a means to raise incomes and human development, as well as reducing extreme poverty (OECD & WTO, 2019). The WTO emphasises that trade facilitation centred around national priorities is the best way to contribute to an environment where business can prosper. This is especially the case for

micro, small and medium-sized enterprises, which are a fundamental part of most developing countries' economies. AfT supports this by fostering economic diversification, promoting technology and knowledge development, enabling disempowered members - such as women and youth - to engage in trade and enhancing growth in sectors with entrepreneurial opportunities (OECD & WTO, 2019). Furthermore, the challenges and binding constraints facing developing countries are also not static, constantly changing over time. This makes it more difficult to identify where AfT is needed most and what it impacts the most (Hoekman & Wilson, 2010).

Following the principles agreed upon in the Paris Declaration, donors and aid receiving governments have placed greater emphasis on overcoming the above-mentioned challenges (Donaubauer & Nunnenkamp, 2016; OECD). This attracted further attention following the 2008-2009 economic crisis as donor government aid budgets came under strain and greater scrutiny (OECD & WTO, 2013). In order to enhance the effectiveness of aid, the Paris Declaration recommended several areas of focus. These included the need for donor and recipient governments to establish frameworks for mutual accountability; the expectation that donor governments' aid projects and programmes are aligned with the priorities of recipient countries; and that recipient countries are committed to providing more result-focussed leadership and support (OECD & WTO, 2013).

While countries have attempted to implement these recommendations, there currently doesn't appear to be any empirical study that assesses this in terms of AfT. The academic literature typically considers AfT in terms of its impact on aid recipient countries' trade performance, with some exceptions. The following section presents the theoretical background to the gravity model which is widely used to assess the impacts of AfT.

2.4 The Gravity Model

This section discusses the literature that establishes and develops the theoretical and methodological foundations of the gravity model, followed by a summary of the studies that employ the gravity model to assess the effects of AfT on aid recipient countries' trade performance.

2.4.1 Gravity Theory

Prior to winning the first Nobel Prize for economics in 1969, Jan Tinbergen (1962) introduced and laid the foundations of the gravity model. The gravity model has since developed into one of the most successful empirical models in economics and the most widely used econometric model for studying the effects of international trade and trade-related policies (Anderson, 2011; De Benedictis & Taglioni, 2011; UNESCAP, 2016).

Tinbergen's seminal work aimed to determine the standard pattern of international trade in the absence of trade impediments. His econometric model was based on the general idea of Newton's law of universal gravitation, in which trade flows are directly and positively related to the economic size of the countries engaging in trade while being inversely related to the distance between them (De Benedictis & Taglioni, 2011). In its infancy, the gravity model achieved success empirically, leading to considerable interest from theorists. It also suffered much criticism due to unclear assumptions, a lack of explicit restrictions and few theoretical foundations (De Benedictis & Taglioni, 2011; Head & Mayer, 2014; UNESCAP, 2016).

This began to change when James Anderson (1979) proposed a theoretical framework of the gravity model which was based on a demand function with Constant Elasticity of Substitution (CES) developed by Armington (1969). Further theoretical advancement was undertaken following Anderson's initial contribution (Bergstrand, 1985, 1989; Deardoff, 1998; Eaton & Kortum, 2002; Krugman, 1980), but it was Anderson and van Wincoop's (2003) work that laid the fundamental theoretical microfoundations of the gravity model used by researchers currently.

In a time when popular belief was that 'national borders' and 'distance' had lost their economic relevance, McCallum (1995) used the gravity model to strongly refute this notion (Head & Mayer, 2014). In an attempt to resolve the issues raised by McCallum (1995), Anderson and van Wincoop (2003) developed a demand-side model taking production as exogenous (Novy, 2013). The model assumes that each country is endowed with a single good, and goods are differentiated across all countries. Consumers can freely enjoy a wide range of both domestic and foreign goods, with consumer preferences assumed to be identical across all countries and following a constant elasticity of substitution utility (Novy, 2013; UNESCAP, 2016). On the production side, the model makes the standard assumptions following Krugman (1979) (UNESCAP, 2016). A firm produces a single, unique product and enjoys increasing returns to scale. They are free to sell their goods

either locally, or internationally, incurring no transport costs when selling locally, while incurring transport costs when selling abroad. Consumers thus consume goods from all countries, however, the prices of international goods are adjusted upwards to take into account the cost of transportation (Novy, 2013; UNESCAP, 2016). These basic microfoundations provide the basis for deriving an equilibrium in which all firms produce goods for the local and international markets, and consumers correspondingly consume.

The two most important contributions Anderson and van Wincoop (2003) made to the gravity model theory are 'Multilateral Resistance' and the identification of possible selection bias. Multilateral Resistance refers to the fact that bilateral trade flows are not only influenced by trade impediments at the bilateral level, but also by the weight of these impediments relative to trade impediments with all other countries. They also highlight concerns relating to selection bias arising from the assumption of heterogeneous firms operating internationally as implied by studies such as Krugman (1980). Not all firms operate in international markets, and the few that do tend to export to a limited group of countries (De Benedictis & Taglioni, 2011).

In order to produce a gravity model from the outlined microfoundations, a set of macroeconomic accounting identities are required (UNESCAP, 2016). Aggregating across all firms in a single economy allows for the derivation of an expression for a country's total exports. With a country's total exports as the dependent variable and the sum of all that country's production being equal to GDP, several steps of appropriate aggregation lead to Anderson and van Wincoop's (2003) "gravity with gravitas" model:

$$logX_{ij}^{k} = logY_{i}^{k} + logE_{j}^{k} - logY^{k} + (1 - \sigma_{k})\left[log\tau_{ij}^{k} - log\Pi_{i}^{k} - logP_{j}^{k}\right] \qquad (1)$$

where X is exports from country i to country j in sector k; Y_{ik} is country i's *GDP* in sector k; E is country j's expenditure in sector k (which may not necessarily be the same as GDP on a sectoral basis); Y_k is aggregate world GDP in sector k; σ_k is the elasticity of substitution in sector k; τ_{ijk} are the trade costs facing exports from country i to country j in sector k (UNESCAP, 2016).

The key feature of Anderson and van Wincoop's (2003) work is the outward and inward multilateral resistance terms, derived as (UNESCAP, 2016):

$$\log\Pi_i^k = \sum_{j=1}^{C} \left\{ \frac{\tau_{ij}^k}{P_j^k} \right\}^{1-\sigma_k} \frac{E_j^k}{Y^k} \tag{2}$$

$$\log P_j^k = \sum_{i=1}^{C} \left\{ \frac{\tau_{ij}^k}{\Pi_i^k} \right\}^{1-\sigma_k} \frac{Y_i^k}{Y^k} \tag{3}$$

The outward resistance term (2) accounts for the fact that exports from country *i* to country *j* depend on trade costs across all export markets. Similarly, the inward resistance term (3) considers the dependence of imports into country *i* from country *j* on trade costs across all possible import partners. As these multilateral resistance terms include trade costs across all bilateral trade routes, Anderson and Wincoop's (2003) model thus explicitly accounts for the fact that trade costs associated with one bilateral route can impact on trade flows of all other routes due to relative price effects (UNESCAP, 2016).

Anderson and van Wincoop's (2003) contribution to the gravity model is undoubtedly the most significant, however, improvements have been made by others since then. Much of the literature has focused on attempting to further refine the meaning and importance of 'distance' in the gravity model (Anderson & van Wincoop, 2004; Blum & Goldfarb, 2006; Harrigan, 2010; McCallum, 1995). Novy (2013) was one of the most successful in this regard and pointed out that Anderson and van Wincoop's model may still have its drawbacks in regards to 'distance'.

He argues that the trade cost function they created may be misspecified and could potentially be omitting trade cost variables (Fang & Shakur, 2018). Furthermore, trade costs may be asymmetric in the real world. Novy offers solutions to these problems by providing a microfounded measure of bilateral trade costs. The main benefits of this measure is that it captures a wide range of trade cost variables into one single measure, which makes it easier to compute as the multilateral resistance issues have already been resolved (Fang & Shakur, 2018).

Novy's methodology for measuring trade costs has since been adopted and used by the United Nations and World Bank to create a trade cost database that gathers and weights all appropriate distance measures into one easy to use bilateral trade cost measure (UNESCAP, 2021). As such, this study prefers to utilise Novy's trade cost measure over the typical trade cost (distance) measures used in past literature.

2.3.2 The Gravity Model in the Aid for Trade Literature

With proven success throughout the international trade literature, the gravity model has also been widely used by the literature concerned with the effectiveness of aid on recipient countries' trade performance. This is because the gravity model is regarded as the best model for capturing the full export gains associated with aid (Helble et al., 2012; Hühne et al., 2014, 2015; Pettersson & Johansson, 2013; Wagner, 2003). Most empirical evidence suggests that AfT benefits both recipients and donors. This contradicts the cynical view that donor countries participate in aid for trade primarily to advance their own export and commercial interests (Hühne et al., 2014). The AfT literature that uses the gravity model presents evidence on several aspects of AfT. These include the benefits of AfT for donors; the benefits of both donors and recipients; its impact on recipient countries' export upgrading; the impact on services trade; the role of existing development; and the impact of the three main AfT subcategories on trade.

As the AfT initiative aims to improve the export performance of recipients and not donors, much of the AfT literature focuses on recipient benefits from AfT, ignoring the possibility that donors may also be beneficiaries of their aid. The studies that do assess this possibility all conclude that AfT, and aid in general, can bring significant benefits to donors (Gounder, 2015; Helble et al., 2012; Hühne et al., 2014; Pettersson & Johansson, 2013; Wagner, 2003). One of the earliest and most notable studies that looked at the benefits donors receive from giving aid, in general, is Wagner (2003). He uses the gravity model to assess the impact foreign aid to 129 recipient countries (total official development assistance, not aid for trade) has on increasing donor country exports from 1970 to 1992. The motivation and conclusion of this study is that donor countries continue to receive significant export benefits from the aid they give, implying that aid is to some extent still tied, albeit unofficially. He presents evidence of a clear link between aid and donor exports, suggesting that aid may increase donor exports of goods by as much as 133 per cent. This, he argues, is sufficient evidence to imply that aid may be tied to trade to a greater degree than official reports suggest.

One key methodological contribution Wagner makes to subsequent literature is the use of a 'no-aid dummy' variable. This variable allows for the fact that there are many instances where aid is zero. Losing this data or employing other inferior techniques to avoid losing this data, can lead to significant changes in the aid coefficient. Wagner (2003) uses traditional gravity variables in his

model specification, including GDP per capita for both donors and recipients (aggregate GDP divided by population), distance, remoteness, and a common language dummy.

Using the same version of the gravity model and variables as Wagner (2003), Gounder (2015) assesses whether AfT to the Asia-Pacific region leads to export benefits for donors. Gounder specifically focuses on the relationship between Australian and New Zealand's aid and their exports of goods to 40 Asia-Pacific developing countries. Using disaggregated AfT data for the period 2002 to 2012, she uses the gravity framework and finds that AfT produces significant export benefits for donors. She also finds that as the gross domestic product of Asia-Pacific countries increases, so too does the donors' aid to these countries. This is suggestive of a greater capacity of these countries to import via aid-trade linkages. In support of Wagner's findings, she concludes that it, therefore, seems plausible that in many cases, donor aid is either explicitly or implicitly tied and that donors are to some degree motivated by self-interest (Gounder, 2015; Hühne et al., 2014; Pettersson & Johansson, 2013). When disaggregating AfT into its three main subcategories, Gounder also reports that AfT for economic infrastructure is positively correlated with donors' exports. These are interesting results for donors and LDCs where the main objective of aid is often to reduce the binding constraint of a lack of infrastructure. Contrary to much of the literature that focuses on all regions, she finds that AfT for productive capacity building increases donors' exports by 2.8 per cent. This suggests that the impact of AfT for productive capacity building on donors' exports may vary across different regions or donor-recipient country relationships.

Owing to the prevailing sceptical view that donor countries give aid selfishly in support of their export industries, a number of studies employed the gravity model to investigate whether this was the case for AfT (Helble et al., 2012; Hühne et al., 2014; Pettersson & Johansson, 2013). It has been found that while AfT does lead to an increase in donor country exports to recipient countries, it has also been found that recipient countries' exports increase by a greater amount. Thus, it can be concluded that while donors may have their own interests in mind, this may not be the primary reason they give AfT (Helble et al., 2012; Hühne et al., 2014; Pettersson & Johansson, 2013).

Helble et al. (2012) was one of the first studies to use the gravity model to specifically analyse AfT's impact on recipient countries' export and import volumes. Their model was based on Anderson and van Wincoop (2003), with a dataset of 40 donor countries and 170 country trading pairs from 1990 to 2005. Accordingly, both time fixed effects and bilateral fixed effects that time

varying are used in their estimations. Their main gravity variables include donor and recipient countries' GDP, importer's applied tariff, distance, common language, and colonial ties. The results presented in their study are suggestive of a small but positive relationship between AfT and trade, with AfT for trade policy and regulation making up a large portion of this. Their results indicate that a single per cent increase in this type of aid would result in a US$347 million increase in recipient country exports.

Analysing the relation between aid and bilateral exports of 184 countries between 1990 and 2005 using the gravity model, Pettersson and Johansson's (2013) results are in line with Helble et al. They also use the same time period, bilateral observations, and a similar version of the gravity model with exporter and importer fixed effects and time dummies. They employ a number of the same gravity variables, with the main difference being they do not include a tariff variable. They use an RTA dummy variable equal to one in cases where a donor and recipient country are members of the same regional trade agreement. While they confirm findings from previous literature that donors benefit from aid, they too find a correlation between recipient aid and recipient exports, concluding that aid is not only conditioned on donor exports. However, AfT's positive impact on both donor and recipient countries' exports is still small.

