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The Role of Aid for Trade in Global Value Chains in Emerging Economies

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Acronyms and Abbreviations

AfBPC	Aid for Building Productive Capacity
AfEI	Aid for Economic Infrastructure
AfTPR	Aid for Trade Policies and Regulations
AfT	Aid for Trade
DiD	Difference-in-Differences
DFD_FVA	Foreign Value-Added Embodied in Domestic Final Demand
DVA	Domestic Value-Added
CEPII	Centre for Prospective Studies and International Information
CES	Constant Elasticity of Substitution
CRS	Creditor Reporting System
EEs	Emerging Economies
EXGR	Gross Exports
EXGR_DVA	Domestic Value-Added Content of Gross Exports
FDI	Foreign Direct Investment
FFD_DVA	Domestic Value-Added Embodied in Foreign Final Demand
FVA	Foreign Value-Added
GDP	Gross Domestic Product
GVC	Global Value Chain
HICs	High-Income Countries
ICIO	Inter-Country Input-Output

ICT	Information and Communication Technology
IF	Integrated Framework
IMGR_DVA	Domestic Value-Added Content of Gross Imports
LDCs	Least Developed Countries
LMICs	Low- and Middle-Income Countries
LPI	Logistics Performance Index
MENA	Middle East and North Africa
OECD	Organisation for Economic Co-operation and Development
OFDI	Outward Foreign Direct Investment
OLS	Ordinary Least Squares
PPML	Poisson Pseudo Maximum Likelihood
QWIDS	Query Wizard for International Development Statistics
R&D	Research and Development
RTA	Regional Trade Agreement
SDGs	Sustainable Development Goals
TiVA	Trade in Value-Added
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organisation

Chapter 1

1. Introduction

Foreign trade, particularly exports, is pivotal for fostering economic growth. It acts as a catalyst for development, not only by boosting a country's economy but also by enabling global integration and improving international competitiveness. The challenges faced by emerging economies (positioned between developing and developed countries) and developing countries in the realm of international trade are diverse and include issues like trade barriers, inadequate infrastructure, supply-side limitations, external economic shocks, and limited access to resources (Kiute et al., 2015). These difficulties hinder their capacity to participate effectively in global trade and leverage the opportunities presented by e-commerce. To tackle these challenges, the international community has recognised the significance of aid for trade, an initiative designed to help less developed countries overcome domestic hurdles, integrate into the global economy, and attain growth driven by exports.

The Aid for Trade Initiative (AfT), introduced in 2005, marks a significant step in harmonizing trade policies with development assistance (Hallaert, 2013). It acknowledges the obstacles less developed countries face in implementing trade liberalisation and adapting to the ever-evolving global trade system. By offering financial support for factors that can enhance trade performance, such as infrastructure, trade agreements, and trade-related services, AfT serves as a critical instrument for promoting sustainable, efficient, and inclusive economic development. AfT operates within three primary categories: Economic Infrastructure, Building Productive Capacity, and Trade Policies and Regulations (OECD, 2019). These categories encompass various subfields, each serving as a channel for delivering aid.

Over the past few decades, due to the increasing impact of globalisation, certain phases of production that were previously localised in a few locations have now become dispersed across different geographical locations. Global value chains (GVCs) denote a series of activities involved in manufacturing a product or delivering a service, ultimately sold to consumers. Each step contributes value to the final product, with at least two steps being conducted in different countries. When a company engages in at least one step within a GVC, it is considered part of the chain. GVCs have resulted in an increase in the

use of intermediate inputs in cross-border transactions, as opposed to final goods, which increase has traditionally been emphasised in international trade frameworks (Antràs, 2020). This has led to the development of a new method for analysing foreign trade based on value-added, which is different from the traditional method of measuring trade value based on its gross value. Researchers have combined data from customs agencies with domestic input-output tables to form worldwide input-output tables to track the movement of value-added trade across nations. The use of value-added data can provide valuable insights into the generation of domestic value-added (DVA) through the export of goods or services, which is essential for development strategies and industrial policies.

The rapid internationalisation of production has allowed more countries, including Emerging Economies (EEs), to participate in GVCs. However, core positions within GVCs remain dominated by major, mainly developed economies. As a result, while developing nations have become increasingly involved in various stages of production, they continue to face challenges in upgrading their roles within these networks. According to Hanson (2012), integrating into GVCs can provide a pathway for EEs to accelerate development, a view further supported by Gereffi (2014), who emphasises the critical role of GVCs in fostering economic and social progress for these countries. Despite these opportunities, the benefits of GVC participation for EEs are uneven, and their progress is often hindered by structural challenges. As Jangam and Rath (2021) point out, GVC involvement among emerging market economies increased from 34.8% in 1995 to 49.3% in 2011, yet this growing participation does not guarantee equal benefits. There is a significant role of GVC participation in fostering economic development, particularly for EEs. The benefits of GVC integration extend beyond mere trade expansion, encompassing critical aspects like productivity growth (Pahl and Timmer, 2020; Mallick and Zhang, 2022), economic upgrading (Jangam and Rath, 2021; Tian et al., 2022) and diversification of exports (Huong and Park, 2021). These dynamics are instrumental not only in enhancing the global competitiveness of EEs but also in fostering deeper economic upgrading, particularly when local firms are actively integrated into GVCs, enabling stronger linkages and broader developmental gains. However, EEs face significant obstacles such as inadequate infrastructure, limited access to trade finance, and complex compliance and border procedures, all of which increase the costs of engaging in foreign markets. Addressing these barriers requires targeted interventions,

with AfT being a potentially crucial mechanism to support EEs in overcoming these challenges and improving their competitiveness in GVCs.

The effectiveness of AfT remains a subject of ongoing debate. Opinions differ on the program's significance in promoting economic growth driven by exports. The role of AfT in international trade and value chains, particularly for EEs continues to evolve and demands further exploration. To gain a deeper understanding of the dynamics and potential benefits of AfT for EEs, the thesis aims to find the answer to the question of how AfT can contribute to increasing international trade and achieving a better engagement in GVCs in EEs, assuming that GVC participation brings economic benefits to the participating countries. To find an answer to the question a gravity model is employed for estimation, considering trade costs and various other factors. The choice of estimation method, the Poisson Pseudo Maximum Likelihood (PPML), is discussed in detail due to its suitability for addressing challenges related to zero trade observations and heteroskedasticity. Furthermore, difference-in-difference (DiD) model is also applied to check the sensitivity of results.

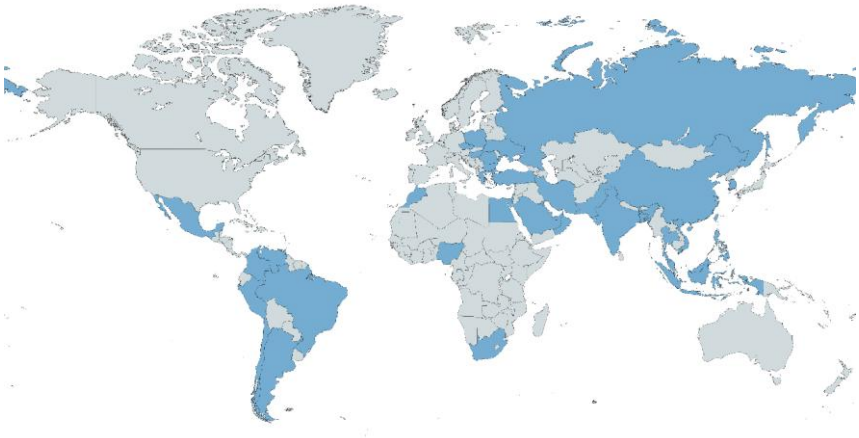
The novelty of this thesis lies in its multifaceted approach to exploring AfT's impact on EEs. First, it analyses the distribution of AfT and its subcategories across EEs, offering insights into how these funds are allocated. Second, it evaluates the engagement of EEs in GVCs, moving beyond traditional trade data by incorporating value-added trade data, particularly through the application of Trade in Value-Added indicators. Moreover, the thesis introduces a comparative framework that examines the effects of AfT not only as an aggregated entity but also by breaking it down into subcategories. This enables a more nuanced evaluation of how specific types of aid influence export performance and GVC engagement in EEs. A novel angle is added by investigating whether these impacts differ based on whether the trade partner is a donor or non-donor, revealing potential asymmetries in trade relationships. To the best of my knowledge, there has been no prior examination of the distinct impact of AfT allocated to the EEs on their international trade and engagement in GVCs using such a broad scope of methods and data. Moreover, this study incorporates a long time series with the latest available data, further enhancing its contribution. Consequently, the novelty of this thesis lies in filling this gap and making a unique contribution to the existing body of knowledge.

1.1. Subjects of the research

Traditionally, countries have been categorised into two main groups: developed countries that are highly industrialised nations with high GDP per capita, advanced infrastructure, and strong innovation capabilities, and developing countries that are nations with lower industrialization levels, lower GDP per capita, and limited technological capabilities. However, an additional subgroup of nations exists, which falls neither within the developed nor the developing category. These countries, referred to as ***"Emerging Economies",*** occupy an intermediary position and present unique characteristics. The term "emerging economy" or "emerging market" originated from the concept of a "developing economy" employed in the 1970s to describe underdeveloped markets. The term emerged in 1980 when Antoine van Agtamael, an economist at the World Bank, coined it to describe economies positioned between developing and developed countries, adding it to the realm of economic terminology (Mardiros and Dicu, 2014). Despite the term being commonly used, there is no universally accepted agreement regarding the conceptual or practical definition of what qualifies as an emerging market. Consequently, the categorisation of nations as emerging markets is somewhat capricious, subject to periodic assessment and evaluation by various global financial organisations employing diverse classifications, approaches, and levels of specificity. Figure 1 illustrates a global map showcasing countries that have been classified as EEs by at least one group of researchers or financial organisation[1]. This classification encompasses a significant proportion of countries situated in Latin America and Southeast Asia, as well as several nations in Eastern Europe, the Middle East, and four major economies located within the African continent[2].

[1] S&P Global Ratings, FTSE International Limited, Dow Jones & Company, Inc., MSCI Emerging Markets Indexes, G.P Morgan, IMF, Russell Investments, Columbia University, Cornell University, BRICS and Next Eleven countries.
[2] A comprehensive list of nations can be found in Appendix 1.

Figure 1 Emerging Economies



Source: Own construction based on classifications of several research groups and financial organisations as of 2024.

EEs have become key drivers of global economic growth in recent decades. While growth in developed economies has been relatively slow since the mid-1980s and was further dampened by the 2008 global economic crisis, demand has been rising rapidly in the Global South, particularly in large EEs like China, India, and Brazil (Staritz et al., 2011). In the meantime, after 1989, the opening of aforementioned countries together with the Russian Federation, significantly expanded global product and labour markets. Although these countries had engaged in some trade with capitalist economies, their full integration into the global capitalist system nearly doubled the field of play for international companies (Freeman, 2006). Thus, nowadays EEs comprise five out of the top ten nations globally as per the adjusted nominal gross domestic product (GDP) based on purchasing power parity. Additionally, the EEs make up eleven[3] out of the top twenty[4]. While this highlights their growing economic scale, it does not necessarily reflect productivity gains or improvements in per capita welfare, as such growth can also stem from factors like public debt expansion or mass production without fostering long-term economic development and resilience. The majority of the global population and territory is constituted by emerging markets, which persistently experience a more rapid expansion in comparison to the developed nations. Furthermore, the globalisation process has been greatly accelerated by those countries, since these giant economies offered seemingly inexhaustible pools of low-wage workers, increasingly capable manufacturing and trade

[3] China, India, Russian Federation, Brazil, Indonesia, Turkey, Mexico, South Korea, Egypt, Saudi Arabia and Poland.
[4] Based on World Bank database, as of September 2024.

infrastructures, abundant raw materials and huge underserved domestic markets with incipient middle classes. According to Mardiros and Dicu (2014), despite various interpretations of the concept of emerging economy by diverse individuals, groups, or international bodies, an examination of these explanations underscores several shared attributes. These include possessing extensive territories and sizable populations, advocating for economic policies that result in accelerated growth, increased trade and investments, prioritizing the expansion of the middle class to ensure positive developments in production and consumption, and maintaining persistent worries regarding the enhancement of living standards, social steadiness, and tolerance.

EEs are an important group in the global trade landscape, as they represent economies with significant potential for growth and increased participation in international trade. These economies often face unique challenges in upgrading industries, boosting export performance, and enhancing their integration into GVCs. Given their critical role in the global economy, EEs are the focal point of this research, as the impact of AfT on their GVC engagement can provide valuable insights into how trade support initiatives can help improve their competitiveness and trade integration. By focusing on EEs, this study aims to uncover the specific mechanisms through which AfT can foster deeper engagement in GVCs, thereby contributing to their access to global markets.

1.2. Hypotheses and research questions

This thesis aims to address both theoretical and empirical gaps in the existing literature on GVCs, aid effectiveness, and international trade. By employing several methods, it seeks to answer the central research question: ***How can AfT enhance international trade and foster deeper engagement in GVCs within EEs, thereby boosting their participation in global trade and improving access to international markets?*** To tackle this question, the thesis assesses the effectiveness of the AfT Initiative in promoting GVC participation through value-added export growth in EEs that have participated in AfT. By concentrating on these specific countries and the available data for the period between 1990 and 2020, the thesis evaluates the importance and potential of AfT to boost their international trade and GVC involvement by testing eight key hypotheses. The exact time frame varies across analyses due to differences in data availability.

H_1: The TiVA and traditional trade data yield significantly different results when applied to the Gravity Model.

H_2: AfT leads to a substantial increase in exports in EEs.

- ***H_{2a}:*** Aid for Economic Infrastructure (AfEI) has a significant positive impact on export performance in EEs.
- ***H_{2b}:*** Aid for Building Productive Capacity (AfBPC) has a significant positive impact on export performance in EEs.
- ***H_{2c}:*** Aid for Trade Policy and Regulations (AfTPR) has a significant positive impact on export performance in EEs.

H_3: The positive impact of AfT is more pronounced in the exports of EEs to donor countries.

H_4: AfT has a positive and significant impact on GVC engagement.

- ***H_{4a}:*** AfT has a positive and significant impact on enhancing the participation of EEs in GVCs.
- ***H_{4b}:*** AfT contributes to improving the positioning of EEs within GVCs.
- ***H_{4c}:*** AfT facilitates the upgrading of EEs within GVCs.