Using a longer time period of 1990-2010, Hühne et al. (2014) compare the effects of AfT from all DAC donors on recipient countries' exports and imports to and from donors. They use a version of Anderson and van Wincoop's (2003) gravity model and aggregate the bilateral components of the model. Their gravity variables include recipient countries' GDP and they also construct a proxy of market access and trade costs. This proxy includes the weighted sum of donor countries' GDP and population, and the distance between donor and recipient. Finally, they run pooled regressions and test for the differences between the coefficients of exports and imports by using a Wald test (Hühne et al., 2014). They estimate that a doubling of total AfT could result in an increase in recipient exports by approximately 5 per cent. In comparison, recipient imports from donors would increase by around 3 per cent. This result provides further evidence that AfT increases recipient countries' exports to a greater extent than donor countries' exports.

While it may be true that recipients benefit more from AfT than donors, Hühne et al., Pettersson and Johansson, and Helble et al.'s results indicate that further explanation of the link between aid and recipient exports is required. Pettersson and Johansson offer several possible explanations,

including a lower effective cost of the distance between bilateral partners, greater preference for donor commodities, as well as familiarisation and enhanced relations between partners. Whatever the explanation, what is clear is that the previously held belief that donors are solely motivated by self-interest seems no longer plausible (Hühne et al., 2014, 2015; Pettersson & Johansson, 2013).

Most AfT programmes are focused on upgrading recipient countries' exports of goods. Thus, most of the literature that uses the gravity model to study the impacts of AfT on trade tend to focus on merchandise trade. However, more recently, Hoekman and Shingal (2020) use the gravity model to study the relationship between AfT and trade in services. Their study, which also includes goods trade, uses OECD AfT data for 28 donors and 162 recipients and performs both bilateral analysis from 2002 to 2010 using the gravity model as well as aggregate analysis from 2002 to 2015 using augmented export and import demand functions using fixed effects specifications. The dependent variables they use are exports and imports of both goods and services. The independent variables include AfT, a no-aid dummy as per Wagner (2003), population, distance, GDP, Consumer Price Index (CPI), government effectiveness, and foreign direct investment (FDI). They find a statistically weak effect of AfT on goods and services trade. However, they find that AfT aimed at services sectors, such as infrastructure, may have a positive impact on recipient countries' goods exports to donor countries.

Tadesse et al. (2019)'s study specifically focuses on institutional quality and its impact on the effectiveness of AfT on bilateral trade costs. They use a sample of 133 developing countries covering the period from 2002-2014 and employ a gravity and mixed effects model. Their findings suggest that greater institutional quality positively impacts the effectiveness of AfT inflows by lowering bilateral trade costs. However, this effect varies greatly across institutional quality measures used in the study, although it is generally more pronounced at higher levels of institutional quality. While institutional quality has been found not to be a determinate of infrastructure (Vijil & Wagner, 2012), it may still improve the effectiveness of AfT. This could be due to it influencing domestic firms in recipient countries to participate in international trade, making it easier to find and choose trading partners, reducing the costs of trade, and expanding the potential goods that can be traded (Tadesse et al., 2019). This lends further support to a push for increasing AfT for trade policy and regulation.

The AfT initiative has had a particular focus on helping low-income countries as they are faced with the most severe constraints (WTO, 2005). However, the evidence of AfT effectiveness varies depending on the level of development of the recipient county, although the results are somewhat mixed. Evidence from Hühne et al. (2014) suggests considerable variation in the effects of AfT between low, lower-middle, and upper-middle income countries. Their results indicate limitations to the effectiveness of AfT for the low income recipient countries. Middle income countries, who face fewer supply constraints, were found to benefit the most from AfT through export promotion as these nations have a higher proportion of manufactured exports, which tend to respond more strongly to incentives than commodities.

One of the major trade obstacles facing many developing countries is that they struggle to upgrade and diversify their exports from a small number of primary commodities they have historically relied on. Employing the same gravity model specification, variables and sample of countries as their 2014 study, Hühne et al. (2015) show that AfT has contributed to recipient country export upgrading over the period 1990 to 2012. Their results show a modest impact, with a doubling of total AfT being associated with approximately 4 per cent increase in manufactured exports, while the impact on primary commodities is generally insignificant. Studying all aid recipient countries as a whole and their exports to both donors and all trading partners, they do not show whether AfT to low income aid recipient countries leads to export upgrading for these countries, which would be of great interest. What their results do show is that the widely held belief that aid is generally motivated by donors' self-interest in gaining access to raw materials in developing countries is not supported (Hühne et al., 2015).

Initially, empirical studies on the effectiveness of AfT were limited by a lack of quality sectoral data and time span. The recent literature has progressed with greater certainty that donors, and more importantly recipients, benefit from AfT. The improved data has also allowed for more reliable studies on the effectiveness of the three main subcategories of AfT: economic infrastructure; productive capacity building; and trade policies and regulations. An empirical assessment of these subcategories on their own, is important as it enables donors to assess which channels have the greatest impact which in turn can help improve future aid policy (Calì & te Velde, 2011; Gounder, 2015; Kim, 2019; Vijil & Wagner, 2012). While not all the literature comes to the same conclusions, several patterns do emerge. Understanding how targeting AfT to these

specific subcategories promotes better trade outcomes for recipients could help focus donor attention on what brings the greatest return on donor aid (Helble et al., 2012).

Vijil and Wagner (2012) use the gravity model to study the impact AfT for infrastructure has on recipient countries' exports. Utilizing a sample of developing countries between 2002-2008 to estimate their results, they use the gravity model with ordinary least squares (OLS) and two-stage ordinary least squares (2SLS). Their study employs aid commitment data as disbursement data is only reliably reported by both DAC members and the European Commission, not for multilateral institutions which they have chosen to include in their study. They also point out that the change in paradigm in which aid is given in the 2000s may mean that using earlier years may lead to results that show structural changes in the aid relationship that blur their results. Vijil and Wagner use a range of fundamental gravity variables plus infrastructure specific variables in their models. They use both exports as well as exports over GDP as their dependent variables. Their independent variables include infrastructure quantity, quality of institutions, GDP, population, international market access for exports, and AfT per capita. Their main finding is that it is only through the infrastructure channel that AfT positively impacts export performance, a result also found by other studies (Calì & te Velde, 2011; Vijil & Wagner, 2012).

When disaggregating aid to study the specific effects of the three main AfT subcategories, Pettersson and Johansson's (2013) results provide no evidence of AfT for building productive capacity having any impact on recipient or donor exports. Other notable studies also provide evidence supporting this finding (Calì & te Velde, 2011; Vijil & Wagner, 2012; Wang & Xu, 2018). Contrary to these studies, when looking at Australian and New Zealand exports to Asia-Pacific, Gounder (2015) reports that AfT for productive capacity building increases donors' exports by 2.8 per cent. This suggests that the impact of AfT for productive capacity building on donors' exports may vary for different donor-recipient country relationships.

When empirically assessing AfT's impact on structural transformation in Sub-Saharan Africa over the period 1990-2010, Cirera and Winters (2015) use several estimation techniques, including the gravity model. In contrast with most of the literature, they find a lack of impact of AfT on trade costs and flows, while still demonstrating that AfT for trade policies and regulations reduce the time to export and import in Sub-Saharan Africa. Their results also show that a certain level of heterogeneity exists in terms of structural change within the region which must be explained by

factors other than AfT. The lack of impact of AfT in Sub-Saharan Africa is worrying as many countries in the region face significant challenges in terms of trade expansion.

The positive impacts of AfT for trade policies and regulations have been found by other studies to not only reduce time but also trade volumes for both recipients and donors (Gounder, 2015; Hühne et al., 2014). When assessing aid for trade regulation from Australia and New Zealand to recipients in Oceania, Gounder (2015) finds that exports from these two donors to recipients increase by 14.9 per cent. This, she argues, implies that recipient countries are regulating their markets in accordance with donor requirements. Vijil (2014) finds that AfT for trade policies and regulations is the most effective AfT category at increasing bilateral trade when factoring in the regional economic integration of country pairs. Using standard gravity model variables and an economic integration variable over the period 1995-2005, his results suggest that when countries share a higher level of economic integration, this makes AfT more effective at increasing bilateral trade.

Overall, the evidence from studies that use the gravity model suggests that increasing AfT for trade policy and regulation has a significant impact on trade for both recipient and donor countries (Busse et al., 2012; Gounder, 2015; Helble et al., 2012; Hühne et al., 2014; Pettersson & Johansson, 2013). This is an important finding considering that this type of aid makes up only 2.8 per cent of total AfT and, while having increased in absolute dollar terms, has in fact decreased as a percentage of total AfT over the past decade. Increasing this type of aid should therefore be a priority for donor countries.

The literature that uses the gravity model to assess the impact of AfT on recipient countries' trade performance generally follows similar methodologies, although all deviate slightly on which of the typical gravity variables are most appropriate. The findings are generally consistent and show that AfT has a small but positive impact on recipient countries' trade performance but also benefit donors. Evidence presented suggests that AfT may not be having the desired positive impact on low-income countries and in Sub-Saharan Africa, though the reasons for this are unclear. The overall positive impact of AfT seems to be driven mainly by aid for economic infrastructure. At the same time, results also suggest aid for trade policies and regulations may also be effective in improving aid recipient countries' trade performance. With a greater depth of reliable data available now compared to when many of these studies were published, ample scope remains to further assess the impact of AfT on recipient countries' trade performance using the gravity model.

2.4 Empirical Studies Using Alternative Models

While the gravity model has been the most popular model used to assess the impacts of AfT on aid recipient countries' trade performance, many studies have opted to use a wide range of alternative models. These studies have generally focused on similar topics to the studies using the gravity model, and include: AfT's impact on export upgrading; the effectiveness of AfT depending on recipient countries' income levels; institutional quality's role on the effectiveness of AfT; and the impact of the three main AfT subcategories on trade.

Export upgrading is a key component of the broad objective of AfT to help recipient countries expand trade. Export upgrading consists of diversification at the intensive and extensive margins and improving export quality (Gnangnon & Roberts, 2017). Extensive margin diversification refers to the variety or volume of exports and/or trading partners, while the intensive margin is the proportion of goods and services a country exports and/or a change in the prices of exports (OECD & WTO, 2019). The OECD and WTO (2019) place significant emphasis on export diversification. It is an integral part of reducing developing countries' structural vulnerabilities, helps sustain economic growth, creates a wider range of opportunities for all people, and reduces poverty and inequality. Wang and Xu (2018) estimate a structurally derived equation restricting their country selection to non-OECD exporters and excluding trade with four major non-OECD donors (China, India, Saudi Arabia, and Brazil) between 2002-2010. Interestingly their results indicate that AfT can also improve the quality of recipient country exports. This, they argue, stems from increasing the range of products and markets to other developing countries. Gnangnon and Roberts (2017) provide results in line with Hühne et al. and Wand and Xu. Using a two-step generalised method of movements (GMM) technique they analyze 83 countries receiving AfT and FDI inflows between 1995 and 2010 and note that AfT programmes are associated with export upgrading in recipient countries.

Focusing on AfT effectiveness from the point of view of export diversification, Kim (2019) employs a two-step GMM technique using a sample of 133 countries receiving aid from DAC member countries over the period from 1996-2013. She presents evidence that suggests AfT has a very limited impact on export diversification, suggesting three possible reasons why her findings may indicate a limited impact compared to others. Firstly, by reducing fixed costs, AfT does not necessarily create opportunities for new products or sectors, rather it may tend to encourage further

investment in sectors already performing well. This reasoning has been confirmed empirically by Gnangnon and Roberts (2017). They demonstrate that AfT tends to lead to an increase in the volume of existing products (greater diversification at the intensive margin) for which a country may already have a comparative advantage. Secondly, Kim's study only observed the impact of AfT over a few years due to data constraints. Thus it is possible that the impacts of AfT on export diversification may take longer to materialise. Thirdly, the OECD data she used is limited in that it does not include new donors such as China as well as recently established multilateral organisations. Furthermore, her study uses OECD Creditor Reporting System (CRS) data from 1996 onward. However, the OECD recommends not using CRS disbursements for analysis prior to 2002 as annual coverage is below 60 per cent (OECD, n.d.). Kim's empirical study is still of some interest as it is not in line with the rest of the literature, although she notes her "findings are not conclusive" (Kim, 2019, p. 2719).

As the AfT initiative stresses the importance of assisting low income countries, several studies using alternative models to the gravity model have also tried to investigate whether low income countries have been benefiting from AfT. They have also found that while the effectiveness of AfT effectiveness tends to depend on the level of development of the recipient country, the results are somewhat mixed. Kim et al.'s (2020) study of 102 developing countries using data from 2002 to 2017 and fixed effects and random effects models presents similar results to Hühne et al.'s (2014) gravity model study. They conclude that AfT is only effective in some recipients' countries that already experience higher growth rates. It is thus possible that high-quality infrastructure and a stable economic environment are preconditions for the effectiveness of AfT. This suggests that donors and recipient country policymakers of low income countries should develop infrastructure and strong economic policy. However, not all studies provide evidence to support this with several studies showing that low income countries may already be benefiting more than others from AfT (Gnangnon & Roberts, 2017; Martínez-Zarzoso et al., 2017; Munemo, 2011).

Using a panel dataset of 124 countries over the period from 2000 to 2011, Martínez-Zarzoso et al. (2017), use a panel quantile regression to find that a doubling of AfT corresponds to an increase in recipient country exports of about 3 to 6 per cent. The increase in exports depends on the level of existing exports, with AfT having a more positive impact on exporters below the median (0.1, 0.25, 0.35, 0.5 quantiles). Assuming that the LDCs are likely to be in the category of low volume

exporters, then it could be inferred that LDCs are some of the main beneficiaries of AfT. Gnangnon and Roberts (2017) provide evidence that LDCs, compared to non-LDCs, benefit more from AfT on the diversification of exports at both the intensive margin and the improvement of the quality of exports. However, export concentration is higher at the extensive margin. Furthermore, their results suggest that AfT can play an important role in upgrading exports in recipient countries when used with FDI inflows. This, they argue, should encourage policymakers in recipient countries to take account of the relationship between these two external capital flows when developing export strategies and FDI related policies.

It is acknowledged that institutional quality plays an important role in trade performance through its impact on transaction costs (Berrittella & Zhang, 2014; Tadesse et al., 2019). This is an important observation as lesser developed countries tend to have weaker institutions more developed countries. Berrittella and Zhang (2014) use data from 16 regions from 2001-2010 and are the first to use a multi-country computable general equilibrium model to empirically assess the effectiveness of aid for trade subcategories. They assess the effectiveness of AfT in terms of three indicators (trade balance, welfare and income) and find that AfT is effective, but its effectiveness is strongly dependent on the institutional quality in recipient countries and by region. In regions where strong institutions and robust aid agenda already exist, higher levels of AfT tend to improve governance and increase social spending. Conversely, in countries experiencing economic decline, political instability, corruption, and no aid reform agenda, higher levels of AfT lead to further declines in the quality of governance and social spending (Berrittella & Zhang, 2014).

The impact of the three main AfT subcategories on trade has received signficant attention from the literature using the gravity model and alternative models alike. The general consensus is that AfT-related infrastructure has a positive effect on recipient countries' exports, but the extent can vary (Calì & te Velde, 2011; Martínez-Zarzoso et al., 2017; Vijil & Wagner, 2012; Wang & Xu, 2018). A lack of infrastructure may be a significant constraint to increasing exports, especially in Sub-Saharan Africa. Investigating trade performance using a sample of 100 and 130 developing countries in the mid-2000s Calì and te Velde (2011) find that aid to economic infrastructure has a positive and causal effect on exports and the estimated elasticity of exports. This result is in line with studies that use the gravity model (Hühne et al., 2014; Pettersson & Johansson, 2013; Vijil & Wagner, 2012). Interestingly, this impact is more pronounced in Sub-Saharan Africa, which is

contrast to Cirera and Winters' (2015) findings. Martínez-Zarzoso et al. (2017) propose that low income countries appear to benefit the most from aid for infrastructure. Using a similar methodology to Calì and te Velde (2011), they find a doubling of infrastructure-related aid can result in a 2-3 per cent increase in exports for countries with the lowest levels of exports.

Many developing countries, particularly LDCs, experience export revenue instability due to a high degree of commodity concentration, small export sectors, natural disasters, weather vagaries and geographical constraints (Gnangnon, 2018; Gounder, 2015). When assessing the effectiveness of AfT for building productive capacity in conjunction with multilateral trade liberalization, Gnangnon (2018) employs a within fixed effects estimator for 119 countries between 2002 and 2013. They find that the higher the amount of AfT for productive capacity building, the greater the impact multilateral trade liberalization has on reducing export revenue instability. This effect being more significant for lower income countries. These results are supported by Kim (2019) who shows that AfT for building productive capacity reduces the level of export concentration in the short and long run. This may benefit developing countries by helping them stabilize export revenues (Gnangnon, 2018). Martínez-Zarzoso et al. (2017) also find AfT for building productive capacity has a positive effect on the export of goods across all quantiles of recipient countries, while it is only effective up to the 0.50 quantile for total exports. This may mean that smaller exporters, who generally have less knowledge and experience, benefit more from AfT for building productive capacity as this type of aid is sector-specific and may take the form of technical assistance (e.g. sharing expertise).

A recent study by Lee and Ries (2016) finds that AfT for building productive capacity helps attract greenfield investment. While developing countries often rely on aid itself to fill the investment gap, AfT also aims to improve infrastructure and ease supply-side constraints making recipient countries more attractive to both foreign and domestic investors. While AfT for infrastructure has shown clear positive results in attracting more FDI, the results for productive capacity have been mixed. Lee and Ries (2016) use a bilateral and country-time fixed effects model and Poisson Pseudo-Maximum Likelihood (PPML) estimator to analyse bilateral data from 2003-2013. They include 25 donor and 120 recipient countries in their study to determine whether bilateral AfT promotes greenfield investment. Their evidence suggests that AfT for both infrastructure and building productive capacity attracts greenfield investment. However, a critical level of aid is

required, which generally means that non-LDCs are the main beneficiaries. While their results relating to infrastructure are consistent with the literature, their results for building productive capacity are not. Selaya and Sunesen (2012) consider general aid and FDI flows between 1970-2001 and find that building productive capacity in fact, deters investment. While employing a more recent timeframe may explain Lee and Ries' results, caution should be taken when interpreting their results in relation to building productive capacity.

Many studies using the gravity model find that AfT for trade policies and regulations positively impact trade even though donor contributions to this subcategory are significantly lower than the other two. The literature using alternative models support this finding. Focusing on trade costs, Busse et al. (2012) consider a sample of 99 countries from 2004-2009 and use a fixed effects model to show that an increase in aid for trade policy of one standard deviation could decrease importing costs by 4.3 per cent. Wang and Xu (2018) show that out of the three AfT subcategories trade policy and regulation has the greatest effect on the quality of recipient country exports, with the effect being cumulated over time.

2.5 Summary of Literature

From its inception over half a century ago, the gravity model has developed into a workhorse in international trade literature due to its empirical success and sound theoretical microfoundations. Linking bilateral trade flows with economic size, the gravity model successfully captures the patterns of international and has become a key tool for researchers studying implications of trade-related policies. While a range of models has been used to investigate the impact of AfT on developing countries trade performance, the gravity model continues to be the most popular. The literature that uses both the gravity model and alternative models alike present similar findings. AfT appears to be effective at increasing donor countries', however, recipient countries' exports generally increase to a greater degree, indicating that donor countries do not only give aid for selfish reasons. It has also been shown to be effective in upgrading recipient countries' exports and improving services trade. AfT for infrastructure and AfT for trade policies and regulations tend to bring the greatest trade benefits for recipient countries out of the three main AfT categories. Evidence suggests that the effectiveness of AfT could also be dependent on recipient countries'

income level, region, and institutional quality. While the literature has generally found that AfT positively impacts trade performance, but these impacts are generally modest.

Chapter Three

DATA, METHODOLOGY AND EMPIRICAL MODELS

3.1 Introduction

This chapter outlines and describes the data, methodology and empirical models used in this study. Given the strong theoretical and empirical foundations outlined in the literature, a structural gravity model is used to assess whether aid for trade has become more effective over time at increasing recipient countries' exports. An unbalanced panel dataset of 125 developing countries (aid recipients) and 29 DAC countries (donors) is employed over 2002-2018. The final set of recipient countries were chosen based on data availability (see Appendix A1).

3.2 Data

This section defines and outlines the variables used in the models and their data sources. Due to data limitations in the IDS database, the selected period for this study is 2002-2018, with all data compiled on an annual basis. The variables were chosen based on previous studies, data availability for the selected period, and their relevance to this study. The dependent variable is exports using UN Comtrade data from the World Bank's World Integrated Trade Solutions (WITS) database. The main independent variable is aid for trade which comes from the OECD Development Committee's International Development Statistics (IDS) online database. The other independent (control) variables used in this study are recipient country GDP, which comes from the World Bank's World Development Indicators (WDI) database, and trade costs, which is from the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) - World Bank Trade Cost database. All data are in constant 2010 US dollars. World Bank WDI CPI figures are used to deflate data from the current to constant 2010 US dollars. The World Bank WDI CPI figures use 2010 as the base year; thus this is the base year used in this study. The rest of this section describes the data in detail.

Total annual aggregate recipient country exports are sourced from UN Comtrade data taken from the World Bank's WTI website (downloaded on 4 February 2021). This study follows other

notable AfT effectiveness papers using the Standard International Trade Classification (SITC) revision 2 (Hühne et al., 2014, 2015; Pettersson & Johansson, 2013). The data was initially downloaded as total annual bilateral exports for each exporter-importer pair (a breakdown of exports items by one-digit SITC levels can be found in Appendix A2). The UN Comtrade database converts all values from the reporter countries' national currency into US current dollars using an annual exchange rate which is calculated using the monthly exchange rate weighted with the monthly trade volume (UN Trade Statistics, 2021).

When compiling trade statistics, country A's reported exports to country B often do not match country B's reported imports from country A (World Bank, 2021). Following the literature, the most appropriate values to use are imports reported by the importer (Hühne et al., 2014, 2015; Pettersson & Johansson, 2013). In cases where import data is missing, the corresponding export data is used. On average, import data reported by the importer is higher than the equivalent export data reported by the exporter. In cases where exports are higher, imports reported by the importer are replaced with the higher export value. For instances where exports are used in place of missing or lower import data, the export value used is inflated by a factor equal to the average difference that importer reported import data exceeds exporter reported export data (Hühne et al., 2014, 2015; Pettersson & Johansson, 2013). Finally, bilateral values are aggregated to show individual recipient countries' trade with all trading partner countries each year.

AfT data comes from the OECD Development Committee's online database International Development Statistics (IDS) (downloaded on 5 February 2021). The specific database used for this study is the Creditor Reporting System (CRS) which provides bilateral trade disbursements from individual DAC countries to recipient countries across a variety of ODA sectors. All data was downloaded in US dollars with the OECD database using the exchange rate prevailing in the year of the aid flow (OECD, 2021). Total AfT comprises three subcategories: economic infrastructure, productive capacity building, trade policies and regulations. The ODA three-digit sector codes for each subcategory can be found in Appendix A3.

This study differs from that of many previous studies in that it uses disbursement data instead of commitment data. Disbursement data is markedly superior to commitment data as the two are known to differ due to donors reneging on their aid commitments (Calì & te Velde, 2011; Gnangnon, 2019; Gnangnon & Roberts, 2017; Hühne et al., 2014, 2015; Pettersson & Johansson,

2013; Vijil & Wagner, 2012). The period of study is limited to 2002-2018, as annual coverage of CRS disbursements data prior to 2002 is only 60 per cent (OECD, 2021). The annual coverage is over 90 per cent from 2002 and has continued to improve since then. This study aggregates bilateral aid disbursements from donors to recipient countries to show aid disbursements from all DAC countries to individual recipient countries each year.

Aggregate GDP is sourced from the World Bank WDI database downloaded in current US dollars (downloaded on 19 November 2020). Ideally, when using the gravity model, sectoral expenditure and output would be used over GDP; however, this is not possible in an empirical context (UNESCAP, 2016). Aggregate GDP is also recommended over using population and per capita GDP, which was common practice in older literature (UNESCAP, 2016).

In a departure from the literature, this study uses the United Nations ESCAP-World Bank trade cost dataset to measure trade costs (downloaded on 4 February 2021). This dataset is based on Novy (2013) and uses macro-economic data and micro-theory to create a comprehensive measure of the bilateral cost of trading between countries (UNESCAP, 2021). One of the major benefits of using this dataset is that not only does it include international transport costs and tariffs, but also incorporates the direct and indirect trade costs outlined in Anderson and van Wincoop (2004), such as differences in languages, currencies, as well as import and export procedures (UNESCAP & The World Bank, 2017). This study aggregates the bilateral trade cost data, which is in ad valorem equivalent form, to show a summation of trade costs between individual recipient countries and all trading partner countries each year.

3.3 Methodology and Empirical Models

The estimation technique in this study uses a version of the structural gravity model with fixed effects to control for bilateral country-specific effects. This study uses an alternative approach to that of most of the gravity model literature to handle the multilateral resistance terms. This is done by eliminating the standard variables commonly used (e.g. distance, population, etc.) in favour of Novy's (2013) single trade costs measure variable (Yotov et al., 2016). The empirical analysis carried out aggregates the bilateral components of the structural gravity model and uses panel data to estimate the following relationship:

$$\ln export_{it} = \alpha + \beta_1 \ln AfT_{it-1} + \beta_2 NAD_{it-1} + \beta_3 \ln GDP_{it} + \beta_4 \ln \tau_{it} + \beta_5 trend + \beta_6 trend * AfT_{it-1} + \delta_i + \varepsilon_{it} \quad (4)$$

$$\ln export_{it} = \alpha + \beta_1 \ln AfT_{it-1} + \beta_2 NAD_{it-1} + \beta_3 \ln GDP_{it} + \beta_4 \ln \tau_{it} + \beta_5 trend + \beta_6 D_{t>2010} * AfT_{it-1} + \delta_i + \varepsilon_{it} \quad (5)$$

The dependent variable $export_{it}$ represents bilateral exports from recipient country *i* to all trading partners in year *t.*

AfT_{it-1} is the explanatory variable of principal interest in this study. It is defined as total aid for trade received by country *i* from all donor countries. However, the regressions in Tables 4, 5, and 6 are carried out using the three major subcategories: aid for economic infrastructure (*AfT_Inf*), productive capacity building (*AfT_Prod*), and trade policy and regulations (*AfT_Pol*).