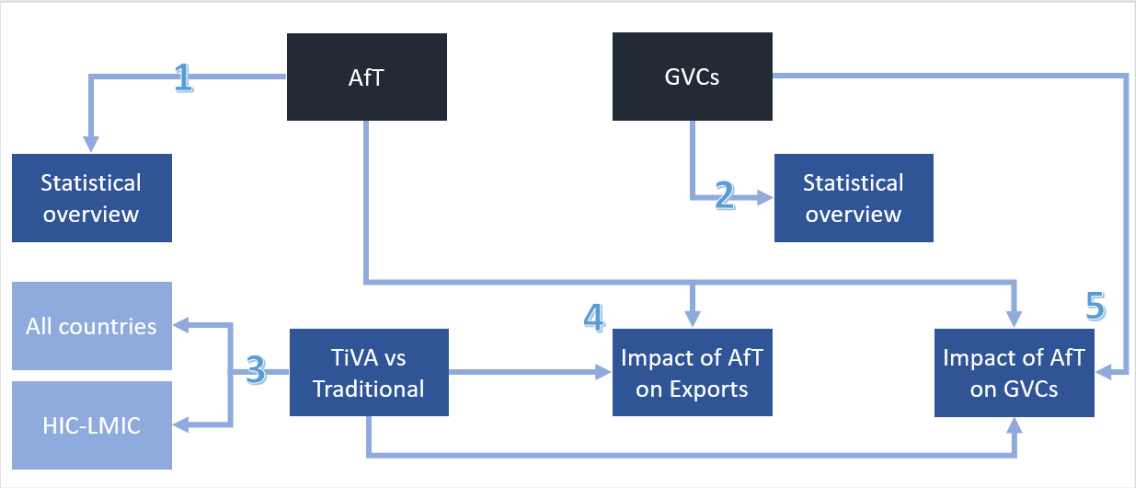
H_5: AfT increases EE reliance on donor value-added, allowing both parties to gain more from the GVCs.

To examine these hypotheses, the thesis utilizes a variety of quantitative research techniques. The diagram in Figure 2 provides a structured overview of the research framework, illustrating the key components and methodological steps involved in analysing the role of AfT in international trade and GVCs in EEs. As illustrated in the figure, the following research objectives are designed to examine the hypotheses:

1. To analyse the distribution of AfT and its subcategories among EEs.
2. To assess the engagement of EEs in GVCs.
3. To compare traditional trade data with value-added data in the application of gravity models.
4. To evaluate the impact of AfT on the export performance of EEs in the gravity models application.

5. To examine the impact of AfT on GVC engagement in EEs in the gravity models application.

Figure 2 Analytical Framework for assessing the role of AfT on GVCs in EEs



Source: Own construction.

Overall, this framework systematically addresses the research objectives, guiding the analysis of how AfT influences both export performance and GVC participation in emerging economies. Furthermore, applying these objectives also provides insight into the initiative from the donor's perspective, helping to identify their interests and motivations behind supporting AfT[5].

1.3. Significance of the thesis

This thesis is significant as it examines the complex relationship — especially when it comes to EEs — between AfT and GVCs. Policymakers and scholars worldwide should understand the role that AfT plays in boosting EEs' involvement in GVCs in an era of expanding international trade.

First, by filling in a major knowledge gap about the ways in which AfT might both directly and indirectly affect GVC involvement, this research contributes to the body of literature. Few studies have explored the relationship between AfT and GVCs, despite the fact that many have looked at both independently. This is particularly true in the context of EEs that face particular developmental constraints. The thesis fills this gap by offering

[5] Although this study acknowledges donor interests and motivations, it does not extensively explore the political dimensions of Aid for Trade.

a comprehensive examination that is relevant for the formulation of effective trade policies.

Second, policymakers in donor nations, international development organisations, and EEs should take note of the research's practical implications. This thesis provides practical knowledge that can advise on the planning and execution of focused AfT programs by outlining the particular components of AfT that most effectively increase international trade and GVC participation — such as investments in economic infrastructure, productive capacity building, and trade policy reform. For AfT to have the greatest socio-economic impact and to promote reasonable growth in EEs, these insights are essential.

Third, the thesis explores the obstacles involved in implementing AfT and taking part in GVC, offering an in-depth understanding of the challenges that aid-receivers encounter. These challenges include donors' own interests, inappropriate economic policy and poor quality of institutions, deglobalisation, global transmission of macroeconomic shocks, COVID-19 and so on. By drawing attention to these difficulties, the thesis not only helps shape policy in the future but also adds to the continuing discussion about how to get over these obstacles in order to accomplish sustainable development goals[6].

Fourth, the thesis applies strong analytical techniques to both traditional and TiVA data, such as difference-in-difference and PPML method in gravity models. These creative approaches support the validity of the thesis's conclusions while also advancing methodology in the field of international trade. Particularly in gravity model applications, comparing traditional data with TiVA data provides fresh insights into quantifying the effect of AfT on export performance and GVC involvement.

While this study covers the period up to 2020 due to data availability, its findings remain highly relevant in today’s trade landscape. AfT continues to play a crucial role in supporting EEs, particularly as they navigate post-pandemic recovery and heightened geopolitical uncertainties, such as the Russia-Ukraine war and shifting global supply chains, and recent trade policy changes under the Trump administration. The structural challenges that AfT aims to address such as trade facilitation, infrastructure development,

[6] Sustainable Development Goals refer to a set of 17 international objectives outlined by the United Nations in 2015, aiming to tackle diverse social, economic and environmental issues and foster global sustainable development.

and capacity building, persist beyond 2020 and have, in some cases, become even more pressing. Additionally, historical analysis provides valuable insights into long-term trends, allowing policymakers to refine and adapt AfT strategies to current realities. By understanding past patterns of GVC participation and the impact of AfT, this research contributes to shaping more resilient trade policies in an increasingly complex global environment. Thus, this thesis is significant as it closes a crucial gap in the literature and makes contributions to practice, methodology, and policy that can lead to a more efficient use of AfT in advancing global economic integration and development.

1.4. Structure of the thesis

This thesis is structured into seven chapters. It begins with an introduction that outlines the research objectives, significance, and overall structure. Chapter 2 explores the AfT initiative, its statistical overview, theoretical and quantitative underpinnings, and implementation challenges, while Chapter 3 examines the concepts and theories of GVCs together with its statistical review and their consequence and modern challenges. Chapter 4 analyses the nexus between AfT and GVCs, focusing on the impact of AfT investments on GVC engagement in EEs. Chapter 5 details the research methodology, including data sources and analytical methods. Chapter 6 presents the findings and discussions, covering the comparison of TiVA data and traditional data in gravity models application, effects of AfT on export performance and GVC engagement. Finally, Chapter 7 summarizes the key findings, draws conclusions, discusses limitations, and offers recommendations for policymakers and future research.

Chapter 2

2. Aid for Trade (AfT): Concepts, Theories, and Implementation Challenges

The AfT initiative is one of the main attempts to support the international trade of developing countries. This initiative is focused on overcoming limitations by assisting and improving trade-related factors. In this chapter, a review of how and why this initiative was launched, through which channels aid is provided, and how it impacts economic indicators will be conducted. It is followed by comprehensive statistical review of AfT disbursed to EEs, examining the overall distribution of AfT and its subcategories. This analysis provides a foundational understanding of how AfT resources are allocated among EEs. Moreover, both theoretical and quantitative investigations about AfT will be presented. Furthermore, studies on the effectiveness of AfT in terms of its impact on the foreign trade of countries will be examined. Finally, the main challenges, such as implementation and the interest of parties, will be discussed, and conclusions from this chapter will be presented.

2.1. Concept of AfT

AfT is a form of financial assistance allocated to support factors that contribute to the enhancement of foreign trade. Developing countries need aid in analysing, negotiating, and enforcing trade agreements and benefiting from expanded market access (Finger and Schuler, 1999). The first WTO Ministerial Conference, organised in 1996, recognizes that the Least Developed Countries (LDCs) were dealing with these kinds of challenges. This led to the formation of an Integrated Framework (IF). The IF, which was established in 1997 to assist in the provision of trade-related technical help to LDCs and was required to strengthen the ability of the LDCs to develop and enforce trade policy. However, the IF had limited progress, and trade was barely seen as a priority for either donors or recipients as it was non-operational, lacking financial resources, and required reform (WTO, 2006; Hallaert, 2013). Hynes and Lammersen (2017) discussed that domestic supply shortages and operational costs are the primary reasons for the failure of trade expansion and development in many of the poorest developing countries. Prowse (2006) concluded that without an approach to increase supply capacity, decrease transport costs, promote the flow of goods over borders, link farmers to markets and so on, trade

opportunities cannot be completely used, and the future profits from trading may not be maximised. Ministers at the 2005 WTO Hong Kong Ministerial Conference acknowledged the need to go beyond simply increasing market access; thus, the AfT initiative was introduced by the global community in December 2005 (Hallaert, 2013). The ministers introduced the initiative to help developing countries build supply-side and trade-related infrastructure, enabling them to better implement WTO agreements and expand their trade. Hallaert (2013) opines that the AfT initiative was initiated as a result of common interests between the WTO and donors. To apply the initiative, the WTO needed to accumulate financial resources. Donors were likely to supply their regular efforts with projects promoting trade as a driver of progress and poverty reduction to achieve the Millennium Development Goals[7].

Meeting at the UN Special Summit in September 2015, leaders of the world agreed to the successful global plan "Transforming our World: The 2030 Agenda for Sustainable Development" (United Nations, 2015). The agenda is an initiative for citizens, the earth, stability, unity, and cooperation with the Sustainable Development Goals (SDGs) at its base. The SDGs strive to promote integrated, sustainable, and robust development and growth. To seize trade opportunities, developing countries need technological and financial aid to integrate and perform in foreign markets. Outdated or inadequate facilities, restricted access to trade financing, the difficulty and expense of meeting an ever-wider variety of requirements, and complicated and time-consuming border processes are all costs for many developing-country companies on foreign markets. AfT is a part of SDG 8 aimed at encouraging sustainable, efficient and inclusive economic development, offering full and productive jobs and stable employment for all. The aim calls for expanded AfT for developing countries, especially the LDCs, including within the “Enhanced Integrated Framework” (UNCTAD, 2015a). This reinforces the demand in the Addis Ababa Action Agenda of the Third International Conference on Financing for Development that AfT will play a key role and thus should aim to assign a growing proportion of aid to the LDCs, based on the principles of the effectiveness of development cooperation (UNCTAD, 2015b).

The AfT initiative, headed by the WTO, assists developing nations, especially, in lowering their trade costs which remain high due to factors such as inadequate

[7] Millennium Development Goals refer to the set of 8 goals that UN Member States have committed to attempting to accomplish by the year 2015.

infrastructure, complex customs procedures, weak regulatory frameworks, and limited access to trade finance. WTO established a general concept of AfT and determined that trade aid must be provided across defined channels. AfT includes everything from apparent trade-related programs like trade policy development and legislation to infrastructure, financial sector support, and private-public sector networking support. It was anticipated that prioritizing trade as a vehicle for economic development and poverty reduction would result in not only additional and stable, but also permanent and reliable funding for developing countries' trade capacities (WTO, 2006). WTO Members settled on AfT benchmarks based on donor reporting to the OECD Creditor Reporting System (CRS) to measure additionality and maintain proper accounting at the global level. These CRS proxies involve official development assistance and other official flows to assist developing countries in improving trade growth strategies, negotiating trade agreements, and achieving their outcomes; construction of bridges, ports, and telecommunication systems to better link domestic companies to regional and international markets; encourage the private sector in utilizing comparative advantages and trying to diversify trade; assist countries in covering the costs of trade liberalisation, like tariff reductions, preference erosion, or diminishing terms of trade; and, ultimately, other trade-related requirements listed as trade-related goals in partner countries' national growth strategies.

According to the OECD-CRS database, AfT is described as aid flowing into sectors that strengthen the recipient country's capacity to enhance and facilitate trade. These sectors are grouped into three main categories by the OECD: ***(a) economic infrastructure, (b) building productive capacity, (c) trade policy and regulations***. Each of the sectors contains subfields that play a role in the channel for the AfT (Table 1).

(a) Aid for Economic Infrastructure (AfEI)

Economic infrastructure includes subcategories namely transport and storage, communications, and energy. To promote sustainable growth, SDG 9 calls for resilient infrastructure, including regional and trans-border infrastructure. Some donors are working to improve electricity transmission and build infrastructure to connect energy sources to end-users. These activities help to achieve SDG 7: Energy for All.

(b) Aid for Building Productive Capacity (AfBPC)

Building productive capacity is another classification for AfT by the OECD and it contains subfields of banking and financial services, business and other services,

agriculture, forestry, fishing, industry, mineral resources and mining as well as tourism. This aligns with SDG Goal 8.10, which aims to strengthen local financial institutions' capacity to promote and extend access to banking, insurance, and financial services for everyone. Access to capital is critical for the private sector to expand.

(c) Aid for Trade Policies and Regulations (AfTPR)

Finally, the last category, trade policies and regulations, contains only trade policies and regulations and trade-related adjustment. This aligns with SDG Goal 16.8 of SDG, which aims to increase and expand the involvement of developing countries in global governance institutions. Support for ministries and agencies in charge of economic strategy, trade-related regulation and administrative reforms, policy analysis, and the enforcement of multilateral trade agreements, such as technical barriers to trade and sanitary and phytosanitary controls, is included in aid for trade policy and regulations. It also includes the costs of integrating markets into national development plans.

Table 1 Categories of AfT and their subfields

AfT categories	Subfields
Economic infrastructure	Transport and storage
	Communications
	Energy
Building productive capacity	Banking and financial services
	Business and other services
	Agriculture
	Forestry
	Fishing
	Industry
	Mineral resources and mining
	Tourism
Trade policies and regulations	Trade policies and regulations and trade-related adjustment

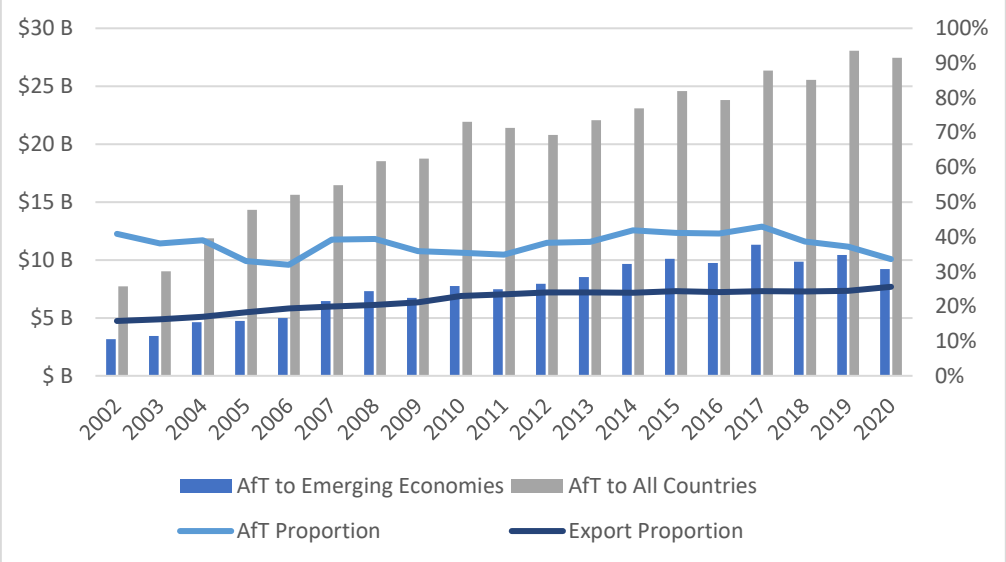
Source: Kheyirkhabarli (2024a), based on OECD–CRS.