NAD_{it} is used as a 'no-aid dummy' variable following Wagner (2003). This is done because the AfT data includes several zero aid values which would imply a loss of these observations when used in the logarithmic form (Calì & te Velde, 2011). As per Wagner (2003), the following specification is used:

$$\beta_1 \ln(max\{1, AfT_{it-1}\}) + \beta_2 NAD_{it-1} = \begin{cases} \beta_1 \ln AfT_{it-1} & when\ AfT_{it-1} > 0, \\ \beta_2 & when\ AfT_{it-1} = 0. \end{cases} \quad (6)$$

β_1 can thus be interpreted as the elasticity where aid is positive, while β_2 adjusts the constant in cases where aid is zero (Wagner, 2003). Therefore, logged exports when aid is positive is greater than logged exports when aid is zero by $\beta_1 \ln AfT_{it-1} - \beta_2$ (Calì & te Velde, 2011; Wagner, 2003). From an econometric perspective, NAD captures the intercept for instances where a recipient country receives no aid (Kim, 2019).

GDP_{it} is used as a size variable representing recipient country *i*'s GDP in year *t*. Size variables are an important part of the gravity model as trade flows generally increase with GDP, thus providing an indicator of the potential supply of an exporting country (Head & Mayer, 2014). Aggregate GDP is always preferred over per capita GDP as population is already included in the trade cost variable (Anderson & van Wincoop, 2003; UNESCAP, 2016).

τ_{it} represents trade costs between country *i* and all trading partners. This comprehensive trade cost measure has been compiled by the United Nations ESCAP and the World Bank and is based on

Novy (2013). It includes all costs relating to trading goods internationally with a bilateral partner. τ_{it} encapsulates not only international transport costs and tariffs but also the trade cost components used in Anderson and van Wincoop (2003) such as distances between trading countries, languages, import/export procedures, and others (UNESCAP & The World Bank, 2017). Values of τ_{it} taken from the ESCAP-World Bank international trade costs database can be used as a trade cost indicator and are in ad valorem equivalent form (UNESCAP & The World Bank, 2017).

$trend$ is a time trend variable that shows the growth rate of exports over time. As per equation (4), $trend * AfT_{it-1}$ is an interaction variable between $trend$ and AfT. The coefficient of this interaction variable (β_6) shows how much the effectiveness of AfT (β_1) has changed over the period 2002-2018. As per equation (5), $D_{t>2010} * AfT_{it-1}$ is an interaction variable between the dummy variable $D_{t>2010}$ (2002-2010 = 0; 2011-2018 = 1) and *AfT*. The coefficient of this interaction variable (β_6) indicates the extent to which the effectiveness of AfT during the period 2011-2018 was different to that of the baseline period 2002-2010 (β_1). These two interaction variables are the central variables used to answer the research question "has aid for trade become more effective over time at increasing recipient countries' exports?"

δ_i represents country-specific fixed effects, which accounts for all time-invariant country-specific effects that may impact exports, such as geography, location, language, etc (Calì & te Velde, 2011). Including fixed effects in a gravity model fully accounts for multilateral resistance influences in estimation that should result in unbiased estimates of the gravity coefficients (Baier & Bergstrand, 2009).

Finally, ε_{it} is the error term. The gravity model literature usually interprets the error term as a reflection of measurement error as trade flow data is believed to be considerably rife with measurement error (Anderson & van Wincoop, 2004). A clear example of this, as noted earlier, is the fact that export reported by the exporter and corresponding import data reported by the importer (mirror data) do not match. Unobservable variables in the trade cost measure τ_{it} may also be reflected in the error term (Anderson & van Wincoop, 2004).

The potential problem of endogeneity exists when running equations (4) and (5). This is because AfT is possibly endogenous to exports (Calì & te Velde, 2011; Hühne et al., 2014; Pettersson & Johansson, 2013). Endogeneity may be present if donor countries' give more AfT to better-

performing recipient countries, causing an upward in the AfT coefficients (Calì & te Velde, 2011). Furthermore, as the reporting of AfT disbursements by donors to the OECD is voluntary, this may lead to possible measurement errors resulting in inconsistent AfT coefficients (Calì & te Velde, 2011). While each study in the AfT literature controls for endogeneity in multiple ways, the most common is by using AfT lagged by one year (Calì & te Velde, 2011; Hühne et al., 2014, 2015; Pettersson & Johansson, 2013). This study carries out all regressions with AfT lagged by one year unless stated otherwise. Further controls for endogeneity have been carried out and discussed in Section 4.4.

Chapter Four

EMPIRICAL RESULTS

4.1 Introduction

This chapter presents the empirical results of examining whether AfT has become more effective over time at increasing aid recipient countries' exports. Firstly, results of the effects of AfT on recipient countries' exports to all trading partners using both pooled OLS and fixed effects are presented with an interpretation. These results are also reported with the AfT variable lagged by one, two, and three years. Secondly, these results are shown and discussed when AfT is separated into its three subcategories: economic infrastructure, building productive capacity, and trade policy and regulations. Finally, results for subsamples of recipient countries across regions and World Bank income groups are present. All results reported use AfT lagged by 1 year unless otherwise stated. This is common in most of the AfT literature as it is reasonable to expect that if aid affects trade, this would materialise with some lag (Calì & te Velde, 2011; Hoekman & Shingal, 2020; Kim et al., 2020; Pettersson & Johansson, 2013). Using lagged AfT also helps deal with the potential endogeneity of AfT to exports (Pettersson & Johansson, 2013). For each independent variable, the coefficient represents the effect on recipient countries' exports to all trading partners. As all variables are calculated in logs, these coefficients can be interpreted as elasticities.

4.2 Total Aid for Trade

All Recipients

As specified in equation (1), the baseline results of this study are presented in Table 1. Results for eight regressions are reported using two different model specifications, pooled OLS and fixed effects. The fixed effects specification is known to be superior to pooled OLS as it controls for time-invariant geographical, political, cultural, and other bilateral effects that may influence a country pair's propensity to trade under normal conditions (Calì & te Velde, 2011; Head & Mayer, 2014; Serlenga & Shin, 2007). Pooled OLS has been noted in the literature as not meeting the assumption that individual effects are uncorrelated with the regressors almost all of the time

(Serlenga & Shin, 2007). Therefore, the fixed effects estimation is generally preferred by the literature as it avoids potentially biased estimations.

The pooled OLS results in Table 1 are all highly significant at the 1 per cent level. The total AfT (*Total AfT*) coefficient is negative, and the trade costs (*Tij*) variable is positive, both of which are not of the expected sign. This suggests that the pooled OLS results presented are not reliable. This study still includes pooled OLS results to show the difference when bilateral country fixed effects are not included. Thus the fixed effects estimation results will be the focus of this and subsequent sections.

When using a fixed effects specification in Table 1, the coefficient signs are consistent with previous studies such as Pettersson and Johansson (2013), Hühne et al. (2014), and Calì and te Velde (2011). Columns (5), (6), and (8) in Table 1 show that there is a small positive effect of *Total AfT* on recipient country exports, with results being significant at the 10 per cent level. These coefficient estimates suggest that, on average, a 100 per cent increase in *Total AfT* in a given period would lead to a 0.8 per cent increase in recipient countries' exports to all trading partners one year later, ceteris paribus. This small but positive impact is in line with what has been found in some of the literature (Helble et al., 2012; Kim et al., 2020; Pettersson & Johansson, 2013).

The only control variable in the fixed effects estimation to provide significant results is aggregate GDP (*GDP*). GDP is positive, as expected, and highly significant. Columns (5) to (9) show similar coefficient results for GDP. These results imply that GDP has a significant impact on recipient countries' exports to all trading partners, which is in line with the AfT literature (Helble et al., 2012; Hühne et al., 2014; Pettersson & Johansson, 2013).

In regard to expected signs, the trade costs (*Tij*) variable did not produce any significant results when using fixed effects. Interestingly, when the same regressions in columns (5) to (8) are estimated using recipient exports to DAC countries (donors) only (see Appendix B1), the trade costs variable is negative and highly significant, as expected. This raises an interesting question as to what it is about trade between recipient countries that account for this difference. Answering this is beyond the scope of this study.

Table 1. Effects of aid for trade on recipient countries' exports to all trading partners

	Pooled OLS				Fixed Effects			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total AfT (1 yr lag)	**-0.090*****	**-0.085*****	**0.077*****	**-0.078*****	**0.008***	**0.008***	0.008	**0.008***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.005)	(0.005)	(0.005)	(0.005)
NAD	**-0.922*****	**-0.823*****	**-0.740*****	**-0.755*****	0.058	0.063	0.061	0.061
	(0.184)	(0.185)	(0.187)	(0.187)	(0.068)	(0.068)	(0.069)	(0.069)
GDP	**1.081*****	**1.098*****	**1.111*****	**1.109*****	**0.903*****	**0.919*****	**0.916*****	**0.914*****
	(0.014)	(0.015)	(0.015)	(0.015)	(0.020)	(0.024)	(0.025)	(0.024)
Tij	**0.242*****	**0.190*****	**0.158*****	**0.162*****	-0.030	-0.037	-0.033	-0.030
	(0.047)	(0.049)	(0.050)	(0.050)	(0.045)	(0.043)	(0.042)	(0.042)
trend	--	**-0.018*****	**-0.016*****	**-0.016*****	--	-0.002	-0.002	-0.002
		(0.005)	(0.005)	(0.005)		(0.003)	(0.003)	(0.003)
*trend * Total AfT (1 yr lag)*	--	--	**-2.12E-11*****	--	--	--	2.12E-12	--
			(7.44E-12)				(1.58E-12)	
*2011-2018 * Total AfT (1 yr lag)*	**--**	**--**	**--**	**-2.70E-10*****	**--**	**--**	**--**	**4.04E-11***
				(9.67E-11)				(2.25E-11)
Observations	1778	1778	1778	1778	1778	1778	1778	1778
Recipient Countries	125	125	125	125	125	125	125	125
R2	0.819	0.872	0.872	0.872	0.117	0.413	0.414	0.414
Adj R2	0.819	0.872	0.872	0.872	0.048	0.368	0.367	0.367

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. Total AfT, the independent variable of principle interest, is lagged by 1 year. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in **bold** 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

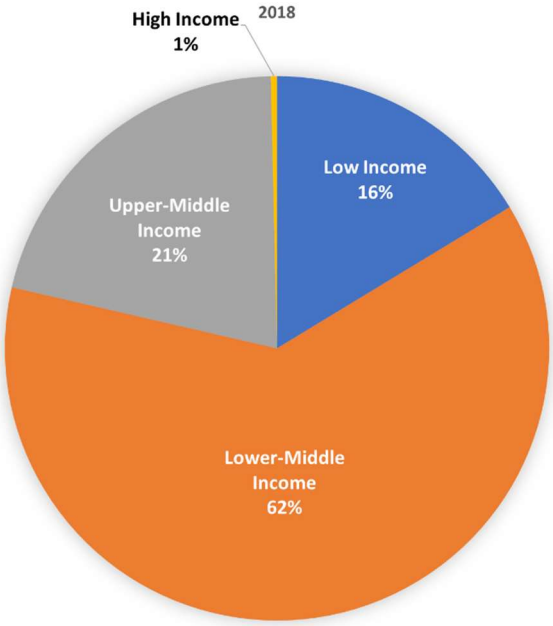
The variables of principal interest are the interaction variables representing total AfT's change in effectiveness over the period 2002-2018 (*trend * Total AfT*) and the difference between AfT's effectiveness during the period 2011-2018 compared to 2002-2010 ($D_{t>2010}$ * *Total AfT*). Column (7) shows the results when *'trend * Total AfT'* is included in the regression. No significant result was found, which suggests that AfT has not become more effective over the period 2002-2018. Also of note, including *'trend * Total AfT'* also makes the total AfT variable insignificant at conventional levels. As a further test, column (8) includes the interaction variable *'*$D_{t>2010}$ * *Total AfT'* which does provide a weakly significant result. Although positive, the coefficient is so small that it could be concluded that the difference in the effectiveness of total AfT in the period 2011-2018 compared to 2002-2010 is negligible.

Overall, the results presented in Table 1 suggest that while *Total AfT* appears to have a small but positive effect on recipient countries' exports to all trading partners over the entire period under investigation, the effectiveness of AfT does not appear to have improved over this period. As noted in much of the literature, the impact AfT has on trade may take more than one year to materialise (Calì & te Velde, 2011; Hoekman & Shingal, 2020; Hühne et al., 2014; Pettersson & Johansson, 2013). As such, this study experiments with multiple different AfT lag structures to see how AfT impacts trade over different time horizons. Table B2 in the Appendix shows the results of equation (1) with total AfT lagged by one, two, and three years (Calì & te Velde, 2011; Hoekman & Shingal, 2020; Hühne et al., 2014).