2.2. Statistical review of AfT disbursed to EEs

It is essential to examine the descriptive statistics to gain insights about AfT. A comprehensive statistical review of AfT disbursements to EEs, including the overall distribution of AfT and its subcategories, offers a foundational understanding of how these resources are allocated among recipient economies. First, Figure 3 describes the

comprehensive disbursement of AfT amounting to USD 377 billion, distributed among all recipient countries, which constitutes 0.1% of world trade, as well as the specific disbursement of USD 144 billion to the 24 EEs included in our sample, representing 0.2% of the EEs' foreign trade, spanning from 2002 to 2020, the most recent year available at the time of the research. The figure elucidates the ratio of disbursements directed towards the EEs in relation to the overall AfT, along with the ratio of exports from those countries compared to global exports. As the graphical representation demonstrates, the disbursements of AfT to all countries and EEs manifest a positive trajectory. On average, EEs have been recipients of 38% of the total trade assistance, making up 24% of global exports. In other words, EEs receive approximately one-third of AfT and contribute about one-fourth to the total global exports. This highlights the significant share of AfT allocated within the framework of the thesis's sample.

Figure 3 The AfT disbursements to all countries and EEs (billion USD, left scale), along with the relative proportion directed towards EEs within the total AfT disbursement and relative proportion of exports of EEs within world exports (%, right scale)

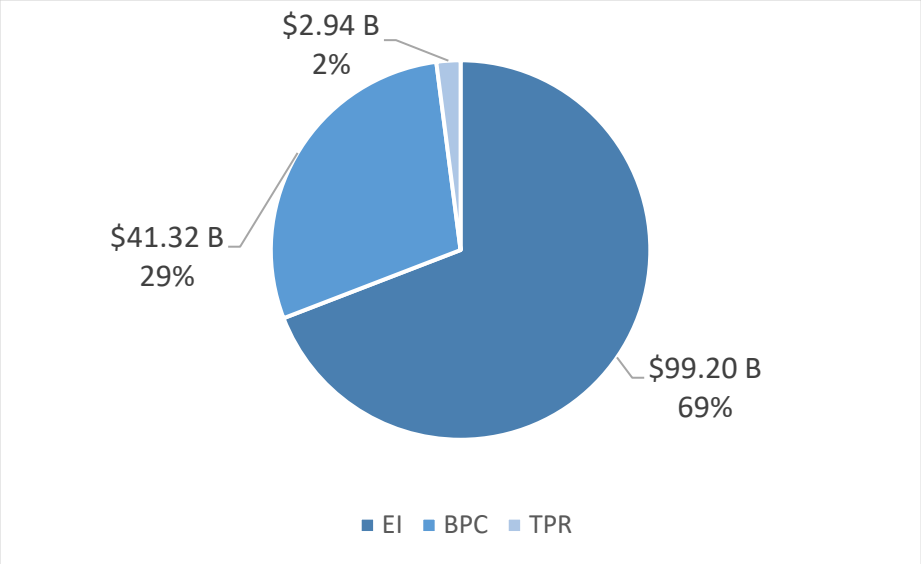


Source: Own construction based on the OECD QWIDS and World Bank database.

Figure 4 provides a visual representation of the apportionment of AfT disbursements to EEs categorised within their respective subgroups. As depicted in the figure, during the 2002-2020 period, a predominant 69% of the aid has been directed toward the Economic Infrastructure (EI) subgroup, representing a substantial sum of USD

99.2 billion. Following closely, there is the allocation of Aid for Building Productive Capacity (AfBPC), which constitutes 29% of the total share and amounts to USD 41.32 billion. Finally, EEs have received a comparatively modest 2% of the disbursements via the Aid for Trade Policies and Regulations (AfTPR) subgroup. Initial data indicate the predominance of Aid for Economic Infrastructure (AfEI) over the other AfT subcategories. These observations offer a comprehensive understanding of how AfT funds are allocated across diverse subgroups of EEs. Analysing the consequences of these distributions on international trade and formulating policy recommendations based on our findings can greatly enhance our overall analysis.

Figure 4 Distribution of AfT Disbursements to EEs by subgroups, 2002-2020

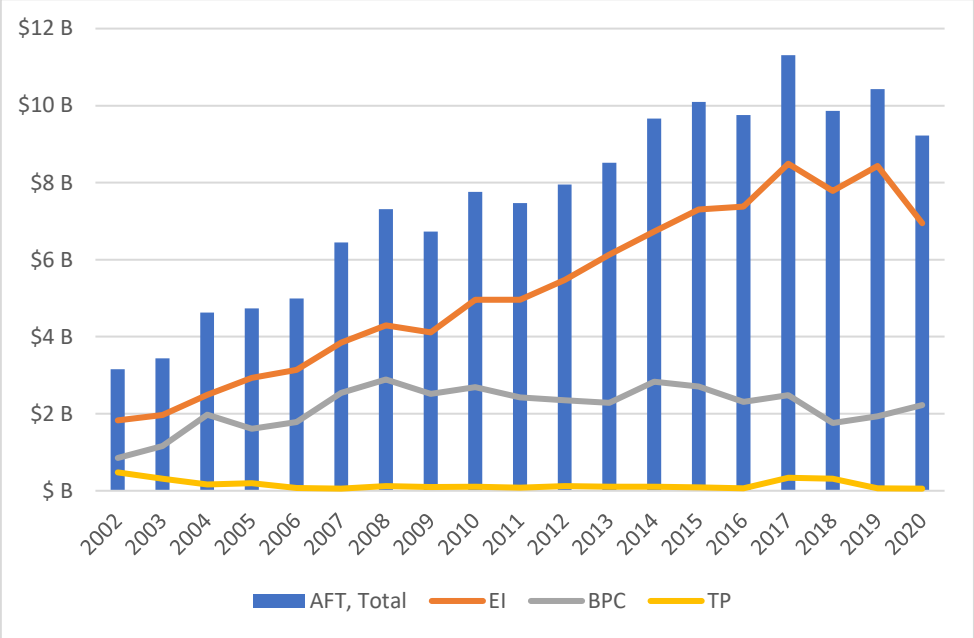


Source: Kheyirkhabarli (2024a), based on OECD QWIDS database.

The trend of disbursed funds for AfEI appears to increase following the global financial crisis, possibly because these countries were more severely affected than others, prompting a greater allocation of AfEI to support their recovery. Figure 5 illustrates the trend of total disbursed funds to EEs for AfT and its subcategories, at constant 2010 USD prices. According to the figure, until 2008, both AfEI and AfBPC were increasing at a similar rate, while AfTPR was decreasing. During the financial crisis, aid decreased across all categories. However, post-crisis, AfEI demonstrated a marked increase, whereas AfBPC and AfTPR exhibited fluctuations. The figure indicates that the gap between AfEI and the other categories began to widen after 2010. Nonetheless, in recent years, this difference has slightly diminished. During this period, the peak disbursement

of AfT funds occurred in 2017, reaching a total of USD 11 billion. Of this amount, USD 8 billion was allocated to AfEI, highlighting its significant predominance among the AfT subcategories. In contrast, AfBPC received just over USD 2 billion, indicating a considerably smaller share of the total disbursement.

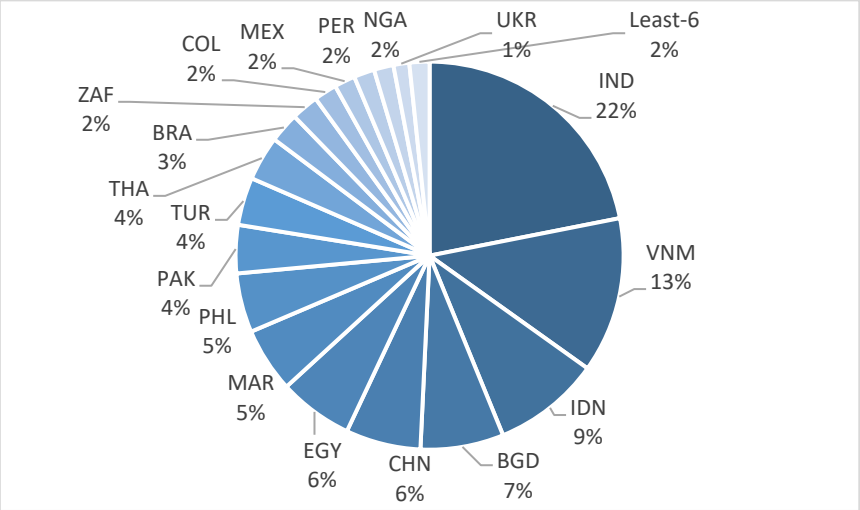
Figure 5 Trendline of AfT and its subcategories disbursed to EEs, 2002-2020



Source: Own construction based on OECD QWIDS database.

The pie chart in Figure 6 illustrates the allocation of total AfT among EEs over the period from 2002 to 2020. Notable differences in the distribution among recipient countries are evident. The figure highlights a strategic focus on countries with significant economic potential and developmental needs. India, Vietnam, and Indonesia, accounting for 2.1%, 1.3%, and 0.9% of world trade in 2020, respectively, are the top recipients, with 22%, 13% and 9% respectively, underscoring their crucial roles in global trade. India emerges as the largest recipient, securing over a fifth of the total AfT. These countries are followed by Bangladesh (7%), China (6%), and Egypt (6%), each receiving more than USD 8 billion during this period. Six countries receiving the least aid are Chile, Malaysia, Mauritius, Argentina, Iran, and Venezuela, each obtaining less than USD 1 billion over the same period.

Figure 6 Allocation of total AfT disbursed among EEs, 2002 to 2020



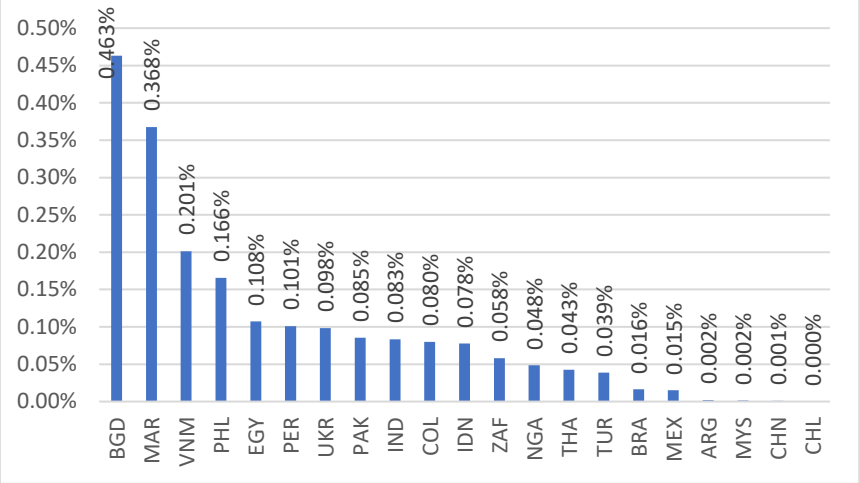
Source: Own construction based on OECD QWIDS database.

Figure 7 illustrates the distribution of AfT received by EEs in 2020, the latest available year, expressed as a percentage of their respective GDP. This metric highlights the relative significance of trade-related development assistance in the context of each nation's economic scale. According to the figure, Bangladesh (0.463%) and Morocco (0.368%) received the highest shares of AfT relative to their GDP, underscoring their reliance on external support to enhance trade capacity. These figures may reflect strategic priorities of donor institutions, regional development needs, or efforts to integrate these economies into GVCs. Additionally, Vietnam (0.201%) and the Philippines (0.166%) also ranked highly, signalling targeted investments in Southeast Asian trade infrastructure and export-oriented sectors. Countries such as Egypt (0.108%), Peru (0.101%), and Ukraine (0.098%) demonstrate moderate AfT/GDP ratios, potentially aligning with their roles in regional trade networks or efforts to address structural economic challenges.

On the other hand, larger emerging economies, including Brazil (0.016%), and Mexico (0.015%), received minimal AfT relative to GDP. This likely reflects their capacity to self-finance trade initiatives or reduced dependency on external aid due to advanced industrialization. Furthermore, Argentina, Malaysia, China and Chile recorded the lowest shares. The disparities in AfT/GDP ratios emphasize the role of economic size and development status in aid allocation. Smaller or less industrialized economies (e.g., Bangladesh, Morocco) appear more dependent on AfT to bolster trade participation, whereas larger economies leverage internal resources. The minimal AfT shares in

advanced emerging markets may also correlate with their established positions in GVCs, reducing the need for external trade-related assistance.

Figure 7 Distribution of Aid for Trade as a Share of GDP in EEs, 2020



Source: Own construction based on OECD QWIDS (AfT) and CEPII (GDP) databases.

The more detailed view can be seen when we check the allocation of AfT based on subcategories, which can reflect a targeted approach to bolstering trade capacities in EEs. Figure 8 illustrates total distributed (a) AfEI, (b) AfBPC and (c) AfTPR among EEs in the period of 2002-2020[8]. If we look at the major aid-recipients and their focus areas, we can see that India stands out as the largest recipient of AfT, with a pronounced emphasis on AfEI ($24.31 billion). The substantial investment of AfEI highlights India's focus on developing its trade-related infrastructure, which is crucial for expanding its trade capabilities. The significant allocation of AfBPC ($7.06 billion) also indicates efforts to enhance India's production sectors, ensuring they can meet both domestic and international demands. Furthermore, Indonesia receives a considerable amount of AfT too, with a major share directed as AfEI ($8.84 billion). The allocation as AfTPR is also noteworthy ($0.63 billion), indicating efforts to streamline trade policies and regulations, thus enhancing the overall trade environment. Moreover, according to the figure, Vietnam's AfEI ($15.36 billion) allocation underscores a strong focus on developing its economic infrastructure. These funds are essential for Vietnam's ambitions to become a significant player in global trade, by ensuring efficient logistics and transportation

[8] A comprehensive list of nations and their disbursed AfT values can be found in Appendix 2.

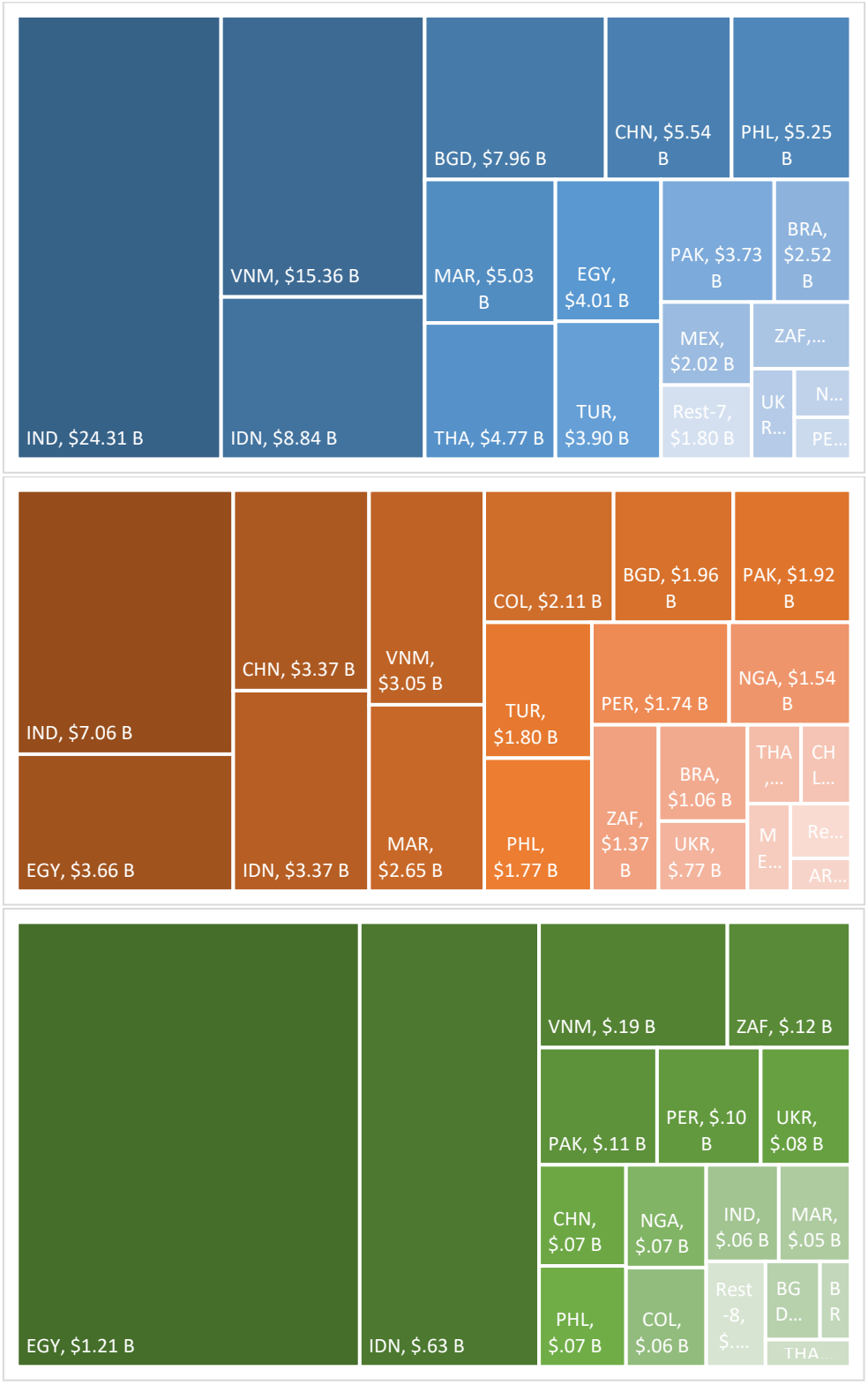
systems. The aid directed as AfBPC ($3.05 billion) shows a balanced approach in boosting production capacities to support its growing export-oriented economy.

Figure 8 Total distributed (a) AfEI, (b) AfBPC and (c) AfTPR among EEs in 2002-2020

(a)

(b)

(c)



Source: Own construction based on OECD QWIDS database.

Although AfTPR has the smallest allocation ($2.94 billion), its impact is significant. Countries like Egypt ($1.21 billion) and Indonesia ($0.63 billion) receive notable AfTPR, focusing on improving trade policies and regulatory frameworks. This support is crucial for creating an enabling environment for trade, reducing barriers, and promoting smoother international transactions. While the figures show that most of the aid is directed towards Asian and African countries, notable recipients from the Latin American region include Brazil, Mexico, and Peru, with a balanced distribution of AfEI, AfBPC, and AfTPR. An analysis of the top ten countries in each AfT category reveals a recurring presence of several nations. Specifically, India, Vietnam, Indonesia, Bangladesh, China, Egypt, and Turkey frequently appear among the top recipients. This repeated inclusion underscores their significant engagement and reliance on AfT funds across various subcategories. On the other hand, Thailand appears in the top ten only once, specifically in the AfEI subcategory. Colombia appears in the top ten exclusively for AfBPC, while South Africa, Peru, Ukraine, and Nigeria each appear only in the top ten for AfTPR. This indicates that for these countries, the singular category in which they rank in the top ten is crucial for their trade development.

The analysis of AfT disbursements from 2002 to 2020 highlights the strategic allocation of funds to EEs, emphasizing the crucial role of infrastructure development in bolstering trade capacities. The predominant focus on AfEI underscores the importance of enhancing trade-related infrastructure to support economic growth. While most aid is directed towards Asian and African countries, notable Latin American recipients also benefit from balanced aid distribution across subcategories. The observed trends and regional insights provide a comprehensive understanding of how AfT is distributed, offering valuable guidance for future policy-making to maximize the potential positive impact of trade assistance in EEs.

2.3. Theoretical underpinnings of the AfT Initiative

AfT is a recent global initiative that provides more targeted economic aid to developing countries to help them adapt to the multilateral trading environment and benefit from the liberalisation. Udvari (2014) stresses that the AfT program has been an important part of international development cooperation since 2005, and it aims to boost developing countries' exports by enhancing supply-side capability. Udvari (2014) and Hynes and Holden (2016) stated that the WTO introduced the AfT initiative to better align

trade policy and development aid in response to several countries' inability to implement the liberalisation mechanism and to adapt to the current international trade system. Hallaert (2013) concluded that trade aid will help WTO members in enforcing unilateral trade and customs reforms and regional treaties, which necessitate changes in the trade and customs regime. AfT will support the implementation of WTO rules and accession commitments for countries that have recently joined the WTO. Eventually, AfT assists countries negotiating WTO membership in understanding the ramifications of membership and developing the trade policy framework that they lack while that is needed, among other things, for the process. AfT will then be able to assert its ability to facilitate the enforcement of trade negotiations.

The efficacy of foreign aid in developing countries is often analysed by focusing on aid specifically aimed at enhancing their trade sector performance, commonly referred to as AfT in the literature. According to Udvari (2017), the purpose of the AfT is threefold: to extend developing countries' exports; to increase developing countries' involvement in multilateral trading structures, and ensure liberalisation is also beneficial for developing countries. There is already considerable evidence that trade aid has helped decrease trade and transportation costs, encouraging trade growth and meeting economic and social objectives (Hynes and Lammersen, 2017). Concurrently, Ghimire et al. (2016) described the AfT as an activity that is focused on the amount of assistance given to sectors that specifically improve the economic infrastructure and other export-friendly services. According to Vijil and Wagner (2012), infrastructure efficiency is strongly associated with infrastructure assistance. Since AfT is meant to make trading easier, Stiglitz and Charlton (2006) considered it a prerequisite for trade reforms, access to markets in developing countries and a catalyst for increasing exports. Aid directed specifically at promoting exports such as trade credits extension has been shown to add positively to exports and consequently, aid channelled to industries that might increase production capacity is likely to be useful in facilitating trade (Ojeaga, 2014). Since its establishment in 2005, AfT has gained considerable importance and became a critical component of international aid designed to help developing countries attain greater self-sufficiency, boost their trade performance and enhance their bargaining role in global negotiations (Kiute et al., 2015). According to Hoekman and Wilson (2011), AfT helps to overcome market failures by increasing competitiveness and lowering output volatility while still promoting product variety. This is especially critical during periods of

uncertainty, such as when oil prices and export demand fluctuate. These scholars argue that AfT plays an important role in helping developing countries increase their export efficiency. Such countries require not only technical assistance for trade but also, more generally, support to lower transaction costs of all sorts, many of them "beyond borders" and to mitigate social costs in the field of trade liberalisation, according to Suwa-Eisenmann and Verdier (2007). On the other hand, there is increasing concern that trade liberalisation would not contribute to increased economic growth and welfare, given the obvious difficulties that developing countries face, such as low productive capacity, limited infrastructure, low productivity, and poor institutions that hinder their access to export markets. As a result, most developing countries are unable to profit from the preferential trade policies implemented by their developed counterparts (Hoekman and Nicita, 2010). Thus, a substantial number of AfT programs have as a core goal the decrease of trade costs.

There are various perspectives on the impact of aid on development and trade promotion. Gomanee et al. (2003) and McPherson and Rakovski (2001) think that aid has a positive effect on development. Svensson (2000) argues that separating aid into industries, in comparison to endogeneity, is a more promising path in seeking to define the impact that aid could have on a developing country. Clemens et al. (2007) consider sector-based aid and see a favourable short-run impact on the economic development, as well as the possibility that institutional aspects affect aid effectiveness. Moreover, Ojeaga (2014) observed that aid to sectors was effective in the promotion of trade, with aid for agriculture, infrastructure, education and trade policy becoming crucial in the trade promotion. This is compatible with the past findings by Morrissey et al. (2004) that directing aid to profitable economic sectors might improve export-oriented growth. Benziane et al. (2022), through a review of 55 studies conducted over the past 11 years, found that AfT has largely had a positive impact on both trade and non-trade outcomes. However, they highlighted that the extent of its effectiveness is influenced by various factors, such as the type of AfT provided, the income level and geographical region of the recipient country, the total AfT disbursed along with its specific categories, as well as the institutional environment, regulatory policies, and the degree of trade liberalization in the beneficiary economy.

Trade infrastructure is especially weak in Africa thus acting as an important barrier. Weak export facilitation infrastructure such as functional ports, sufficient roads,

stable electricity, and communications and a lack of appropriate technologies and expertise to meet product requirements like sanitary measures, technological barriers, certification are among the challenges facing developing countries, especially in Sub-Saharan Africa (Stiglitz and Charlton, 2006). Unfortunately, the majority of African nations have low transportation networks and are consistently weak export performers. Limão and Venables (2001) provide some empirical research suggesting that trade flows in African countries are comparatively limited, owing primarily to weak transportation infrastructure. According to Udvari (2014), in East and West Africa, trade-related needs, especially infrastructure development, are more prominent. Furthermore, Lanz et al. (2016) noted that transportation costs increase due to insufficient infrastructure, cumbersome border processes and poor logistic systems. Meanwhile, Ojeaga (2014) stated that aid toward infrastructure investments made a significant contribution to exports, and aid used for the development of infrastructure is expected to create an encouraging atmosphere that will facilitate trade by reducing the cost of trade facilitation. According to Buys et al. (2010), road upgrades may have a significant positive impact on trade volumes. On the other hand, Udvari (2010) claims that although economic infrastructure plays the largest role in low-income countries, it is much more important to improve production capacity in the lower-middle-income countries. Masunda (2020) reveals that for export diversification, only AfT is devoted to productive capacity matters.

In spite of its well-documented importance, throughout aid history, trade policies and regulations were always underestimated, thus a little portion of total aid was donated for this category. According to the OECD and WTO (2011), this low share is partly due to the absence of a Doha Round agreement to introduce trade-related reforms. However, it also demonstrates that AfT could go beyond facilitating the adoption of trade deals to help developing countries "benefit from WTO agreements and, more broadly, to extend their trade" (WTO, 2005, p: 11). Additionally, Helble et al. (2012) argue that some forms of AfT such as AfT relevant to trade policies and regulations could be numerically small and thus unlikely to trigger any real exchange rate appreciation which means that one of the main disadvantages of AfT is not related for this field. AfT facilitation includes assistance for customs authorities, tariff adjustments, and the simplification and harmonisation of international import and export processes such as customs evaluation, licensing procedures, transactions, and insurance. Moreira (2010) pointed out that steadily falling tariffs raise competition on the one hand while reducing tariff collections

in developing countries on the other. The relationship with export tends to be more stable and on a larger scale as aid is directed towards trade policies and regulations (Helble et al., 2012). Aderibigbe (2022) stated that enhancement of border efficiency proves effective in boosting exports from Nigeria. Furthermore, Masunda (2020) noted that trade policies and regulations are linked to increased export diversification, to the degree that AfT helps improve competitiveness and lower trade costs. AfT improves developing countries' export efficiency by improving access to markets, reducing supply-side restrictions and developing trade policies in aid-receiving countries (Ghimire et al., 2016).

2.4. Quantitative underpinnings of the AfT Initiative

AfT has been shown to significantly enhance trade performance at both the micro and macro levels, though its impact varies based on several factors. For example, the research by Cali et al. (2013) highlights that the effectiveness of AfT depends on the form of intervention, the recipient country's income level, the industry to which the aid applied, and the recipient country's geographic area. On the other hand, Burnside and Dollar (2000) point out that aid is only useful to nations with stable policies. In a study of the relationship between various AfT groups and trade efficiency, Helble et al. (2012) discovered that a 1% rise in AfT disbursements, measured relative to its baseline level, could result in a USD 415 million rise in global trade. Furthermore, according to Lee and Ries (2016), a 10% rise in annual trade assistance from the five largest bilateral contributors which are Japan, the United States, France, Germany, and the United Kingdom results in 25 extra new greenfield investment projects in recipient countries each year.

By analysing the impact of AfT through its economic infrastructure channel, Ferro et al. (2014) found that a 10% rise in aid to transportation, ICT and energy services is correlated with increases in manufactured goods exports from recipient countries by 2.0%, 0.3% and 6.8%, respectively. Moreover, according to Cali and Te Velde (2011), the infrastructure channel of AfT is successful in supporting recipient exports. Besides, Eden and Kraay (2014) also observe that in developing countries, one additional dollar in public infrastructure attracts two dollars in private investment. Cali and Te Velde (2011) reported that increasing AfT facilitation by $1 million resulted in a 6% decrease in the cost of packaging, loading and shipping. Naito (2016) found a similar result: transportation costs would decline as a result of AfT.

AfT plays a crucial role in enhancing productive capacity and fostering export diversification, particularly in developing economies. Masunda (2020) claims that although AfT's impact on infrastructure, policy and regulations are minor, AfT's impact on productive capacity is highly relevant at the 0.01 level. According to the results, AfT could raise exports by 0.067% with a 1% increase in productive capacity. Moreover, Masunda (2020) revealed that for export diversification, only AfT is devoted to productive capacity matters. The findings indicate that a 1% increase in the AfT dedicated to production capacity would result in a 0.02% decrease in export concentration and thus a 0.02% growth in export diversification, ceteris paribus. According to Ferro et al. (2014), a 10% rise in aid for banking services is correlated with increases in manufactured goods exports from recipient countries by 4.7%. When the banking aid rose by USD 5.5 billion until 2014 and central banks, financial intermediaries, credit lines, credit co-operatives, and microcredit are all encouraged by this. However, after 2015, it started to fluctuate and in 2019 the amount of aid was equal to USD 4.5 Billion. Besides credit, a sustainable business and investment environment entails trade and business groups, regulatory and legal reform, capacity building and consultation for private sector institutions, trade knowledge, and public-private sector collaboration at trade fairs. In 2019, these business facilities provided USD 2.7 billion in funding, the largest amount ever . In general, the majority of trade aid is devoted to developing economic infrastructure and increasing production capacity. Both are critical in lowering trading and transportation expenses, strengthening the economic environment, and linking small businesses to regional and GVCs. There are several empirical results that are mostly focused on the impact of aid on exports are broadly analysed in the next subchapter.

2.5. Theoretical Perspectives on the Role of AfT in International Trade

In today's world, exports may have a significant impact on people's standard of living and are becoming increasingly relevant in supporting and sustaining growth in developing and developed countries. Economists have long regarded trade as a development driver (Freund and Bolaky, 2008). There are two radical viewpoints that have attempted to determine the relationship between net exports and economic growth, namely, the first group thinks that exports contribute positively to economic growth while export is not considered by the second group since it does not add to economic development. Beyond these two perspectives, some researchers suggest that exports may

even have a negative impact on economic growth. Meanwhile, Berg and Schmidt (1994), as well as Onafowora et al. (1996), argue that increased exports promote economic growth. In other words, export growth and economic growth are positively linked.