Recipient Subsamples by Region and Income Group

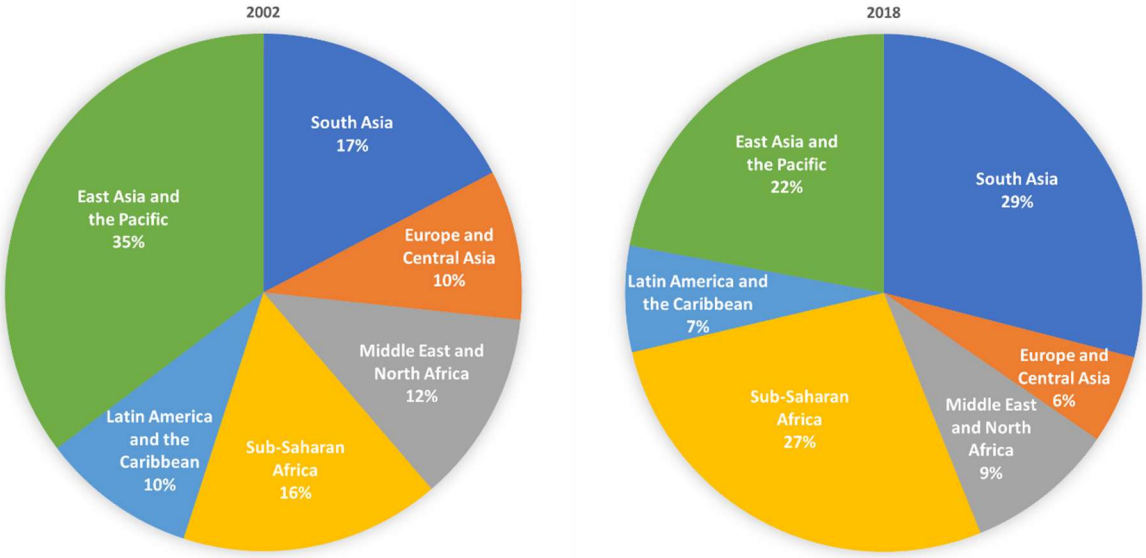
Re-estimating the empirical model using various subsamples of recipient countries allows for the assessment of whether total AfT has become more effective over time at increasing aid recipient countries' exports depending on their region or World Bank income level. In doing so, this study is able to investigate whether AfT is effective where it is needed most, and if so, whether its effectiveness is increasing over time. Firstly, this study uses the World Bank income group classification to differentiate between low-income countries, lower-middle-income countries, upper-middle income countries, and high-income aid recipient countries that receive AfT (see Appendix A1). Figure 4.1 shows the share of total AfT for each income group as of 2018, with

Figure 4.1 Aid for Trade Disbursements by World Bank Income Group



Source: Author's calculation using the OECD CRS database.

Figure 4.2 Aid for Trade Disbursements by Region



Source: Author's calculation using the OECD CRS database.

well over half of AfT going to lower-middle-income countries, and just 16% to low income countries. As previously highlighted, AfT aims to 'overcome the supply-side and trade-related infrastructure constraints' facing developing countries (WTO & OECD, 2011, p. 1). Thus, one might expect AfT to be most effective if it benefited low income countries where these constraints

are typically known to be most severe (Hühne et al., 2014). Secondly, recipient countries are grouped by region to assess if any particular region benefits more than others from AfT and if AfT's effectiveness has changed over time in these regions. Figure 4.2 presents the share of total AfT for the six regions used in this study for both 2002 and 2018. Sub-Saharan Africa is of particular interest as it is generally accepted that this region is lagging behind others in respect to world market integration, making AfT all the more important there (Hühne et al., 2014).

The results for recipient country income groups are presented in Table 2 and are somewhat surprising. Over the entire sample period, *Total AfT* appears to have a considerably negative effect on low income recipient countries' exports to all trading partner, the result being highly significant. This result suggests that if *Total AfT* to low income recipient countries were increased by 100 per cent, then their exports would decrease by a staggering 11 per cent. This result may not come as a surprise to some foreign aid sceptics who believe aid increases government corruption, creates perverse incentives, may cause capital flight, discourages local savings and investment, and suffers from severe planning issues (Bauer, 1966, December 1; Easterly, 2006; Johnson, 1996; Schleifer, 2009). However, the AfT literature has found some evidence in the past that total AfT has positive effects on low-income countries' export performance (Gnangnon & Roberts, 2017; Martínez-Zarzoso et al., 2017; Munemo, 2011), while some of the other literature has found no evidence of this (Busse et al., 2012; Hühne et al., 2014; Kim et al., 2020). The scope of this study does not allow for investigation of the direct cause of this negative effect, but it is nonetheless concerning as *Total AfT* does not have a negative effect on any other income group. The effectiveness of *Total AfT* on low income countries' exports does not appear to be improving either, with both time interaction variable coefficients being insignificant.

The upper-middle income country group is the only other group to produce significant results, with the lower-middle and high income groups producing insignificant results for *Total AfT* effectiveness over the entire period, as well as over time. The highly significant results for the upper-middle income group show that following a 100 per cent increase in *Total AfT* to upper-middle income recipient countries, their exports will increase by 2 per cent. This is well above the 0.08 per cent found for recipient countries as a whole. These results, along with the low income group result, suggest that AfT appears to be more effective at increasing exports for countries who are already further along the development path. This may be because upper-middle income

Table 2. Effects of aid for trade on recipient countries' exports to all trading partners - Subsample of recipient countries by World Bank income group

	Low Income		Lower Middle		Upper Middle		High Income		All (except High Income)	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total AfT (1 yr lag)	**-0.108*** **	**-0.110*** **	0.017	0.015	**0.020*** **	**0.021*** **	0.005	0.004	0.005	0.004
	(0.023)	(0.023)	(0.013)	(0.012)	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)
NAD	--	--	**0.426***	**0.394***	0.056	0.083	**0.178****	**0.178*** **	0.063	0.057
			(0.230)	(0.211)	(0.080)	(0.082)	(0.079)	(0.080)	(0.050)	(0.052)
GDP	**0.856*** **	**0.849*** **	**0.910*** **	**0.906*** **	**0.909*** **	**0.908*** **	**1.050*** **	**1.049*** **	**0.899*** **	**0.897*** **
	(0.095)	(0.078)	(0.028)	(0.028)	(0.034)	(0.035)	(0.084)	(0.084)	(0.026)	(0.026)
Tij	-0.113	-0.095	0.058	0.071	**-0.135*** **	**-0.136*** **	0.105	0.106	-0.037	-0.034
	(0.178)	(0.172)	(0.078)	(0.080)	(0.047)	(0.049)	(0.116)	(0.116)	(0.050)	(0.050)
trend	**0.041*** **	**0.042*** **	**0.007***	0.007	**-0.016*** **	**-0.015*** **	**-0.032****	**-0.032****	0.002	0.002
	(0.011)	(0.010)	(0.004)	(0.004)	(0.004)	(0.004)	(0.013)	(0.013)	(0.003)	(0.003)
*trend * Total AfT (1 yr lag)*	-1.81E-11	--	-3.34E-13	--	**6.08E-12***	--	-1.10E-11	--	1.36E-12	--
	(1.63E-11)		(1.84E-12)		(3.42E-12)		(4.48E-11)		(1.40E-12)	
*2011-2018 * Total AfT (1 yr lag)*	--	-1.49E-10	--	3.28E-11	--	7.19E-12	--	8.18E-11	--	3.04E-11
		(1.33E-10)		(3.28E-11)		(6.05E-11)		(5.76E-10)		(2.19E-11)
Observations	292	292	665	665	609	609	212	212	1566	1566
Recipient Countries	22	22	47	47	42	42	14	14	111	111
R2	0.300	0.300	0.375	0.375	0.613	0.612	0.511	0.511	0.402	0.402
Adj R2	0.232	0.232	0.322	0.322	0.580	0.580	0.463	0.463	0.354	0.354

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. Total AfT, the independent variable of principle interest, is lagged by 1 year. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in bold. 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

Table 3. Effects of aid for trade on recipient countries' exports to all trading partners - Subsample of recipient countries by region

	East Asia and Pacific		Europe and Central Asia		Latin America and the Caribbean		Middle East and North Africa		South Asia		Sub-Saharan Africa	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total AfT (1 yr lag)	0.022	0.017	0.001	0.001	**0.018****	**0.018****	**0.017****	**0.019****	0.016	0.021	**-0.028****	**-0.034*****
	(0.028)	(0.027)	(0.003)	(0.003)	(0.008)	(0.008)	(0.007)	(0.008)	(0.045)	(0.047)	(0.013)	(0.012)
NAD	--	**--**	**0.141*****	**0.138****	0.088	0.089	**0.357*****	**0.373*****	--	--	--	--
			(0.051)	(0.054)	(0.099)	(0.099)	(0.064)	(0.071)				
GDP	**1.338*****	**1.341*****	**0.951*****	**0.950*****	**0.925*****	**0.923*****	**0.957*****	**0.941*****	0.374	0.339	**0.858*****	**0.838*****
	(0.092)	(0.093)	(0.048)	(0.048)	(0.073)	(0.072)	(0.043)	(0.042)	(0.295)	(0.297)	(0.055)	(0.055)
Tij	-0.044	-0.036	**-0.446*****	**-0.445*****	0.134	0.132	-0.006	0.038	0.512	0.463	-0.065	-0.034
	(0.176)	(0.172)	(0.102)	(0.101)	(0.125)	(0.127)	(0.033)	(0.029)	(0.353)	(0.336)	(0.103)	(0.103)
trend	**-0.049*****	**-0.049*****	-0.007	-0.008	-0.011	-0.011	**-0.029*****	**-0.027*****	0.058	0.064	**0.019*****	**0.018*****
	(0.014)	(0.014)	(0.007)	(0.007)	(0.010)	(0.010)	(0.006)	(0.006)	(0.047)	(0.048)	(0.007)	(0.007)
*trend * Total AfT (1 yr lag)*	-1.08E-11	--	4.29E-12	--	2.45E-11	--	**2.94E-11*****	**--**	**9.61E-12***	--	-3.14E-12	--
	(1.05E-11)		(5.88E-12)		(1.29E-11)		(5.95E-12)		(4.91E-12)		(1.06E-11)	
*2011-2018 * Total AfT (1 yr lag)*	--	-1.09E-10	--	1.07E-10	--	**3.31E-10****	--	**3.59E-10*****	**--**	1.07E-10	--	**2.42E-10***
		(1.03E-10)		(7.77E-11)		(1.68E-10)		(8.43E-11)		(6.75E-11)		(1.45E-10)
Observations	259	259	217	217	407	407	187	187	92	92	616	616
Recipient Countries	19	19	14	14	28	28	14	14	7	7	43	43
R2	0.350	0.350	0.679	0.679	0.463	0.463	0.684	0.681	0.155	0.151	0.429	0.431
Adj R2	0.286	0.286	0.648	0.648	0.415	0.416	0.648	0.644	0.039	0.034	0.381	0.384

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. Total AfT, the independent variable of principle interest, is lagged by 1 year. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in bold. 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

countries are more likely to be already experiencing higher growth rates, have sound economic environments, and good quality existing infrastructure, all of which have been found to improve the effectiveness of AfT (Berrittella & Zhang, 2014; Kim et al., 2020). The interaction variable *trend * Total AfT* is positive and significant at the 10 per cent level for the upper-middle income group, however, the positive coefficient is so small that the improvement is arguably negligible. Overall, these results show that AfT does not appear to be effective where it is needed most, in fact quite the opposite, and its effectiveness is also not increasing over time.

The results for recipient countries by region are shown in Table 3, and considering the results by income group presented in Table 2, are not surprising. The *Total AfT* coefficient for Sub-Saharan Africa is significant and negative, which is disappointing considering the great need in this region and the significant attention it receives from donors. However, this result is to be expected based on Table 2 since this region is made up of a large number of low income countries. This further emphasises the need to determine exactly what it is about low income countries that leads to AfT having a negative effect on exports. Unsurprisingly, Latin America and the Caribbean as well as the Middle East and North Africa produce significant and positive *Total AfT* coefficients. Thisagain is expected as these regions have a high number of upper-middle income countries. However, Europe and Central Asia are also made up of many upper-middle income countries, but no significant result was found here. Interestingly, they are the only region with a significant trade cost coefficient. This negative coefficient suggests that a decrease in trade costs in this region leads to an increase in exports of around 45 per cent. The interaction variable *trend * Total AfT* is significant and positive by a very small amount in both the Middle East and North Africa as well as South Asia. The $D_{t>2010}$ * *Total AfT* interaction variable is also significant and slightly positive in Latin America and the Caribbean, the Middle East and North Africa. As these amounts are so small, they show that the effectiveness of AfT has not notably improved over time.

4.3 Aid for Trade Subcategories

All Recipients

Table 4 presents results for regressions in which total AfT is disaggregated into the three main subcategories as defined by the OECD: AfT for economic infrastructure, building productive

capacity, and trade policy and regulations. The results shown are for recipient exports to all trading partners. Results for exports to DAC countries are not presented as they are almost the same. These results are available upon request. The CRS codes that make up these subcategories existed before the AfT Initiative but have received greater attention and funding from donor countries since the 2005 initiative.

Developing countries' exports performance is often weak due to inadequate transport and communication infrastructure and unreliable energy supply (Martínez-Zarzoso et al., 2017). AfT for economic infrastructure aims to help recipient countries' exports become more competitive by reducing the time and cost of export goods. Thus, from a theoretical perspective, it is expected that aid towards economic infrastructure would increase recipient countries' exports (OECD & WTO, 2019). The empirical evidence in the literature supports this by finding that AfT for economic infrastructure having a small but positive impact on exports (Donaubauer et al., 2016; Hoekman & Shingal, 2020; Martínez-Zarzoso et al., 2017; Pettersson & Johansson, 2013; Vijil, 2014), while Calì and te Velde (2011) find that AfT for economic infrastructure has a significant impact on total exports. However, results in columns (1) to (4) below show that AfT for economic infrastructure leads to a decrease in exports the following year. This is a very surprising result and is in contrast with the literature.