According to the OECD-WTO publication AfT at a Glance 2015 (OECD and WTO, 2015), trade costs are a major barrier to developing countries enhancing their export competitiveness and productivity. Cali and Te Velde (2011) noted that the effect of aid on exports can be determined by how the aid provided to promote trade lowers production costs within an economy. When aid targets more efficient uses, such as improving infrastructure, streamlining logistics, or enhancing capital utilization, it can help reduce structural and transaction costs, thereby lowering marginal costs, even in contexts where labour is already inexpensive. Ojeaga (2014) stated that output will grow if companies' marginal costs of production decline as a result of foreign aid. It is presumed in the Dixit and Stiglitz (1977) model that certain companies only operate in their home market. However, firms entering global markets face significant trade costs, including shipping, tariffs, and financing expenses. While aid can help lower interest rates and reduce some of these costs, the ultimate burden often falls on producers, consumers, or governments, depending on how the aid is allocated and the market structure.

According to the New Trade Theory, trade can be increased when firms produce and sell not only in the domestic market but also in foreign countries where their technologies and factor endowments are similar, since their average costs of production decrease and they enjoy increasing returns to scale. Since the 2000s, a 'New New Trade Theory' has emerged and concentrated on firm-level exports. According to Melitz (2003), a new source of trade advantages emerged. When trade barriers are eliminated to encourage competition, low-productivity businesses, previously protected by trade barriers, are pushed to leave the market, allowing high-productivity enterprises to expand their output volume. Thus, a country's overall average production increases. Meanwhile, higher international entry costs, according to Helpman et al. (2008), trigger the competitiveness barrier, rendering it more difficult for local firms to enter the global market. Similarly, exporters' trade costs, such as shipping and other export costs, make it impossible for companies to begin exporting.

In the globalised world of today, promoting trade and export performance is critical for most countries' economies. Correspondingly, developing countries and EEs

are facing trade-related difficulties such as trade barriers (tariffs and non-tariff barriers), infrastructure (roads, ports and telecommunications), supply-side restraints and challenges such as external shocks and scarce resources, all of which hinder their ability to engage efficiently in international trade and to enjoy the benefits offered by e-commerce (Kiute et al., 2015). Thus, the international community has placed a strong emphasis on AfT to help those countries overcome domestic challenges, integrate into the global economy and achieve export-driven growth. The WTO supports and facilitates AfT to foster and improve trade, knowledge diffusion, technological improvement, and innovation, thus enhancing the efficiency of developing country exports and facilitating their complete integration into the international multilateral framework. AfT is projected to lead to increased exports, reduced trade costs, and increased foreign investment. Furthermore, AfT has the potential to promote economic integration among developing countries. Many AfT projects have increased trade policy understanding and knowledge, as well as promoted entry into the multilateral trading process. Thus, Brenton and Von Uexkull (2009) claim that exports have risen dramatically in many cases as a result of export development programs. Ghimire et al. (2016) state that, the AfT has a positive effect on developing countries' export earnings.

The AfT is aimed at improving the trading infrastructure in developing nations, thus potentially increasing their exports (Udvari, 2017). Using simple export demand model, Cali and Te Velde (2011) investigated the shifts in export volume by including 100 developing countries in the study. AfT support for the growth of economic infrastructure leads to increased exports, according to their econometric findings. Pettersson and Johansson (2013) came to similar results: the advancement of trade infrastructure contributes to expanded exports. By applying OLS and two-stage least squares methods, Vijil and Wagner (2012) claim that a 10% increase in aid for upgrading trade infrastructure results in a 1.22% increase in the recipient’s exports. Infrastructure programmes such as roads, harbours and airports are frequently financed by multilateral and bilateral funding. Firms’ transportation expenses can be lower as a result of this. Using fixed effects in simple export demand model, Ojeaga (2014) found that multilateral aid has been shown to contribute to exports in a more important way than bilateral aid. The altruistic aspect and good governance criteria connected with multilateral aid may have made it more successful in facilitating trade than bilateral aid. The result reveals that bilateral aid adds 12 percentage points to trade although multilateral aid increase trade by

21 percentage points, which is 9 percentage points greater than the bilateral aid commitment to trade. Besides, using OLS fixed-effects in gravity models, Helble et al. (2012) noted that a 1% increase in trade policy and regulations aid contributes to an 818 million USD increase in global trade. According to the assessment of USAID (2010), trade assistance focusing on export growth, trade policy changes, expanded involvement in trade negotiations, and productivity benefits from international trade assistance, each incremental dollar raises the volume of developing country exports by 42 USD. As AfT is decomposed into its three subcategories of economic infrastructure, productive capacity, and trade policy and regulations, the same result holds. Surprisingly, the third and smallest subcategory tends to be especially effective. Using generalized method of moments in gravity models, Hühne et al. (2014) found that doubling the aid can result in a 10% increment in recipient exports. Cali and Te Velde (2011) and Helble et al. (2012) found similar results. Meanwhile, Ojeaga (2014) determined that aid had a major influence in four industries, with aid for trade and business support programmes, education, agriculture and infrastructure adding 15, 16, 17 and 22 percentage points to trade.

Lowering trade costs through AfT can play a significant role in promoting export diversification and enhancing productive capacity in EEs. According to Masunda (2020), lower trade costs are likely to be linked to a more diverse export base, and increased productive capacity can be favourably correlated with export diversification. Dennis and Shepherd (2011) measured the effects of trade facilitation on export diversification for a group of 246 countries and customs areas, including EU members. According to their findings export costs, business entry costs and foreign transportation costs all have a negative impact on export diversification. These results indicate that if AfT is effective in lowering trading costs, it would be able to assist developing countries in diversifying their exports. The authors' model reveals that total AfT has a significant impact on export diversification at the 5% level, suggesting a favourable effect on export diversification. Using panel data for 99 developing countries from 2004 to 2009, Busse et al. (2012) indicated that trade aid is closely linked to reduced trade costs and therefore can play a significant role in assisting developing countries profit from trade. By focusing on 112 countries over the period 2002–2015 and using the system generalised method of moments approach, Gnangnon and Roberts (2017) found that a 1% growth in AfT is correlated with a 7.3-point increase in export diversification at the intensive margin and

a 1.16-point increase in export quality improvement. Furthermore, in his research, Gnangnon (2019) stated that an additional 1 US dollar AfT increases the shares of exports of low- and high-skilled and technology-intensive manufacturers in total primary export products by 0.136% and 0.056%, respectively.

AfT not only fosters economic ties between donor and recipient nations but also enhances trade flows, benefiting both parties. Easterly (2003) stated that supplying aid to a nation will promote a strong relationship between the two nations, with the donor country driving the search for resources and other country-specific interests in the recipient country. If a significant reserve of a resource is found, it might lead to cooperation between the two nations, strengthening the claim that aid is primarily altruistic and encouraging aid to promote trade. According to the OECD and WTO (2013), every dollar spent on AfT results in an increase of approximately 8 dollars in exports from all developed nations and a 20-dollar rise in exports from the poorest countries. Meanwhile, by focusing on sample of 12 new donors and 130 recipients over the period from 2000 to 2014 and applying PPML method in gravity model, Zhang and Martínez-Zarzoso (2021) found that in the short term, every 1 USD spent on foreign aid leads to an average increase in donors' exports ranging from 0.27 to 1.24 USD. Meanwhile, according to Hühne et al. (2014), AfT raises all recipient exports to donors and recipient imports from donors, with the former dominating the total favourable results.

There are several researchers who analyse the effect of AfT based on country groups. For example, Cali et al. (2011), at a more regional level, found that AfT benefits the small countries of the Caribbean Islands. Furthermore, Udvari (2014), using OLS method in gravity models, determined that if a country belongs to the ACP[9] category, exports to the EU are higher[10], while this trend is reversed in the case of the LDCs. According to the results of her research, if the country is part of the ACP group, a 1% increase in AfT assistance leads to a 1.18% increase in their exports to the EU. By contrast, Lee and Oh (2022), who studied the impact of AfTPR for 143 developing countries by applying panel fixed effects and two stage least square methods, noted that this type of aid has a positive and significant impact on the exports of CLMV[11] and, in general, Asian

[9] African, Caribbean, and Pacific Group of States
[10] The ACP and EU have special relationships governed by the Cotonou Agreement.
[11] Cambodia, Laos, Myanmar, and Vietnam

countries, while the impact is insignificant for the regions of Europe and Africa. Basnett et al. (2012) determine that AfT works better when it is focused on regional trade restrictions. Although foreign aid has historically been based at the country level, regional trade-related programs have grown in popularity in recent years. The urge in Sub-Saharan African nations to seek a deeper degree of regional integration as a step toward international economic integration is currently the main factor. Moreover, Hühne et al. (2014) also stated that AfT is most required in Sub-Saharan Africa to help recipient countries further integrate into global markets. Furthermore, the authors discover that total AfT is more successful in supporting East Asian and Latin American exports than Sub-Saharan African ones.

Many authors believe that countries that receive AfT to improve their exports and thus become more competitive in global markets have seen a rise in exports. However, in the research of Hühne et al. (2014), for the low-income group of recipient nations, the significantly positive impact on recipients' exports does not apply. Instead, results suggest that AfT supports the exports of middle-income economies, which are less reliant on aid to address supply constraints. Helble et al.'s (2012) findings indicate a small, however significant correlation between AfT facilitation and greater trade flow. By contrast, despite having a positive coefficient, the empirical data of Kiute et al. (2015), using random effects and generalized method of moment technique, show that the effect of AfT on export performance is insignificant. Given the overall bilateral assistance, Nowak-Lehmann et al. (2013) noted that the effect of the aid on recipient exports is insignificant by applying Dickey-Fuller Generalized Least Squares in gravity model. Although the findings of Kiute et al. (2015) were not statistically significant, they nonetheless supported the optimistic view that AfT can encourage trade. This suggests that the possible effect of AfT on export output could be unappreciated due to unaccounted factors, at national or global level, not taken into consideration in the report. Their study revealed a variety of noteworthy and contradictory scenarios about the effectiveness of AfT, revealing that the programme has not been entirely successful in achieving the desired effects of supporting developing countries' exports. Moreover, aid inflows may harm a country's international competitiveness by causing actual exchange rate appreciation. Thus, exportable production will be discouraged at the recipient nation (Hühne et al., 2014). Countries in Sub-Saharan Africa are reportedly experiencing significant challenges in their financial markets due to alterations in the net aid flows they

receive, according to Klutse et al. (2022). However, Ghimire et al. (2016) called for increasing export-oriented international aid for developing countries as widespread trade gains are still to be realised in many countries.

2.6. Implementation challenges of AfT

The initiative has made significant progress, however, there are still issues with maintaining its validity. There are several researchers who investigated the problems and challenges of AfT. According to De Melo and Cadot (2014), although progress has been made in mainstreaming trade into developing country policies, capacity gaps still exist. Thus, most African nations are still struggling. According to Hallaert (2013), building trust that available capital can be invested in trade-related programs is the first challenge of AfT. The second challenge is showing trustworthy results. Hallaert (2013) thinks that the initiative must be redesigned to meet these challenges, and the better strategy is to narrow the range of the initiative rather than broadening it because of false recordings of the AfT projects. Finger (2008) also underlines the fact of difficulty of distinguishing AfT from other types of financial flows, especially to infrastructure projects such as railways, airports, rural roads, and ports which may impact trade positively. Meanwhile, donors mark certain projects as AfT projects because AfT is distributed across established networks. The recorded AfT flows are inflated as a result. At the same time, at the G20 conference in Seoul in 2010, the World Bank promoted a proposal of rather than extending the initiative's reach, the WTO should standardise it and ensure that trade aid is more effective. The World Bank, in a report titled "AfT Facilitation," recommended that trade aid should be focused more on services and network systems (Hoekman and Wilson, 2011). The aforementioned researchers suggest that the AfT Initiative must be remodelled.

There are several researchers who are suspicious about the precise application of financial assistance donations. For example, Ojeaga (2014) noted that if foreign aid is given primarily for altruistic purposes, it will have a significant impact on the recipient nation’s growth if it is used properly. Furthermore, Udvari (2014) points out that according to the legal records, AfT is not supposed to act like a tied aid, meaning that recipient countries are not required to meet the donor countries' requirements. Along with that, researchers believe that donor countries have their own interest in providing AfT. According to Finger (2008), the increase of the amount of AfT was remarkably more for

the EEs, compared to those in sub-Saharan Africa. According to Udvari (2014), in China, one of the world's biggest exporters, the European Union has launched more AfT programmes than Sub-Saharan Africa. Some researchers are looking at the consequences from the perspective of the donor. Brazys (2013) worked with four donors[12] and four recipients[13]. He found that the AfT has various effects depending on the donor and receiver. This decelerates us that there is a need to assess aid operations in a donor-specific manner. Meanwhile, Kapás (2023) proposed that countries transitioning into stable democracies receive greater aid from donors than those that persist as autocracies. Finally, Udvari (2014) supported the argument that, despite the fact that AfT has some high standard goals, donor countries' economic, political and strategic ambitions are more critical than their actual needs.

Udvari (2017) claims that based on empirical research while AfT seeks to benefit the world's poorest nations, aid allocation does not meet this expectation. Additionally, Bearce et al. (2013) conducted their research on the United States' aid activities, and their findings show that an increment of a dollar in AfT results in a 65-dollar increase in trade in the recipient country, although this effect could be greater in the case of poorest nations. The authors determined that AfT provided by the US results in export expansion, not only in recipient countries but also in the United States. Djajić et al. (2004) state that aid is inextricably linked to donor exports, either directly through forcing recipients to spend aid on supplies from a particular donor country, or indirectly by "habit-formation effects" or "goodwill effects". The main donor countries which are suppliers of AfT are classified as "egoistic" by Berthélemy (2006). Arvin and Baum (1997), and Martínez-Zarzoso et al. (2009) suggest that aid would open the door for donor countries' exporters. Besides, Wagner (2003) demonstrated that exports of the donors increased more than those of the recipients as a result of the disbursement of foreign aid to developing nations, while Lloyd et al. (2000) concluded that the contrary was true. According to Silva and Nelson (2012), aid has a positive impact on exports from donors to recipients while it has a negative impact on non-donor countries' exports to recipients. By contrast, Helble et al. (2012) concluded that AfT is more closely correlated with recipient countries' exports than with their imports, implying that AfT increases recipient countries' balance of payments. Concurrently, Hühne et al. (2014) estimated that a doubling of overall AfT would mean that recipient exports would increase by 5% and recipient imports would increase by 3%.

[12] Germany, Japan, Norway, and The United States
[13] Indonesia, Philippines, Timor-Leste, and Vietnam

This supports the results of Helble et al. (2012) and disproves the sceptical opinion that donors give AfT to boost their own export interests.

Ojeaga (2014) determined that the effectiveness of AfT was commonly undermined in Africa by the factors like inappropriate economic policy and poor quality of institutions. Furthermore, Gnangnon (2019b) also confirms that AfT encourages the diversification of exported products in those nations where institutional quality, as well as, trade liberalisation policy is in good condition. Considering the fact that, economic policy has a huge influence on the feasibility of aid in not only countries of the aforementioned continent, but also in all developing countries. Thus, donors should tend to highlight the need for those nations to implement consistent economic policies. Furthermore, Lammersen and Roberts (2015) mention the problem of not determining the accurate focus and limitations of receivers when AfT is donated. They argue that, since countries have their own development path and trade-related priorities, these factors together with their political and at some point, regional constraints should be considered. Furthermore, Basnett et al. (2012) argue that this mismatch between AfT flows and receivers' needs can be explained by coordination failures among institutions. In general, identifying the precise needs of aid receiver countries with the help of enhanced coordination and cooperation among organisations, and defining appropriate economic policies may be crucial to ensure the efficient use of aid.

2.7. Chapter summary

AfT has been shown to have positive effects on trade in a number of cases, including infrastructure improvement, trade barrier reduction and increased productive capacity. Although the results may differ from nation to nation and region to region, the primary objective of AfT is to improve countries' capacity for beneficial international trade.

The analysis of AfT disbursements from 2002 to 2020 revealed significant trends and allocations. We saw that EEs received 38% of total AfT, contributing 24% to global exports. This highlights the substantial share of AfT directed towards EEs. Furthermore, it is found that 69% of aid targeted EI, emphasizing infrastructure development, while AfBPC and AfTPR received 29% and 2%, respectively. Post-2008 financial crisis, AfEI disbursements increased significantly, peaking in 2017 at $8 billion. The results underscore strategic allocation, with India, Vietnam, and Indonesia as top recipients, focusing on infrastructure and production capacity. Asian and African countries are

prominent aid-recipients, with notable Latin American countries receiving balanced distributions. Recurring presence of countries like India and Vietnam in top AfT categories might highlight their reliance on these funds for trade development. These insights emphasize the targeted nature of AfT allocations and their critical role in enhancing trade capacities in EEs.

The literature review shows that although there are disagreements and obstacles regarding the efficacy of AfT, the contribution of the programme to developing nations' export-driven economic growth continues to be a crucial and dynamic facet of global trade and development policy. Thus, AfT is vital in advancing global trade and economic growth. Literature shows that there are many different opinions and findings regarding the impact of AfT on export performance. Thus, in order to realise the general view, the studies and findings are grouped and illustrated in tables. Table 2 presents the findings of authors who claim that AfT increases the export diversification rate and decreases the trade cost.

Table 2 Literatures about positive impact of AfT on export diversification and trade cost reduction

Authors	***Opinions and findings***
Positive impact on export diversification	
Dennis and Shepherd (2011)	Total AfT has a significant and favourable impact on export diversification at the 5% level.
Gnangnon and Roberts (2017)	A 1% growth in AfT is correlated with a 7.3-point increase in export diversification.
Gnangnon (2019b)	AfT encourages the diversification of exported products in those nations where institutional quality, as well as, trade liberalisation policy is in good condition
Positive impact on trade cost reduction	
Busse et al. (2012)	Trade aid is closely linked to reduced trade costs and therefore can play a significant role in assisting developing countries to profit from the trade.
Cali and Te Velde (2011)	Increasing AfT facilitation by $1 million resulted in a 6% decrease in the cost of packaging, loading, and shipping.
Naito (2016)	Transportation costs would decline as a result of AfT.

Source: Own construction.

Additionally, Table 3 shows the opinions and findings about the positive impact of AfT in general on export performance of developing countries. The table shows the literatures which not only argue that the risen export indicators is explained by trade

development programs, but also it presents some empirical finding how much dollar they increase. In this table, it is also highlighted the comparison of positive impact between multilateral and bilateral AfT.

Table 3 Literatures about positive impact of AfT on export in general

Authors	***Opinions and findings***
Brenton and Von Uexkull (2009)	Exports have risen dramatically in many cases as a result of export development programs.
USAID (2010)	Each incremental dollar of trade aid raises the volume of developing country exports by 42 USD.
Ojeaga (2014)	Multilateral aid has been shown to contribute to exports in a more important way than Bilateral aid.
Ghimire et al. (2016)	The AfT has a positive effect on developing countries' export earnings.
Gnangnon (2019a)	$1 increment of AfT improves the shares of exports of low- and high-skilled and technology-intensive manufactures in total primary export products by 0.136 and 0.056 percentages, respectively.

Source: Own construction.

Furthermore, Table 4 depicts findings of positive impact of one of the main channels of AfT, economic infrastructure, on export performance. The empirical findings are presented in percentage point changes of exports in recipient developing countries.

Table 4 Literatures about positive impact of AfT on exports through the channel of economic infrastructure

Authors	***Opinions and findings***
Cali and Te Velde (2011)	The AfT support in the growth of economic infrastructure leads to increased exports.
Vijil and Wagner (2012)	A 10% increase in aid for upgrading trade infrastructure results in a 1.22% increase in the recipient's export.
Pettersson and Johansson (2013)	Assisting the advancement of trade infrastructure contributes to expanded exports.
Ojeaga (2014)	Aid toward infrastructure investment has been seen to make a significant contribution to exports.
Ferro et al. (2014)	A 10% rise in aid to transportation, information, communications technology, and energy services is correlated with raises in manufactured goods exports from recipient countries by 2.0%, 0.3%, and 6.8%, respectively.
Udvari (2017)	The AfT is aimed at improving the trading infrastructure in developing nations, thus potentially increasing their exports.

Source: Own construction.

Moreover, Table 5 illustrates the results positive impact of the other important channels of AfT, building productive capacity and trade policy and regulations, on export

performance. The table also highlights empirical findings regarding not only exports of manufactured goods but also global trade in general.

Table 5 Literatures about positive impact of AfT on exports through the channels of building productive capacity and trade policy and regulations

Authors	***Opinions and findings***
Positive impact through Building productive capacity	
Masunda (2020)	AfT could raise its exports by 0.067 percent with a 1% increase in productive capacity.
Ferro et al. (2014)	A 10% rise in aid to banking services is correlated with raises in manufactured goods exports from recipient countries by 4.7 percent.
Positive impact through Trade Policy and Regulations	
Helble et al. (2012)	A 1% increase in trade policy aid contributes to an 818 million USD increase in global trade.
Hühne et al. (2014)	Doubling the aid can result in a 10% increment in recipient exports.
Lee and Oh (2022)	AfT Policy and Regulations has positive and significant impact on the exports of Asian countries.

Source: Own construction.

On the other hand, several authors claim that the positive impact of AfT is not observed (Table 6). Furthermore, it also may reduce the global trade through the decrement of exports from non-donor countries. Meanwhile in recipient countries, AfT can cause exchange rate appreciation which may result with exports of uncompetitive products in global market.

Table 6 Literature indicating no positive impact or negative effects of AfT on exports

Authors	***Opinions and findings***
Silva and Nelson (2012)	Aid has a negative impact on non-donor countries' exports to recipients.
Nowak-Lehmann et al. (2013)	Given the overall bilateral assistance, the effect of the aid on recipient exports is insignificant
Hühne et al. (2014)	Exportable production can be discouraged in the recipient nations because of actual exchange rate appreciation.
Hühne et al. (2014)	For the low-income group of recipient nations, the significantly positive impact on recipients' exports does not apply.
Kiute et al. (2015)	The effect of AfT on export performance is insignificant
Klutse et al. (2022)	Countries in Sub-Saharan Africa are reportedly experiencing significant challenges in their financial markets due to alterations in the net aid flows they receive.

Source: Own construction.

In this chapter some challenges of AfT are included as well. Several authors claim that donors consider their own interest when they disburse AfT. Thus, trade aid is directed to not poor countries, but rather towards partner counties. Furthermore, it is also argued that donors' main interest is to increase own exports. However, there are contrary arguments which state that exports of recipients increased more than donors' exports to recipients (Table 7).

Table 7 Literatures that discuss challenge of donor's interests and contrary arguments

Authors	***Opinions and findings***
Donors' self-interest challenge	
Wagner (2003)	Exports of donors increased more than exports of recipients as a result of the disbursement of foreign aid to developing nations.
Djajić et al. (2004)	Aid is inextricably linked to donor exports, either directly or indirectly.
Silva and Nelson (2012)	Aid has a positive impact on exports from donors to recipients.
Bearce et al. (2013)	AfT provided by the US results in export expansion not only in recipient countries but also in the United States.
Ojeaga (2014)	If foreign aid is given primarily for altruistic purposes, it will have a significant impact on the recipient nation's growth if it is used properly.
Udvari (2014)	In China, the European Union has launched more AfT programs than in Sub-Saharan Africa.
Udvari (2017)	While AfT seeks to benefit the world's poorest nations, aid allocation does not meet this expectation.
Zhang and Martínez-Zarzoso (2021)	In the short term, every 1 USD spent on foreign aid leads to an average increase in donors' exports ranging from 0.27 to 1.24 USD.
Kapás (2023)	Countries transitioning into stable democracies receive greater aid from donors than those that persist as autocracies.
Contrary arguments to "Donors' self-interest"	
Lloyd et al. (2000)	Exports of recipients increased more than exports of donors
Helble et al. (2012)	AfT is more closely correlated with recipient countries' exports than with their imports
OECD/WTO (2013)	Every dollar spent in AfT results in an increase of roughly 8 dollars in exports from all developed nations and a 20-dollar rise in exports from the poorest countries.
Hühne et al. (2014)	Doubling overall AfT would mean that recipient exports would increase by 5% and recipient imports would increase by 3%.

Source: Own construction.

Finally, Table 8 depicts other challenges of AfT, such as poor quality of institutions, capacity gaps and limitations of determination of needs and reporting the

overstated AfT disbursement. Meanwhile, the table also shows the requests of researchers for transformation of the initiative to a model which considers political and regional constraints of countries, increases trust between donors and recipients and brings more focus on services and network systems.

Table 8 Literatures about other challenges and calls for remodelling

Authors	***Opinions and findings***
Other challenges	
Finger (2008)	It is difficult to distinguish AfT flows from other types of financial flows, especially in infrastructure projects.
Basnett et al. (2012)	AfT flows and receivers' needs do not match, and this can be explained by coordination failures among institutions.
De Melo and Cadot (2014)	Although progress has been made in mainstreaming trade into developing country policies, capacity gaps still exist.
Ojeaga (2014)	The effectiveness of AfT was commonly undermined in Africa by the factors like inappropriate economic policy and poor quality of institutions.
Lammersen and Roberts (2015)	The development focus and limitations of receivers are not well-determined when AfT is donated.
Calls for remodelling	
Hoekman and Wilson (2011)	Changing of focus of trade aid to more on services and network systems is recommended.
Hallaert (2013)	The initiative must be redesigned to meet the challenges of building trust and showing trustworthy results.
Lammersen and Roberts (2015)	Factors like development path and trade-related priorities, together with receiver countries' political and regional constraints should be considered.

Source: Own construction.

To conclude, literature brings both positive and negative results for the impact of the AfT on export. Furthermore, the opinions are also different regarding the effectiveness of the initiative. However, the majority of the authors are optimist about the AfT program and require more attention on it and believe its further development and usefulness.

Chapter 3

3. Global Value Chains (GVCs): Concepts, Theories, and Modern Challenges

In recent times, significant shifts in the global economic structure have occurred, leading to the emergence and subsequent prominence of GVCs as an analytical framework for understanding these transformations. GVCs involve a series of interconnected processes engaged in the production of goods or services, where each step contributes value to the final output and spans across multiple countries. The objective of this chapter is to investigate the concepts of GVCs and trade in value-added (TiVA) data. Furthermore, the chapter investigates a detailed statistical analysis of EEs within GVCs, focusing on key GVC indicators. By assessing these indicators, the thesis sheds light on the participation and positioning of EEs in GVCs. Additionally, an examination of the theoretical discourse surrounding GVCs will be undertaken. Subsequently, an evaluation of the key challenges that have recently arisen will be pursued, culminating in the presentation of the chapter's conclusions.

3.1. Concept of global value chains

In business terms, globalisation refers to the increasing integration of economies through trade, investment, and the movement of goods, services, and capital across borders, facilitated by technological advancements and policy liberalisation (Dreher et al, 2008). Over the course of 300 years, globalisation has gone through two stages of unbundling (Baldwin, 2013). The first stage was made feasible by steam technology, and profitable through economies of scale. Antràs (2020) also highlights that the "First Globalisation" is a term commonly used to describe the period from 1870 to 1914, during which there was a significant surge in international trade, primarily driven by the invention of the steamship. The second stage was enabled by the information and communication technology (ICT) revolution, which allowed for coordination of complex processes from afar, and made it lucrative to separate production stages due to significant wage disparities between developed and developing nations, developments in transportation technology and liberalisation of trade and capital flows. Meanwhile, other technological advancements also played a crucial role in fragmenting global production. Innovations such as containerisation, automation, and improvements in logistics and

transportation further enhanced firms' ability to separate production stages across countries. As a result, certain stages of production that were once carried out in close proximity have now been geographically dispersed.

Nowadays, labels that indicate the country of origin on manufactured goods have become obsolete symbols of a former period, and the majority of products in certain industries are identified as being "Made in the World" (Antràs, 2020). Initially proposed by Gereffi et al. (2001), the notion of GVCs was originally designed to examine the governance arrangements of industries that manufacture for international markets. The GVC concept draws on earlier work in Global Commodity Chains and Global Production Networks, which focused on understanding the linkages and power dynamics within global production systems and the flows of goods, services, and capital across different regions (Coe et al., 2008). Nowadays, it has gained widespread popularity as a tool to examine the structural transformations taking place in the world economy, as stated by Gereffi (2019). GVCs, refer to a sequence of activities involved in manufacturing a product or providing a service, which is at the end of the process sold to customers. Each step adds value to the final product, and at least two steps are completed in different countries. When a company carries out at least one step in a GVC, it is said to be participating in the GVC. Meanwhile, Buckley and Ghauri (2004) define GVCs as networks that are dispersed globally and created by companies with varying goals. These networks collaborate to perform tasks that have traditionally been completed by a single organisation. Different industries experience varying levels of impact from GVCs. According to UNCTAD (2020), industries that are highly integrated into GVCs, such as electronics, automotive, and machinery, occupy the top ranks in global production networks. In contrast, sectors like agriculture and wholesale or retail, which primarily cater to domestic markets, are positioned lower in terms of GVC involvement.

One way to view the rise of GVCs is to see it as an increase in the use of intermediate inputs for transactions across borders, rather than final goods as traditionally emphasised in international trade frameworks (Antràs, 2020). If a nation imports a small number of intermediates and exports a significant portion of intermediate exports to third countries, it is concentrating on upstream activities (Van der Marel, 2015). Examples of relatively upstream activities are the creation of raw materials and intangibles like research and development or the design of industrial products. Conversely, downstream activities refer to the assembly of processed products or post-sales customer services and are characterised by high importation of intermediates and low exportation of intermediate exports to third countries. Furthermore,

the global economy can be divided into two types: "headquarter" economies, which have a small number of imported intermediates in their exports, and "factory" economies, which have a high proportion of imported intermediates in their exports (Baldwin, 2013). "Headquarter" economies are countries that specialise in high-value-added activities such as R&D, branding, and management within GVCs. These economies often host multinational corporations that orchestrate global production. On the other hand, "Factory" economies are countries that specialise in manufacturing and assembly activities with lower domestic value-added contributions, often serving as production hubs within GVCs. Moreover, the strength of correlation can be observed between a country's connections within foreign value-added (FVA) networks in exports and the indicators that assess backward and forward participation in GVCs, which serve as the key indicators reflecting countries' involvement in GVCs (Amador and Cabral, 2017). Backward participation involves a country exporting products that contain value from imported materials. Forward participation, on the other hand, happens when a country exports products that are not entirely consumed by the importing country, however, are included in their exports to other countries. The purpose of these indicators is to gauge how much a country participates in GVCs. Baldwin (2013) argues that a high participation index in GVCs indicates a country's deep involvement in these chains. As countries become wealthier, they tend to increasingly use imported intermediate goods in their exports, which reflects a higher level of integration into global production networks.