The results in columns (1) to (4) suggest that at most, a doubling of AfT for economic infrastructure may lead to a decrease in recipient countries' exports by 0.7 per cent, so the negative impact is very small, but the result significant. Like the negative result for total AfT for low-income countries, this result may not come as a surprise to foreign aid sceptics (Bauer, 1966, December 1; Easterly, 2006; Johnson, 1996; Schleifer, 2009). In contrast to much of the literature, aid for infrastructure has been found to be ineffective in improving recipient countries' endowment of infrastructure when assessed using a differences-in-differences approach (Donaubauer & Nunnenkamp, 2016). Possible explanations for this finding include the fact that aid may be tied, such projects notoriously suffer from time and cost overruns, and donors generally prefer to finance new projects while existing infrastructure is not adequately maintained or improved. Furthermore, poor management of projects leads to an increase in the flow of public investment, but not an increase in the stock of public capital. In some instances aid may also be fungible, thus

Table 4. Effects of aid for trade subcategories on recipient countries' exports to all trading partners

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AfT_Inf (1 yr lag)	**-0.007****	**-0.006****	**-0.003***	**-0.003***	--	--	--	--
	(0.003)	(0.003)	(0.002)	(0.002)				
NAD_Inf	-0.025	-0.013	-0.036	-0.036	--	--	--	--
	(0.063)	(0.063)	(0.044)	(0.044)				
AfT_Prod (1 yr lag)	**0.014****	**0.013****	--	--	**0.008***	**0.008****	--	--
	(0.006)	(0.005)			(0.004)	(0.004)		
NAD_Prod	0.106	0.106	--	--	0.063	0.062	--	--
	(0.108)	(0.107)			(0.063)	(0.063)		
AfT_Pol (1 yr lag)	-0.003	-0.003	--	--	--	--	-0.002	-0.002
	(0.004)	(0.003)					(0.003)	(0.003)
NAD_Pol	-0.060	-0.060	--	--	--	--	**-0.060***	**-0.060***
	(0.039)	(0.039)					(0.036)	(0.036)
GDP	**0.919*****	**0.915*****	**0.932*****	**0.930*****	**0.915*****	**0.911*****	**0.931*****	**0.931*****
	(0.025)	(0.025)	(0.024)	(0.024)	(0.025)	(0.025)	(0.024)	(0.024)
Tij	-0.036	-0.032	-0.030	-0.028	-0.035	-0.031	-0.039	-0.038
	(0.043)	(0.044)	(0.044)	(0.045)	(0.042)	(0.043)	(0.045)	(0.045)
trend	-0.001	-0.001	-0.003	-0.003	-0.002	-0.002	-0.003	-0.003
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
*trend * AfT_Inf (1 yr lag)*	**4.63E-12****	**--**	**3.77E-12****	**--**	--	--	--	--
	(1.94E-12)		(1.76E-12)					
*trend * AfT_Prod (1 yr lag)*	-1.93E-13	--	--	--	3.93E-12	--	--	--
	(7.87E-12)				(7.17E-12)			
*trend * AfT_Pol (1 yr lag)*	**-6.19E-11*****	**--**	--	--	--	--	**5.53E-11*****	**--**
	(2.12E-11)						(2.00E-11)	
*2011-2018 * AfT_Inf (1 yr lag)*	--	**5.13E-11****	--	**5.86E-11****	--	--	--	--
		(2.41E-11)		(2.59E-11)				
*2011-2018 * AfT_Prod (1 yr lag)*	--	5.39E-11	--	--	--	1.17E-10	--	--
		(9.26E-11)				(8.16E-11)		
*2011-2018 * AfT_Pol (1 yr lag)*	--	-8.12E-10	--	--	--	--	--	-5.86E-10
		(4.95E-10)						(4.76E-10)
Observations	1778	1778	1778	1778	1778	1778	1778	1778
Recipient Countries	125	125	125	125	125	125	125	125
R2	0.417	0.417	0.413	0.413	0.414	0.414	0.414	0.414
Adj R2	0.368	0.368	0.367	0.367	0.367	0.368	0.368	0.368

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. Columns (1) and (2) show results when all 3 AfT subcategories are included in one regression; columns (3) and (4) show results for AfT for Infrastructure; columns (5) and (6) show results for AfT for Productive Capacity Building; and columns (7) and (8) show results for AfT for Trade Policy and Regulations. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in bold. 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

aid for infrastructure may end up being used for other purposes (Donaubauer & Nunnenkamp, 2016). Further explanation may come from the possibility that AfT for economic infrastructure could be benefiting firms that produce and supply for local consumption. This may be the result of the fact that the geographical conditions of a country tend to have an impact on how much a country invests in infrastructure for trade (Vijil & Wagner, 2012).

In contrast to AfT for economic infrastructure, when assessing the impact of AfT for productive capacity building on recipient countries' exports, this study finds results more in line with the literature. It is well known that recipient countries struggle to diversify exports and exploit their comparative advantages (OECD & WTO, 2019). AfT for productive capacity building seeks to overcome the supply-side constraints that cause these issues by investing directly in service sectors: banking and financial services; business services; tourism, and non-services sectors: agriculture; forestry; fishing; industry; mineral resources and mining; and construction, with two-thirds of aid going to agriculture and business services (OECD & WTO, 2019). Columns (1), (2), (5), and (6) in Table 4 show significant and positive results for productive capacity building with a doubling of aid to this category resulting in an increase of recipient countries' exports from 0.8 per cent and 1.4 per cent. Several studies have found that AfT for productive capacity has similar positive results on recipient countries' exports (Ferro et al., 2014; Ghimire et al., 2013; Hühne et al., 2014, 2015; Martínez-Zarzoso et al., 2017), and also has a particularly positive impact in attracting greenfield investment (Lee & Ries, 2016). Finally, it should be noted that several studies find contrary evidence and suggest that AfT for productive capacity building has no positive impact on recipient countries' exports (Calì & te Velde, 2011; Hoekman & Shingal, 2020; Pettersson & Johansson, 2013).

Gaining access to global markets has always been a significant challenge for developing countries (OECD & WTO, 2019). It is also common for developing countries to suffer from governance failures owing to weak institutions and inadequate administrative procedures (Calì & te Velde, 2011). AfT for trade policies and regulations aims to overcome these problems by providing assistance and resources for the training of trade related officials, technical and institutional support for proposing, developing, and implementing trade agreements, and assistance in compliance with global trade rules and standards (Basnett et al., 2012). The results presented in columns (1), (2), (7), and (8) in Table 4 provide no significant results for AfT for trade policies

and regulations, indicating that this subcategory is not effective in increasing recipient countries' exports. These results are in line with some of the literature which finds that AfT for trade policies and regulations has no significant impact on recipient countries' exports (Cirera & Winters, 2015; Hoekman & Shingal, 2020; Pettersson & Johansson, 2013). In contrast, other studies find that this subcategory can have a positive impact on exports' (Busse et al., 2012; Helble et al., 2012; Hühne et al., 2014; Martínez-Zarzoso et al., 2017), and improves export quality (Wang & Xu, 2018).

As is the case with total AfT, Table 4 shows that AfT subcategories have not become more effective over time at increasing aid recipient countries' exports. Significant results were found for both AfT for economic infrastructure and trade policies and regulations. However, in both of these cases, the coefficients are so small to conclude that AfT has not become more effective over the entire period of this study, nor between the periods 2002-2010 and 2011-2018.

Recipient Subsamples by Region and Income Group

To investigate whether the AfT subcategories are effective where they are needed most, this study re-estimates the equations from columns (1) and (2) in Table 4 using recipient country subsamples by World Bank income group and region. This helps to identify where the AfT subcategories are most effective, which can help explain the previous results found at the 'all recipient countries' level, as well as helping to inform future AfT policy decisions better.

Similar to the results for total AfT in Table 2, this study finds that AfT at the subcategory level also has a considerably negative effect on low income countries' exports to all trading partners. As per columns (1) and (2) in Table 5, significant results were found for both AfT for economic infrastructure and productive capacity building, although no significant result was found for AfT for trade policies and regulations. This study finds no significant results for AfT for economic infrastructure for the other income groups. This result may suggest that the negative results found in Table 4 for all recipient countries may be due to low-income countries' negative results. The fact that this result mostly comes from low income countries may not be surprising as the potential causes previously discussed are more likely to exist in low income countries (Donaubauer & Nunnenkamp, 2016; Kim et al., 2020).

Table 5. Effects of aid for trade subcategories on recipient countries' exports to all trading partners - Subsample of recipient countries by World Bank income group

	Low Income		Lower Middle Income		Upper Middle Income		High Income		All (except High Income)	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
AfT_Inf (1 yr lag)	**-0.028****	**-0.026***	0.014	0.014	-0.001	2.77E-05	-0.003	-0.003	**-0.007****	**-0.007****
	(0.014)	(0.014)	(0.009)	(0.009)	(0.004)	(0.003)	(0.006)	(0.006)	(0.003)	(0.003)
NAD_Inf	**0.322*****	**0.321*****	**-0.250*****	**-0.258*****	-0.074	-0.072	-0.119	-0.118	0.013	0.012
	(0.085)	(0.090)	(0.092)	(0.090)	(0.070)	(0.071)	(0.093)	(0.093)	(0.072)	(0.072)
AfT_Prod (1 yr lag)	**-0.082*****	**-0.080*****	0.004	0.000	**0.018*****	**0.020*****	0.003	0.002	**0.013****	**0.012****
	(0.028)	(0.028)	(0.014)	(0.013)	(0.004)	(0.004)	(0.008)	(0.008)	(0.005)	(0.006)
NAD_Prod	--	--	**0.752*****	**0.706*****	0.096	0.129	0.239	0.234	0.096	0.083
			(0.254)	(0.223)	(0.086)	(0.085)	(0.131)	(0.128)	(0.103)	(0.101)
AfT_Pol (1 yr lag)	-0.006	-0.006	-0.003	-0.003	-0.003	-0.003	0.006	0.005	-0.005	-0.005
	(0.005)	(0.005)	(0.007)	(0.007)	(0.004)	(0.004)	(0.008)	(0.008)	(0.004)	(0.004)
NAD_Pol	**-0.217****	**-0.227****	-0.122	-0.123	-0.015	-0.016	0.039	0.031	**-0.077***	**-0.077***
	(0.096)	(0.098)	(0.082)	(0.083)	(0.035)	(0.034)	(0.067)	(0.066)	(0.044)	(0.044)
GDP	**0.856*****	**0.832*****	**0.919*****	**0.917*****	**0.911*****	**0.909*****	**1.051*****	**1.056*****	**0.904*****	**0.900*****
	(0.092)	(0.094)	(0.029)	(0.032)	(0.034)	(0.034)	(0.088)	(0.088)	(0.025)	(0.025)
Tij	-0.051	-0.072	0.062	0.076	**-0.128*****	**-0.124****	0.099	0.104	-0.035	-0.031
	(0.186)	(0.185)	(0.076)	(0.083)	(0.047)	(0.050)	(0.132)	(0.131)	(0.052)	(0.053)
trend	**0.041*****	**0.042*****	0.007	0.007	**-0.015*****	**-0.014*****	**-0.032****	**-0.033****	0.003	0.003
	(0.013)	(0.013)	(0.005)	(0.005)	(0.004)	(0.004)	(0.013)	(0.013)	(0.004)	(0.004)
*trend * AfT_Inf (1 yr lag)*	3.54E-11	--	1.99E-12	--	**1.31E-11***	--	5.25E-11	--	**3.97E-12****	--
	(2.89E-11)		(2.30E-12)		(7.32E-12)		(1.10E-11)		(1.85E-12)	
*trend * AfT_Prod (1 yr lag)*	-3.01E-11	--	-4.39E-12	--	1.71E-11	--	-8.45E-12	--	-3.57E-12	--
	(2.18E-11)		(8.72E-12)		(1.80E-11)		(3.50E-11)		(7.03E-12)	
*trend * AfT_Pol (1 yr lag)*	-5.05E-10	--	-3.32E-10	--	**-5.42E-11****	--	1.30E-08	--	**-6.46E-11*****	--
	(6.23E-10)		(1.78E-10)		(2.16E-11)		(9.56E-09)		(2.16E-11)	
*D_{11 to 18} * AfT_Inf (1 yr lag)*	--	-1.93E-10	--	3.36E-11	--	7.68E-11	--	-6.19E-10	--	**4.37E-11***
		(5.34E-10)		(3.79E-11)		(9.47E-11)		(1.07E-09)		(2.44E-11)
*D_{11 to 18} * AfT_Prod (1 yr lag)*	--	-9.24E-12	--	1.03E-10	--	2.79E-11	--	3.33E-10	--	3.56E-11
		(3.65E-10)		(1.76E-10)		(2.67E-10)		(5.11E-10)		(8.95E-11)
*D_{11 to 18} * AfT_Pol (1 yr lag)*	--	-9.54E-10	--	-3.83E-09	--	-5.54E-10	--	**1.34E-07****	--	**-8.55E-10***
		(5.95E-09)		(2.43E-09)		(3.60E-10)		(6.04E-08)		(5.10E-10)
Observations	292	292	665	665	609	609	212	212	1566	1566
Recipient Countries	22	22	47	47	42	42	14	14	111	111
R2	0.326	0.323	0.380	0.380	0.616	0.614	0.518	0.517	0.406	0.406
Adj R2	0.243	0.239	0.321	0.321	0.579	0.577	0.453	0.452	0.356	0.356

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. AfT for Infrastructure, AfT for Productive Capacity Building, and AfT for Trade Policy and Regulations, the independent variables of principle interest, are lagged by 1 year. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in bold. 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

Table 6. Effects of aid for trade subcategories on recipient countries' exports to all trading partners

	East Asia and Pacific		Europe and Central Asia		Latin America and the Caribbean		Middle East and North Africa		South Asia		Sub-Saharan Africa	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AfT_Inf (1 yr lag)	0.018	0.015	-0.014	-0.013	-0.002	-0.002	**0.015*****	**0.017*****	0.025	0.002	**-0.012***	**-0.012***
	(0.028)	(0.028)	(0.012)	(0.012)	(0.005)	(0.005)	(0.005)	(0.006)	(0.052)	(0.043)	(0.006)	(0.007)
NAD_Inf	--	--	-0.001	-0.004	**-0.164***	**-0.163***	**0.409*****	**0.421*****	--	--	0.091	0.085
			(0.101)	(0.097)	(0.086)	(0.086)	(0.067)	(0.072)			(0.096)	(0.098)
AfT_Prod (1 yr lag)	0.010	0.012	**0.024***	**0.022***	**0.018****	**0.018****	0.002	0.002	**0.077***	**0.079****	0.001	-0.003
	(0.066)	(0.063)	(0.013)	(0.014)	(0.009)	(0.009)	(0.006)	(0.006)	(0.045)	(0.039)	(0.009)	(0.009)
NAD_Prod	--	--	0.112	0.110	0.207	**0.207***	--	--	--	--	-0.019	-0.016
			(0.086)	(0.082)	(0.126)	(0.125)					(0.127)	(0.132)
AfT_Pol (1 yr lag)	-0.010	-0.010	**-0.009****	**-0.008****	0.002	0.002	-0.007	-0.008	0.011	0.014	-0.003	-0.002
	(0.018)	(0.018)	(0.004)	(0.004)	(0.005)	(0.005)	(0.009)	(0.009)	(0.011)	(0.012)	(0.004)	(0.004)
NAD_Pol	-0.144	-0.144	0.092	0.092	-0.044	-0.043	-0.195	**-0.200***	**-1.583*****	**-1.590*****	-0.020	-0.030
	(0.227)	(0.227)	(0.056)	(0.056)	(0.072)	(0.073)	(0.119)	(0.118)	(0.282)	(0.288)	(0.057)	(0.057)
GDP	**1.340*****	**1.347*****	**0.941*****	**0.941*****	**0.930*****	**0.923*****	**0.972*****	**0.978*****	0.101	0.228	**0.849*****	**0.816*****
	(0.091)	(0.093)	(0.054)	(0.054)	(0.070)	(0.068)	(0.053)	(0.052)	(0.407)	(0.415)	(0.051)	(0.055)
Tij	-0.053	-0.042	**-0.413*****	**-0.409*****	0.143	0.139	-0.053	0.003	0.201	0.213	-0.084	-0.054
	(0.206)	(0.206)	(0.112)	(0.110)	(0.130)	(0.131)	(0.033)	(0.026)	(0.330)	(0.332)	(0.108)	(0.111)
trend	**-0.047*****	**-0.047*****	-0.002	-0.001	-0.011	-0.011	**-0.032*****	**-0.031*****	0.094	0.071	**0.019*****	**0.019*****
	(0.016)	(0.016)	(0.008)	(0.008)	(0.010)	(0.010)	(0.006)	(0.007)	(0.068)	(0.071)	(0.007)	(0.007)
*trend * AfT_Inf*	-1.08E-11	--	**3.72E-11***	--	**3.05E-11***	--	**5.86E-11*****	--	**7.82E-12***	--	-5.54E-12	--
(1 yr lag)	(1.36E-11)		(2.13E-11)		(1.64E-11)		(1.36E-11)		(4.57E-12)		(1.68E-11)	
*trend * AfT_Prod*	-3.21E-12	--	-2.36E-11	--	3.78E-11	--	-1.06E-11	--	-2.05E-12	--	-1.46E-11	--
(1 yr lag)	(5.46E-11)		(2.15E-11)		(5.14E-11)		(1.72E-11)		(1.35E-11)		(1.60E-11)	
*trend * AfT_Pol*	-4.69E-11	--	-3.42E-10	--	4.23E-11	--	**7.72E-10***	--	-7.78E-10	--	2.31E-10	--
(1 yr lag)	(2.41E-11)		(3.05E-10)		(3.58E-10)		(4.50E-10)		(4.46E-10)		(3.06E-10)	
*D_{11 to 18} * AfT_Inf*	--	-6.94E-11	--	**3.80E-10***	--	3.04E-10	--	**9.89E-10*****	--	**1.92E-10***	--	-6.35E-11
(1 yr lag)		(1.48E-10)		(2.18E-10)		(2.28E-10)		(1.95E-10)		(1.00E-10)		(2.11E-10)
*D_{11 to 18} * AfT_Prod*	--	-2.69E-10	--	-1.71E-10	--	7.98E-10	--	**-4.05E-10***	--	-1.58E-10	--	3.24E-10
(1 yr lag)		(6.18E-10)		(3.08E-10)		(5.89E-10)		(2.28E-10)		(1.86E-10)		(3.35E-10)
*D_{11 to 18} * AfT_Pol*	--	-6.26E-10	--	**-8.00E-09***	--	-2.45E-10	--	-2.92E-09	--	-5.72E-09	--	4.90E-09
(1 yr lag)		(4.46E-10)		(4.43E-09)		(5.12E-09)		(3.24E-09)		(6.98E-09)		(4.66E-09)
Observations	259	259	217	217	407	407	187	187	92	92	616	616
Recipient Countries	19	19	14	14	28	28	14	14	7	7	43	43
R2	0.355	0.354	0.690	0.692	0.472	0.473	0.700	0.700	0.406	0.399	0.431	0.433
Adj R2	0.276	0.276	0.650	0.652	0.416	0.417	0.656	0.655	0.279	0.271	0.376	0.379

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. AfT for Infrastructure, AfT for Productive Capacity Building, and AfT for Trade Policy and Regulations, the independent variables of principle interest, are lagged by 1 year. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in bold. 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

AfT for productive capacity building is also highly significant and negative for low income countries. The results suggest that a doubling of AfT for productive capacity building would lead to a reduction in exports to all trading partners by 8 per cent. This is obviously a surprising and concerning result as this type of aid is specifically directed at overcoming the supply-side constraints facing export industries but appears to be having the opposite effect for low income countries. This may be explained by the fact that low-income countries' exports are less diversified and more likely to be made up of a small number of commodities. Furethermore, AfT may unintentionally be promoting production towards local markets taking resources away from exports. In contrast, AfT for productive capacity building is significant and positive for upper-middle income groups. One possible explanation for the difference in results between low income and upper-middle income groups is that low income countries' exports are almost entirely made of primary commodities and a small number of manufactured goods (less than 10 per cent). In contrast, upper-middle income countries' exports are made of approximately 30 per cent primary commodities and 70 per cent manufactured goods (Hühne et al., 2015). As mentioned earlier, the agricultural industry receives the most aid from the AfT for productive capacity building category, so further investigation into the effectiveness of this aid could be fruitful.

When assessing the effectiveness of the AfT subcategories by region, only a small number of significant results were found. As might be expected, a doubling of AfT for economic infrastructure to Sub-Saharan Africa would lead to a 1.2 per cent decrease in exports to all trading partners. While this may be because this region contains a large number of low income countries, it still does not explain why AfT leads to a decrease in exports. In contrast, this study finds that a doubling of AfT for economic infrastructure to the Middle East and North African region leads to between a 1.5 to 1.7 per cent increase in exports to all trading partners. Determining why there is such a pronounced difference between these two regions might help in understanding how donor countries can make aid more effective. Results for both income group and region subsamples confirm that AfT has not become more effective over the period considered in this study, nor between the two periods 2002-2010 and 2011-2018.

4.4 Robustness Checks

In this section, several robustness checks are performed by modifying the baseline specification in Table 1. As shown in Table 7 below, these modifications do not significantly impact the main results of this study.

Column (1) results present the baseline specification but is estimated using random effects instead of fixed effects. A fixed effects model is almost always preferred in the literature, but some studies have used the random effects model as a robustness check (Kim et al., 2020; UNESCAP, 2016).

The next robustness check carried out adds recipient countries' population (*POP*) as an additional explanatory variable. This follows Pettersson and Johansson (2013) and Hühne et al. (2014) who use it to distinguish between country size and purchasing power. *POP* is expected to be negatively associated with foreign trade, due to the greater possibilities for domestic specialisation and trade resulting from a larger population. Column (2) shows that population is significant and in fact positive, while the standard explanatory variables are largely unchanged.

Next, aggregate *GDP* is replaced by its two components, *GDP per capita* and *POP*. This is an alternative way of distinguishing between country size and purchasing power (Hühne et al., 2014; Pettersson & Johansson, 2013). The results in column (3) show that the coefficient for *GDP per capita* is highly significant and similar to that of aggregate *GDP,* while *POP* is also highly Column (1) results present the baseline specification but is estimated using random effects instead of fixed effects. A fixed effects model is almost always preferred in the literature, but some studies have used the random effects model as a robustness check (Kim et al., 2020; UNESCAP, 2016).

The next robustness check carried out adds recipient countries' population (*POP*) as an additional explanatory variable. This follows Pettersson and Johansson (2013) and Hühne et al. (2014) who use it to distinguish between country size and purchasing power. *POP* is expected to be negatively significant and positive. The AfT coefficient in both columns (2) and (3) prove to be highly robust to both modifications.

Aid given to small countries often amounts to a high share of government revenue and GDP, while annual aid fluctuations tend to be more severe for small countries (Hühne et al., 2014). To check for this, aid recipient countries with populations of less than one million are excluded. As per column (4), no significant results was found for the *Total AfT* coefficient.

Table 7. Robustness checks - Effects of total aid for trade on recipient countries' exports to all trading partners

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total AfT (1 yr lag)	0.003	**0.009***	**0.009****	-0.001	**0.015*****	**0.008***	**0.008***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
NAD	0.048	0.053	0.054	-0.002	0.104	0.059	0.060
	(0.080)	(0.069)	(0.069)	(0.067)	(0.070)	(0.058)	(0.070)
GDP	**0.995*****	**0.902*****	**--**	**0.909*****	**0.791*****	**0.346*****	**0.909*****
	(0.034)	(0.026)		(0.033)	(0.049)	(0.069)	(0.026)
GDP per Capita	--	**--**	**0.894*****	--	--	--	--
			(0.027)				
Population	--	**0.228****	**1.250*****	--	--	--	--
		(0.172)	(0.173)				
Exports (1 yr lag)	--	--	--	--	--	**0.619*****	--
						(0.061)	
FDI	--	--	--	--	--	--	0.014
							(0.012)
Tij	-0.016	-0.034	-0.031	-0.011	-0.063	-0.048	-0.060
	(0.044)	(0.043)	(0.042)	(0.046)	(0.073)	(0.043)	(0.049)
trend	**-0.011*****	**-0.006****	**-0.006***	0.004	0.002	**-0.010***	-0.002
	(0.003)	(0.003)	(0.003)	(0.004)	(0.006)	(0.006)	(0.004)
*trend * Total AfT*	1.98E-13	1.59E-12	1.79E-12	3.00E-14	4.80E-12	9.61E-13	9.40E-13
	(2.03E-12)	(1.55E-12)	(1.63E-12)	(1.23E-12)	(2.48E-12)	(1.28E-12)	(1.42E-12)
2011-2018 dummy	--	--	--	--	--	--	--
Observations	1778	1778	1778	1474	1778	1778	1692
Recipient Countries	125	125	125	103	125	125	125
R2	0.034	0.415	0.413	0.431	0.351	0.658	0.413
Adj R2	0.031	0.369	0.366	0.387	0.299	0.631	0.364

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. Total AfT, the independent variable of principle interest, is lagged by 1 year. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in bold. 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

It has been suggested that lagging all independent variables by one year may help mitigate any potential reverse causality problems (Busse et al., 2012). Column (5) shows that not only does this increase the significance of the *Total AfT* coefficient, but the coefficient itself also increases. The *GDP* coefficient on the other hand, while still highly significant, decreases by a small amount.

Exports tend to be persistent over time and generally depend on previous exports. Thus we test the robustness of our results using a dynamic specification (Calì & te Velde, 2011). To do this, *Exports* lagged by one year is included as an independent variable. Column (6) shows that this modification does not affect the *Total AfT* coefficient at all, while *Exports* lagged by one year is highly significant and positive, and the *GDP* coefficient is substantially lower than in the baseline specification (by an amount approximately the same as the *Exports* lagged by one year coefficient).

Finally, *FDI* is included as an independent variable in column (7) as it has been suggested that foreign aid may be a complement to FDI in filling a country's foreign exchange gap (Hoekman & Shingal, 2020). The *FDI* coefficient does not end up being significant and has no impact on the other variables from the baseline specification.

4.5 Summary and Conclusions of Empirical Results

The results presented in this empirical chapter show that AfT is effective at increasing aid recipient countries' exports, with results proving to be robust. The results for the three main AfT categories are all different, with AfT for economic infrastructure leading to a decrease in exports, AfT for productive capacity building increasing exports, while no significant result for AfT for trade policies and regulations was found. Total AfT and the main AfT categories do not appear to be effective where they are needed most, with the exports of low income countries and Sub-Saharan Africa generally being adversely affected. Most importantly in the context of this study, the effectiveness of AfT does not appear to have increased over time.

Chapter Five

CONCLUSION

5.1 Introduction

This study has empirically examined several channels in which AfT impacts the trade performance of developing countries to determine whether AfT has become more effective over time at increasing aid recipient countries' exports. To achieve this aim, the three main objectives of this study were: First, identifying whether AfT has been effective at increasing aid recipient countries' exports; Second, determining whether AfT has become more effective over time at increasing aid recipient countries' exports; Third, assessing the effectiveness of AfT in developing countries who face the most significant challenges in the global trading system.

The methodology used in this study to estimate results is the structural gravity model and is based on theoretical microfoundations. The period under investigation is 2002-2018 and includes data from 125 aid recipient countries' and 29 donor countries (DAC member countries). Aid disbursement data is used as this is known to be much more reliable than aid commitment data. This study employs a trade costs variable that includes all costs relating to trading goods internationally and can be considered a comprehensive measure of all gravity variables.

Since the inception of the AfT Initiative in 2005 a significant body of literature has been developed to determine if AfT effectively improves developing countries' trade performance. To determine whether the Paris Declarations aim of making aid more effective has been achieved in terms of AfT, this study's main contribution to the literature is that it uses two interaction variables to determine whether AfT has become more effective over time at increasing aid recipient countries' exports.