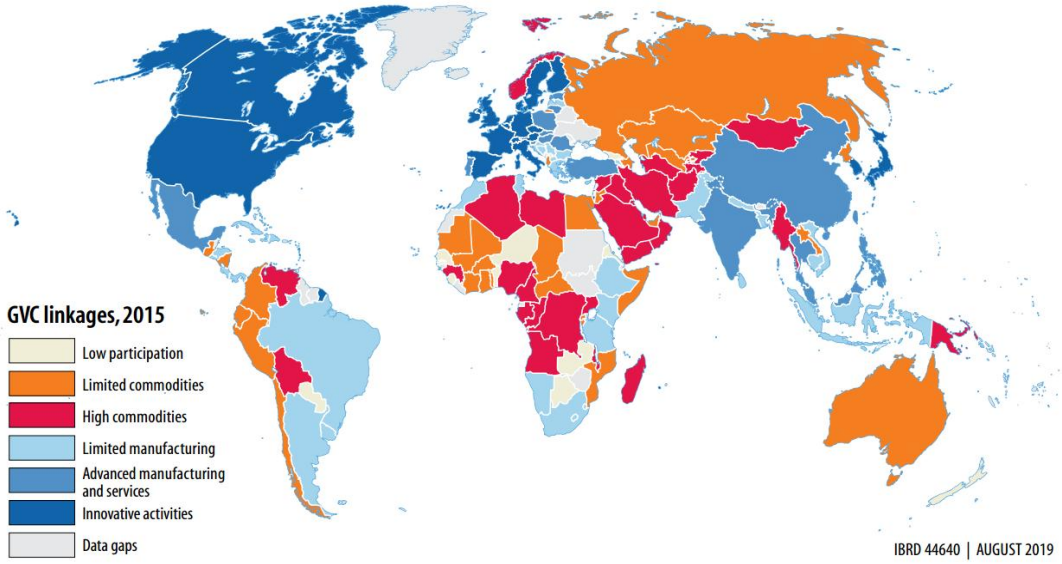
As the internationalisation of production grew rapidly, new countries were able to integrate into GVCs, reducing the influence of major economies that previously held core positions during the earlier phases of globalisation, particularly in the mid-20th century. As a result, more countries are now relevant players in GVCs and developing countries are increasingly participating in various stages of production. GVCs are even being recognised as a potential path for EEs to achieve development, as indicated in the literature by Hanson's (2012) study on the integration of developing countries in the global economy and the rise of south-south trade in GVCs. The expanding role of EEs in GVCs and the growing significance of GVCs for both economic and social welfare for those countries are emphasised by Gereffi (2014) as well[14]. In accordance with Jangam and Rath's (2021) findings, there has been a rise in GVCs involvement for emerging market economies from 34.8% in 1995 to 49.3% in 2011. Baldwin (2013) claim that the

[14] While Gereffi (2014) highlights the developmental opportunities associated with GVCs, critical scholars such as Bair and Werner (2011) caution that GVCs may reinforce power imbalances and disarticulate gains, challenging assumptions about equitable development.

process of industrialisation initially occurred in Japan, followed by the Republic of Korea, Chinese Taipei, Hong Kong, China, and Singapore. This resulted in an increase in local wages, which then led to the practice of offshoring to other countries such as Thailand, the Philippines, Indonesia, Malaysia, and eventually, China from 1990 onwards. However, as the wages in these new group of countries, also known as the "tigers," have started to surge, jobs that require minimal skills are increasingly being offshored to nations like Bangladesh and Viet Nam (Baldwin, 2013). This pattern aligns with Kojima's Flying Geese Paradigm, which describes the sequential relocation of industries from more developed to less developed economies as comparative advantages shift (Kojima, 2000).

However, the degree to which countries have engaged in GVC activities is not uniform. While some regions of the world, including Europe and East Asia, have a significant presence in GVCs, other areas such as Latin America and Africa have much lower levels of involvement. Furthermore, even in regions where countries actively participate in GVCs, the composition of these flows can vary considerably by sector. This can be observed in Figure 9, which displays the unequal sectoral concentration within GVCs, as presented in the World Bank's development report for 2020 (World Bank, 2020). In this figure, in general, we can observe that developed western countries and EEs are more concentrated on innovative activities and advanced manufacturing and services. Moreover, in general, industrialised countries tend to specialize in high-skill tasks, which are better paid and capture a larger share of the total value-added. Large EEs clearly have more options in terms of upgrading within GVCs than small economies. They can focus on manufactured exports, as China and Mexico have done since the mid-1990s, however they can also reorient their productive capacity to serve domestic demand if export markets become less attractive (Gereffi and Sturgeon, 2013). We should mention the economies that have already surpassed the "take off" phase and are now EEs that have significant presence in GVCs as depicted in the figure. Examples of such economies include EU Eastern and Baltic economies, Turkey, China, India, Indonesia, Mexico, and Brazil. China has assumed a crucial position in the GVCs by actively participating in both imports and exports. The rise of BRIC nations has significantly altered the GVC landscape (Jangam and Rath, 2021).

Figure 9 Unequal sectoral concentration of countries within GVCs



Source: World Development Report based on GVC taxonomy for 2015 (World Bank, 2020).

Meanwhile, small countries have fewer options. Their market size is not large enough to attract foreign direct investment (FDI) for the local market, and domestic firms tend to be small-scale and less advanced. However, market size is not the sole determinant of FDI absorption—factors such as strategic location, integration into regional value chains, skilled labour availability, and targeted government incentives can also make smaller economies attractive to foreign investors. The regional organisation of some GVCs has created opportunities for smaller countries to leverage low costs and proximity to large markets to build export capacities in specialised GVC niches like intermediate goods in the context of regional production systems. Thus, specialisation and regional GVC linkages matter for political and economic integration in a way that was not the case previously. Van der Marel (2015) stress that a distinct set of policies is necessary for each of these nations to gain advantages from trade, as their placement in GVCs varies significantly. GVC-oriented industrial policies seek to improve the ability of EEs to enhance their upgrading opportunities within these chains by facilitating both intermediate and primary goods trade (Gereffi and Sturgeon, 2013).

The fragmentation of production worldwide has unlocked numerous prospects for the EEs to engage and gain advantages, whether by sophisticating an entire product or performing a particular assignment. The involvement of developing countries in a supply

chain enables them to participate in the global economy and presents new prospects for global development, which is a key benefit of GVCs. Pomfret and Sourdin (2018) suggest that for a country to take part in the GVC, it must guarantee the efficient exchange of inputs and outputs, as well as have access to reliable trade services and advanced information technology. During the fragmented production phase, EEs are not required to establish complete production capacities. Instead, they can focus on specific stages of the production process. Engaging in GVC activities can assist EEs in transferring knowledge and technology, enhancing their capabilities, and gaining entry to diverse external markets. With the acceleration of technological progress, the decrease in transportation and communication costs, and the elimination of political and economic trade barriers, the potential for international production fragmentation has significantly expanded. This setup involves companies in various nations specializing in specific phases of the production process (Amador and Cabral, 2017).

According to Antràs (2020), viewing GVC participation at the level of individual firms can be beneficial, especially in situations where firms possess some degree of market influence and production methods involve increasing returns to scale. Essentially, GVC participation is a phenomenon that ultimately pertains to the firm level, making it worthwhile to conceptualize it in this way and potentially learn a great deal from doing so. However, this may increase the vulnerability of the firms in the cases of crisis. Corredoira and McDermott (2014) state that emerging country-based suppliers can enhance their processes through various robust connections to leading multinational companies and non-market establishments. These ties function as "knowledge bridges," allowing firms to access expertise embedded within secluded industrial districts. Bair (2009) characterizes the management of a value chain as comprising two elements: the exertion of influence by certain participants on others and the allocation or sharing of the value generated throughout the chain by the leading firms. Meanwhile, according to Wang et al. (2014), the existence of multinational corporations from other countries has an adverse effect on the local companies' domestic sales while having a beneficial effect on their exports. To sum up, the emergence of GVCs has opened doors for developing nations to engage in the global economy, leading to potential economic growth and integration. However, involvement in GVCs also exposes firms to risks, while necessitating access to trade services, technology, and strong partnerships with multinational corporations for effective participation.

GVC participation has long been recognized as a crucial factor driving economic growth and trade expansion, particularly in EEs. By integrating into GVCs, these economies can benefit from increased productivity, technology transfer, and knowledge dissemination. A study by Jangam and Rath (2021), covering 24 EEs from 1995 to 2011, revealed that both forward and backward GVC integration significantly boosted economic upgrading in these economies. Additionally, Tian et al. (2022) found that backward GVC participation offers more opportunities for upgrading in developing countries by enabling them to import advanced inputs, whereas forward participation tends to result in higher upgrading levels for developed nations. Further evidence supporting GVC benefits comes from Pahl and Timmer (2020), who analysed data from 1970 to 2008 for a broad set of countries and confirmed the positive long-term effects of GVC participation on productivity growth in the formal manufacturing sector. Similarly, Mallick and Zhang (2022) examined 14 Asian economies from 1995 to 2016 and demonstrated that GVCs significantly contribute to domestic productivity growth, with labour productivity seeing a larger increase compared to total factor productivity. Ndubuisi and Owusu (2021), analysing 122 countries during the 1996-2015 period, found that GVC participation positively influences export quality, bringing it closer to the global quality frontier. While this effect is consistent for developed nations, developing countries only see these benefits through backward GVC participation. In another study, Huong and Park (2021), focusing on 134 countries from 2002 to 2018, concluded that GVC participation plays a key role in diversifying export products and partners. This effect is most pronounced with backward participation, while forward participation's influence on product diversification varies depending on factors like trade liberalization and policy consistency. The outcomes associated with GVC participation, economic upgrading, productivity enhancement, and export diversification, are critical not only for boosting trade volumes but also for promoting broader economic development.

3.2. Concept of trade in value-added (TiVA)

In the present day, the inclusion of imported intermediate goods in exports is a significant aspect of the manufacturing procedure, resulting in a substantial increase in gross exports (EXGR) compared to domestic value-added (DVA) counterpart (Amador and Cabral 2017). The concept of trade analysis based on value-added is a relatively new method that has gained significance in studying international economic cooperation. This approach differs

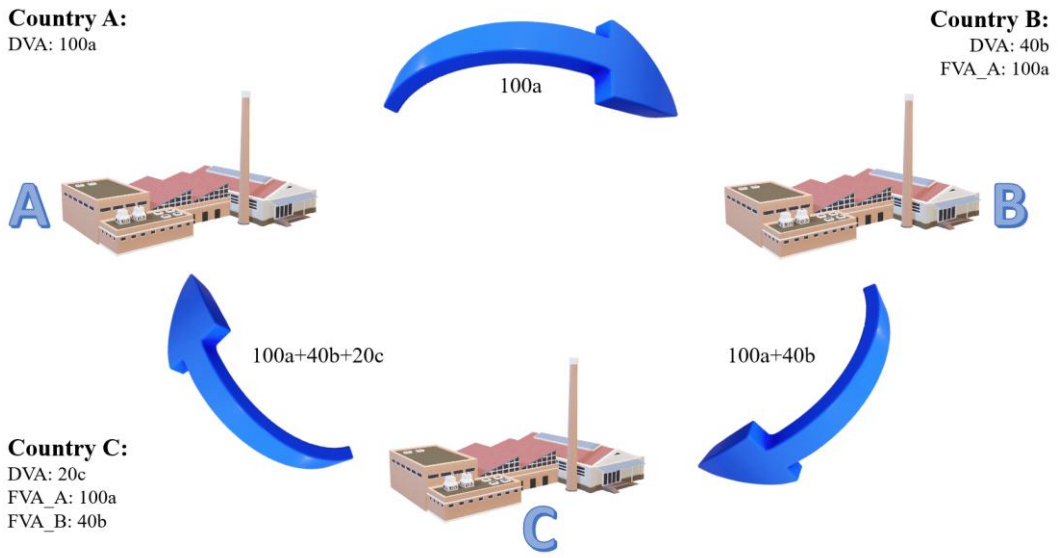
greatly from the traditional method of measuring trade value based on gross value and has become essential in empirical research. Javorsek and Camacho (2015) argue that analysing trade value only in terms of finished goods does not paint an accurate picture of global relationships since the importance of intermediate product trade has increased, while trade in finished goods has decreased, in relative terms. With the rise of GVCs, traditional foreign trade statistics no longer accurately depict the international production and trade pattern because parts and components often cross borders multiple times, leading to repetitive counting. Therefore, it is increasingly important to distinguish between domestic and foreign value-added in foreign trade to obtain a precise understanding of a country's actual involvement in global production and its genuine trading activities.

Stehrer (2012) explains that the calculation of the value of trade using the TiVA method involves considering the size of demand for final goods, which is known as the "final demand approach." When measuring exports, the size of demand refers to DVA content that is used to satisfy foreign final demand, indicating the level of relationship between national producers and foreign consumers, irrespective of direct commercial ties. Similarly, imports of value-added measure the amount of FVA content that is included in domestic final demand. In essence, the TiVA method provides insight into the intensity of the relationship between domestic and foreign markets in terms of the value-added content of traded goods.

To understand how this concept works, Figure 10 illustrates TiVA. According to the figure, country A exports a product that has a value of 100. Thus, 100a is the DVA of country A on a product that is exported to country B. Furthermore, country B imports a product that has 100a value and adds its own 40b value, and exports it to the country C. In this export, 40b is the DVA of country B, while 100a is the FVA. Finally, country C imports a product from country B with 140 values in total, of which 100 of them belongs to country A, and only 40 of them belongs to country B. Moreover, country C adds its final 20c domestic value and exports the product to the country A. Conventional measures of trade show total global exports and imports as 400 (100+140+160), however only 160 (100+40+20) of value-added has been generated in the production. Conventional measures also show that country A has a trade deficit of 160 with country C, despite the fact that A is the chief beneficiary of country C’s consumption. Furthermore, the figure also depicts that protectionist measures of country A on imports from country C could harm its own exporters and hence competitiveness. Thus, TiVA data can prevent any mistakenly accepted policies that can harm local industries.

Moreover, by providing information at the level of specific industries, it is possible to provide insights into other areas too, such as the contribution of the service sector to international trade, which in traditional data their contributions could be underestimated.

Figure 10 Illustration of Trade in Value-Added



Source: Kheyirkhabarli (2024b).