5.2 Research Conclusions of Empirical Results

This study has carried out an empirical analysis of AfT's effectiveness at increasing aid recipient countries' exports, whether its effectiveness has improved over time, and investigates AfT's effectiveness in different regions and income groups. When considering all countries included in

this study, AfT has been found to be effective in increasing aid recipient countries' exports to all trading partners. The extent to which recipient countries' exports benefit has generally been less than what has been found in most literature. When assessing aid recipient countries' exports to donor countries only, AfT becomes more effective. This suggests that while donor countries do not solely give aid for their own interest. Whether cynically or not, it is likely that donors give aid in a way that also provides benefits to them and aid recipients.

Interestingly, this study's findings suggest that most of the benefits from AfT come from AfT for productive capacity building, while AfT for economic infrastructure appears to have a negative effect on aid recipient countries' exports. These findings contrast with the literature that has generally found AfT for economic infrastructure to be the most effective, and AfT for productive capacity building often not effective at all. No significant results were found for AfT for trade policies and regulations, which is also counter to the literature, that generally finds this AfT category to positively affect recipient countries. The impact of the three main categories of AfT tends to vary significantly across income levels and regions, suggesting that there may be something about these subgroups that influences the effectiveness of AfT.

This study finds no evidence that AfT has become more effective over time at increasing aid recipient countries' exports. Assuming donor and recipient countries have done what they can to follow the Paris Declaration to improve the effectiveness of aid, this result is highly disappointing. This result holds when studying the three main categories as well as across recipient country regions and income levels. However, the effectiveness of AfT may depend on the aims and objectives of specific donor and aid recipient countries. Thus, it should be acknowledged that there are still several avenues outside the scope of this paper where AfT may have become more effective.

When assessing the effectiveness of AfT in different regions and across income groups for the whole sample period, several important results were found. Total AfT and the three main AfT categories all appear to adversely affect the low-income country group's exports and the Sub-Saharan African region. As these countries are regarded as facing the biggest trade challenges, these results suggest that AfT is not effective where it is needed most. These results are an important contribution to the literature as the evidence presented in past studies has been somewhat mixed.

5.3 Policy Implications

As the results of this empirical study show, AfT is effective at increasing recipient countries' exports. However, the effectiveness of AfT has not improved over time as was hoped for by the Paris Declaration on Aid Effectiveness. In terms of AfT's effectiveness at increasing recipient countries' exports, it is clear that both total AfT and its main subcategories are more effective across some income groups and regions, not effective in some, and have adverse effects in others. If donors were solely interested in making AfT as effective as possible, then directing all AfT funds to countries within the highly effective income groups and regions would likely improve the effectiveness of AfT. That said, one of the main objectives of the AfT Initiative is to ensure that AfT goes to where it is needed most, implying low-income countries and Sub-Saharan Africa. AfT to these subgroups appears to have the opposite desired effect by decreasing exports. Gaining a better understanding of why this might be the case and implementing policies to overcome these potential barriers would be the most important action donors could take to improve the effectiveness of aid.

5.4 Future Research

Much of the existing literature studying the effectiveness of AfT on recipient countries' trade performance tends to focus on impacts at a high level. This has often been due to a lack of literature in this area and data constraints. However, in more recent times, the literature has started to look at more micro level aspects of AfT, donors, and recipients to better understand where and how AfT is most effective. This is certainly the right path to follow as this study and the existing literature suggest that the effectiveness of AfT varies depending on the AfT category, the income level of the recipient country, the region, and possible even the donor. Understanding what existing attributes recipient countries possess that may make AfT more effective and what are the most severe obstacles making AfT ineffective for some, could help improve the effectiveness of AfT.

The results presented in this study, along with the generally mixed results in the literature, highlight the need for greater focus and attention on low-income countries and the Sub-Saharan African region. This needs to come in the form of further academic research. However, donors themselves should also be reviewing their AfT programmes to countries in these groups as there may be donor-specific issues they can be resolved to help improve the effectiveness of AfT. While it is clear that

AfT is effective overall, the results presented in this study and previous studies focus attention on the areas that will assist policy-makers and influence future research to help improve the effectiveness of AfT.

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APPENDIX A

A1 - Recipient Countries by Region and World Bank Income Group

East Asia and the Pacific		Latin America and the Caribbean		Sub-Saharan Africa	
Cambodia	**	Antigua and Barbuda	****	Angola	**
China	***	Barbados	****	Benin	**
Fiji	***	Bolivia	**	Botswana	***
Indonesia	***	Brazil	***	Burkina Faso	*
Kiribati	**	Chile	****	Burundi	*
Lao PDR	**	Colombia	***	Cabo Verde	**
Malaysia	***	Costa Rica	***	Cameroon	**
Fed. States of Micronesia	**	Dominica	***	Chad	*
Mongolia	**	Dominican Republic	***	Comoros	**
Myanmar	**	Ecuador	***	Democratic Republic of the Congo	*
Palau	****	El Salvador	**	Republic of the Congo	**
Papua New Guinea	**	Grenada	***	Côte d'Ivoire	**
Philippines	**	Guatemala	***	Equatorial Guinea	***
Samoa	***	Guyana	***	Eswatini	**
Thailand	***	Honduras	**	Ethiopia	*
Timor-Leste	**	Jamaica	***	Gabon	***
Tonga	***	Mexico	***	The Gambia	*
Vanuatu	**	Nicaragua	**	Ghana	**
Vietnam	**	Panama	****	Guinea	*
Europe and Central Asia		Paraguay	***	Guinea Bissau	*
		Peru	***	Kenya	**
Albania	***	St Kitts and Nevis	****	Lesotho	**
Armenia	***	St Lucia	***	Liberia	*
Azerbaijan	***	St Vincent and the Grenadines	***	Madagascar	*
Belarus	***	Suriname	***	Malawi	*
Bosnia and Herzegovina	***	Trinidad and Tobago	****	Mali	*
Croatia	****	Uruguay	****	Mauritania	**
Georgia	***	Venezuela	***	Mauritius	****
Kyrgyz Republic	**	**Middle East and North Africa**		Mozambique	*
Moldova	**			Namibia	***
Montenegro	***	Algeria	**	Niger	*
North Macedonia	***	Bahrain	****	Nigeria	**
Tajikistan	*	Egyptian Arab Republic	**	Rwanda	*
Turkey	***	Islamic Republic of Iran	***	Sao Tome and Principe	**
Ukraine	**	Iraq	***	Senegal	**
South Asia		Jordan	***	Seychelles	****
		Lebanon	***	Sierra Leone	*
Afghanistan	*	Morocco	**	South Africa	***
Bangladesh	**	Oman	****	Tanzania	**
Bhutan	**	Saudi Arabia	****	Togo	*
India	**	Syrian Arab Republic	*	Uganda	*
Nepal	**	Tunisia	**	Zambia	**
Pakistan	**	West Bank and Gaza	**	Zimbabwe	**
Sri Lanka	**	Yemen Republic	*		

World Bank Income Group	
*	Low Income Country (LIC)
**	Lower-Middle Income Country (LMIC)
***	Upper-Middle Income Country (UMIC)
****	High Income Country (HIC)

A2 - SITC Revision 2 one-digit codes:

0. Food and live animals
1. Beverages and tobacco
2. Crude materials, inedible, except fuels
3. Mineral fuels, lubricants and related materials
4. Animal and vegetable oils, fats and waxes
5. Chemicals and related products, not elsewhere stated
6. Manufactured goods classified chiefly by material
7. Machinery and transport equipment
8. Miscellaneous manufactured articles
9. Commodities and transactions not elsewhere classified

A3 - Aid for Trade Subcategory Sector Codes

- *Economic Infrastructure:*
    - Transport and Storage (210)
    - Communications (220)
    - Energy (230)
- *Productive Capacity Building:*
    - Banking and Financial Services (240)
    - Business and Other Services (250)
    - Agriculture (311)
    - Forestry (312)
    - Fishing (313)
    - Industry (321)
    - Mineral Resources and Mining (322)
    - Tourism (332)
- *Trade Policies and Regulations:*
    - Trade Policies and Regulations (331)

APPENDIX B

Table B1. Summary statistics, full sample, 2002-2018

Variable	Observations	Positive Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Exports to all countries	1903	1903	4.35E+10	3.61E+09	1.90E+11	27703.65	2.86E+12
Total AfT	1903	1835	1.24E+08	34399966	2.92E+08	196.2117	3.98E+09
AfT for Infrastructure	1903	1775	75107998	11719031	2.22E+08	17.97989	3.64E+09
AfT for Prod Cap	1903	1883	48965374	17042990	94236374	196.2117	1.24E+09
AfT for Policy and Reg	1903	1589	2778070	430511.5	13203595	131.5538	3.13E+08
GDP	1903	1903	1.71E+11	1.38E+10	8.28E+11	27756520	1.47E+13
Tij	1903	1903	26704.09	28326.93	10974.13	1582.526	52463.7

Notes: The mean and median of the aid variables are conditional on aid being positive.

Table B2. Effects of aid for trade on recipient countries' exports to DAC countries

	Fixed Effects			
VARIABLES	(1)	(2)	(3)	(4)
Total AfT (1 yr lag)	**0.017*** **	**0.014*** **	**0.013*** **	**0.013*** **
	(0.005)	(0.004)	(0.004)	(0.004)
NAD	**0.106** **	**0.153*** **	**0.146*** **	**0.149*** **
	(0.053)	(0.056)	(0.055)	(0.056)
GDP	**0.690*** **	**0.843*** **	**0.833*** **	**0.832*** **
	(0.034)	(0.033)	(0.035)	(0.035)
Tij	**-0.082***	**-0.152*** **	**-0.138*** **	**-0.138*** **
	(0.046)	(0.033)	(0.047)	(0.048)
trend	--	**-0.024*** **	**-0.024*** **	**-0.024*** **
		(0.003)	(0.003)	(0.003)
*trend * Total AfT (1 yr lag)*	--	--	**7.87E-12*** **	--
			(1.76E-12)	
*2011-2018 * Total AfT (1 yr lag)*	**--**	**--**	**--**	**9.00E-11**
				(2.51E-11)
Observations	1778	1778	1778	1778
Recipient Countries	125	125	125	125
R2	0.090	0.352	0.353	0.353
Adj R2	0.020	0.301	0.302	0.302

Notes: Dependent variable: Aid recipient countries' exports to DAC countries. Total AfT, the independent variable of principle interest, is lagged by 1 year. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in **bold**. 'No-aid dummy' variable included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.

Table B3. Effects of aid for trade on recipient countries' exports to all trading partners (AfT multiple lags)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total AfT (1 yr lag)	0.008	**0.008***	--	--	--	--	0.009	0.008
	(0.005)	(0.005)					(0.007)	(0.007)
Total AfT (2 yr lag)	--	--	0.002	0.002	--	--	-0.005	-0.005
			(0.005)	(0.005)			(0.009)	(0.009)
Total AfT (3 yr lag)	--	--	--	--	**0.008***	**0.008***	0.008	0.008
					(0.004)	(0.004)	(0.007)	(0.007)
NAD	0.061	0.061	-0.003	0.002	0.015	0.016	0.068	0.069
	(0.069)	(0.069)	(0.073)	(0.072)	(0.052)	(0.053)	(0.086)	(0.086)
GDP	**0.916*****	**0.914*****	**0.917*****	**0.914*****	**0.911*****	**0.906*****	**0.903*****	**0.897*****
	(0.025)	(0.024)	(0.025)	(0.024)	(0.034)	(0.032)	(0.031)	(0.030)
Tij	-0.033	-0.030	-0.035	-0.031	-0.020	-0.015	-0.019	-0.015
	(0.042)	(0.042)	(0.043)	(0.044)	(0.049)	(0.050)	(0.047)	(0.049)
trend	-0.002	-0.002	-0.005	-0.005	-0.005	-0.005	-0.004	-0.004
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
*trend * Total AfT (1 yr lag)*	2.12E-12	--	--	--	--	--	3.89E-12	--
	(1.58E-12)						(5.04E-12)	
*2011-2018 * Total AfT (1 yr lag)*	--	**4.04E-11***	--	--	--	--	--	9.84E-11
		(2.25E-11)						(7.07E-11)
*trend * Total AfT (2 yr lag)*	--	--	1.90E-12	--	--	--	-2.52E-12	--
			(2.79E-12)				(8.97E-12)	
*2011-2018 * Total AfT (2 yr lag)*	--	--	--	5.11E-11	--	--	--	-3.75E-11
				(3.65E-11)				(1.26E-10)
*trend * Total AfT (3 yr lag)*	--	--	--	--	1.41E-12	--	-2.77E-13	--
					(1.95E-12)		(6.92E-12)	
*2011-2018 * Total AfT (3 yr lag)*	--	--	--	--	--	4.93E-11	--	-2.24E-11
						(3.57E-11)		(1.14E-10)
Observations	1778	1778	1653	1653	1528	1528	1528	1528
Recipient Countries	125	125	125	125	124	124	124	124
R2	0.414	0.414	0.417	0.417	0.439	0.440	0.440	0.441
Adj R2	0.367	0.367	0.367	0.368	0.388	0.388	0.387	0.387

Notes: Dependent variable: Aid recipient countries' exports to all trading partners. Total AfT, the independent variable of principle interest, has been lagged by 1, 2, and 3 years resepetively. All variables are reported in logs, except for trend and dummy variables. All standard errors computed using the White test and reported in parentheses. P values are indicated by ***p < 0.01, **p < 0.05 and *p < 0.1, respectively; significant coefficients highlighted in **bold**. No-aid dummy included in all regressions as per Wagner (2003). A constant is included in all regressions but not presented in the table.