What has been lacking is a systematic attempt to mainstream the development of statistics in this area. To track the movement of value-added trade across nations, a group of researchers has combined data from customs agencies with domestic input-output tables to form worldwide input-output tables. The recently introduced databases provide a comprehensive and uniform account of the interdependence of production in numerous nations on imports, which are frequently subjected to additional processing and then exported. The most commonly used global input-output tables, abbreviated as WIOTs, include the World Input-Output Database, abbreviated as WIOD, spearheaded by a team of researchers at the University of Groningen, though its updates ceased in 2014; the Organisation for Economic Co-operation and Development (OECD) Inter-Country Input-Output (ICIO) database, which serves as the foundation for the Trade in Value Added (TiVA) indicators; and the Eora Global Supply Chain Database, which was created by a group of researchers at the University of Sydney. On March 15, 2012, the OECD and World Trade Organisation (WTO) joined forces to develop a database of TiVA indicators and to mainstream their production within the international statistics system. The first preliminary results from this initiative were released on January 16, 2013 (Ahmad, 2013). In essence, the TiVA method provides insight into the intensity of the relationship between domestic and

foreign markets in terms of the value-added content of traded goods. Furthermore, the database provides statistics on both gross trade and value-added trade of selected OECD and non-OECD countries from 1995 to 2020[15]. The database includes data on both total trade and trade in specific goods and services. The usage of the database can help us better understand how much DVA is generated by the export of goods or services in a country is crucial for development strategies and industrial policies. Furthermore, looking at trade from a value-added perspective also allows to better reveal how upstream domestic industries contribute to exports, even if those same industries have little direct international exposure. Gross trade statistics, for example, reveal that less than one-quarter of total global trade is in services, however, in value-added terms, the share is significantly higher (Ahmad, 2013).

The TiVA data, despite offering valuable insights into global production networks, faces certain limitations, too. One challenge is the intricate and demanding nature of accurately assessing and assigning value-added contributions at each production stage, potentially leading to data inaccuracies and uncertainties (Koopman et al., 2010). Furthermore, the reliance on input-output tables and assumptions when calculating value-added can introduce biases and distortions, making it difficult to capture the true extent of value-added activities and their impact on trade flows (Johnson and Noguera, 2012). These challenges make the database limited both in number of countries and years. The challenges impose limitations on the scope of the database, restricting its coverage to a limited number of countries and years. Furthermore, the absence of ownership data prevents distinguishing whether an input (DVA) originates from a locally owned firm or a foreign-owned firm operating domestically.

There are several authors who employed TiVA data in their research. For example, according to the research on value-added trade in the chemical industry in Poland and Hungary conducted by Folfas and Udvari (2019), both countries actively engage in production fragmentation and the GVC. However, they depend more on intermediaries from wealthier nations rather than on domestically produced semi-products with high DVA content. Moreover, according to Escaith and Gaudin (2014), where value-added data from 53 countries was included, there is a relatively strong relation between GDP and several TiVA indicators. Conversely, there is a strong negative correlation between the share of foreign content in total gross exports (%) and the absolute value of foreign value-added (FVA) in

[15] As of September 2024.

both services and manufacturing exports. This suggests that more developed countries, which typically have higher value-added exports, tend to exhibit lower foreign content as a percentage of their gross exports, despite potentially high absolute values of FVA. In contrast, the total domestic content in total gross exports exhibits the highest correlation coefficient, particularly regarding DVA in primary and manufacturing exports, as anticipated. Furthermore, Jangam and Rath (2021), by using TiVA data, found that that in EEs, the DVA has experienced positive enhancements due to both forward and backward participation, with forward participation playing a more significant role in its improvement. On the other hand, some researchers applied both traditional and value-added data and compared them. For instance, Power (2012) observes that in several developed countries, the ratio of exports to GDP is similar to the ratio of DVA exports to GDP. In contrast, in EEs, there is a substantial gap between these two ratios, indicating that their exports have a higher proportion of FVA content.

3.3. Statistical review of EEs in GVCs

It is essential to evaluate the current level of engagement of EEs in GVCs. The level of engagement of countries in GVCs can be represented by several indicators. The data employed for the statistical review spans the period from 1990 to 2018, the latest available year. The GVC participation and positioning indices used in this study were calculated based on the indicators provided by the UNCTAD Eora Database[16]. Specifically, the indices were derived from the database's Domestic Value-Added (DVA), Foreign Value-Added (FVA), and Domestic Value-Added in Exports (DVX) components. The methodological approach behind these indicators is further elaborated in the Casella et al. (2019).

The measurement of GVC participation, positioning, and upgrading relies on well-established methodologies developed in the literature on global trade decomposition. Two major schools of thought have emerged in this field: Koopman et al. (2014), which focuses on the decomposition of gross exports, and Wang et al. (2013, 2017), which centers on the decomposition of value-added trade. These approaches are fundamental for understanding the construction of GVC indicators and their implications.

[16] Database link: https://worldmrio.com/unctadgvc/

Koopman et al. (2014) introduced a comprehensive method to decompose a country's gross exports into distinct value-added components, distinguishing between domestic value-added (DVA), foreign value-added (FVA), and double-counted terms. This approach is crucial for measuring the extent to which a country's exports rely on foreign inputs and contribute to downstream production. On the other hand, Wang et al. (2013, 2017) refined the decomposition by shifting the focus from gross exports to value-added trade flows. Their framework allows for a more precise assessment of GVC participation by considering not just direct exports but also indirect contributions through third countries. Unlike Koopman's decomposition, which is centered on gross trade flows, Wang's approach provides insights into value creation and redistribution across countries and industries.

The primary variable used in this analysis is the ***GVC participation index***. The formula below demonstrates how to calculate it (Koopman et al., 2014; Wang et al., 2017):

$$GVC\_part = \frac{DVX + FVA}{DVA + FVA} \qquad (1)$$

where:

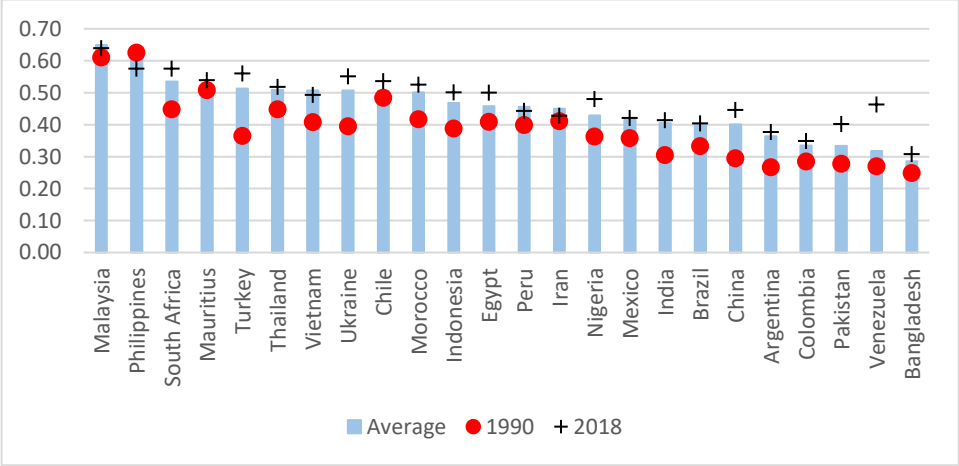
- *DVX* is the domestic value-added of the country embodied in the exports of other countries, representing the forward GVC participation component of the index.
- *FVA* is the foreign value-added embodied in the country's exports, representing the backward GVC participation component of the index.
- *DVA* is the domestic value-added embodied in the country's own exports.

The denominator *(DVA+FVA)* represents the ***gross exports*** of the country, encompassing both domestic and foreign value-added. A higher GVC participation index indicates greater involvement of the country in GVCs.

The bar chart in Figure 11 illustrates the average participation index of aid-recipient EEs in GVCs during 1990-2018, and the specific levels in 1990 and 2018 to reflect how each EE's engagement in GVCs has evolved. Starting with the average indicator, this data reveals significant differences in the engagement of EEs in GVCs. Malaysia tops the list with a participation index of 0.65, indicating a high level of integration into global production networks, followed closely by the Philippines at 0.63.

South Africa ranks third with an index of 0.54, showcasing its significant involvement in GVCs. Several countries, including Mauritius, Turkey, Thailand, Vietnam, Ukraine and Chile, share an index of 0.51, indicating a similar level of involvement in GVCs. Morocco and Indonesia also demonstrate relatively high participation with indices of 0.50 and 0.47, respectively. Egypt and Peru both show a participation index of 0.46, while Iran and Nigeria have indices of 0.45 and 0.43, respectively. Meanwhile, Argentina, Colombia, Pakistan, Venezuela, and Bangladesh exhibit lower levels of participation in GVCs, with indices ranging from 0.36 to 0.29. Bangladesh has the lowest participation index of 0.29, reflecting its minimal engagement in global production processes, among others. The GVC participation trends of the 1990 and 2018 data differ significantly, as can be seen in the figure. Turkey, China, South Africa and Ukraine, for instance, show a significant increase in GVC involvement over time, indicating their growing integration into international production networks. In contrast, the Philippines' GVC membership decreased a bit between 1990 and 2018. High participation economies, like Malaysia, could be very close to reaching their maximum degree of integration, which would cause progress in GVC participation to slow down. Furthermore, during this period, Malaysia achieved the highest participation index in 2007, reaching 0.69. In contrast, the lowest participation index was recorded by Bangladesh in 1993, with a value of 0.23. The chart underscores the varying degrees of integration of EEs into GVCs, with some countries significantly more engaged than others. These differences in indices can be attributed to a range of factors, such as industrial capabilities, infrastructure quality, and international trade relationships.

Figure 11 GVC Participation Index in EEs: 1990, 2018 and Average (1990-2018)



Source: Own construction based on UNCTAD Eora database.

It should be noted that high participation index in GVCs does not automatically ensure increased benefits. Examining the forward and backward linkages can provide important insights into the net gains a nation obtains from its engagement in GVCs. If gains are assessed by net value-added, then a higher proportion of forward[17] linkages relative to backward linkages signifies greater gains (Banga, 2013b). This implies that through participation in GVCs, a country is producing and exporting more DVA than the FVA it is importing. Conversely, if the backward linkages exceed the forward linkages, it indicates that the country is importing more FVA than it is exporting DVA. Therefore, net value-added can be a trustworthy measure of the level of net gains, revealing whether a country's engagement in GVCs is primarily beneficial or if it is more dependent on foreign inputs. To assess the extent to which economies retain domestic value from their participation in GVCs, I calculated the ***net value-added*** (NVA) in exports as a share of GDP, defined as:

$$NVA\_GDP = \frac{DVX - FVA}{GDP} \qquad (2)$$

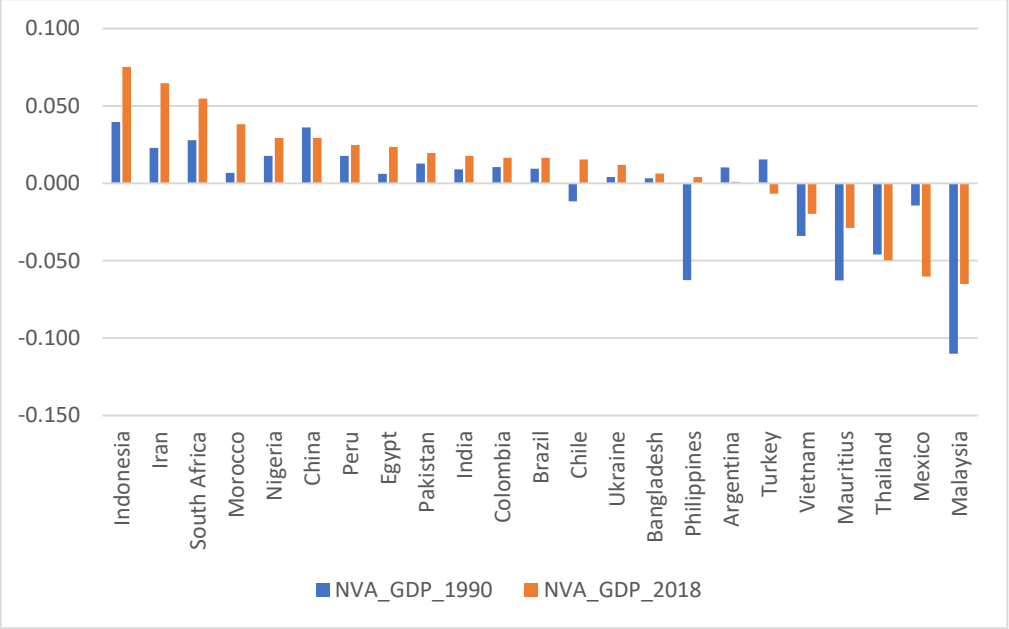
By incorporating GDP, this metric allows for a standardized comparison across countries, highlighting which economies benefit more from GVC participation relative to their economic size. The results for selected emerging economies in 1990 and 2018 in Figure 12 illustrate shifts in their ability to capture domestic value-added over time.

Several countries have seen a significant increase in their NVA_GDP ratios, indicating stronger domestic value retention. Indonesia, Iran, and South Africa exhibit the highest NVA_GDP values, with notable growth from 1990 to 2018. Indonesia's increase from 0.040 to 0.075 suggests enhanced domestic value creation, likely driven by industrial upgrading, stronger local supply chains, and reduced reliance on foreign inputs. Iran and South Africa have also strengthened their positions, implying that a greater share of their exports consists of domestically produced inputs. Morocco stands out as well, with its ratio rising from 0.007 to 0.038, signalling a shift toward greater domestic input use in exports, possibly due to policies supporting local industries and trade diversification.

[17] Forward linkages often include raw materials, energy, and agricultural products, which are counted as domestic value-added. However, this classification can be misleading, as it may not fully capture the complexity of value creation and distribution.

Other countries demonstrate more moderate improvements. While China's NVA_GDP slightly declined from 0.036 to 0.029, it still maintains a positive balance, reflecting its strong domestic production base. Similarly, Peru, Brazil, India, and Colombia show small increases, indicating that they are capturing more value domestically but at a slower pace compared to leading economies. A particularly interesting case is Chile, which transitioned from a negative NVA_GDP (-0.012) in 1990 to a positive value (0.015) in 2018, suggesting a shift towards greater domestic value retention, potentially due to industrial restructuring or reduced reliance on imported inputs.

Figure 12 Net Value Added as a Share of GDP: Emerging Economies Comparison, 1990 vs. 2018



Source: Own construction based on UNCTAD Eora database.

In contrast, several economies exhibit stagnation or decline, highlighting their increased dependence on foreign inputs. Turkey's NVA_GDP fell from 0.015 to -0.007, suggesting a growing reliance on assembly-based production models. Mauritius and Vietnam, while improving their ratios, remains in negative territory, indicating continued dependence on foreign inputs. Thailand and Mexico show declining trends, reinforcing their roles as processing hubs with high foreign input reliance. Malaysia, which had the lowest NVA_GDP in 1990 (-0.110), improved slightly to -0.065 while remaining the

most dependent on foreign inputs among all observed countries, reflecting its deep integration into manufacturing and electronics assembly chains.

These findings highlight the varying degrees to which emerging economies benefit from GVC participation. Countries with rising NVA_GDP, such as Indonesia, Iran, South Africa, and Morocco, appear to be increasing their domestic production capacity and value retention, likely through industrial upgrading and investment in local suppliers. On the other hand, countries with declining or persistently negative NVA_GDP, such as Malaysia, Mexico, Thailand and Vietnam, remain deeply embedded in GVCs but with a high reliance on imported inputs. This could make them more vulnerable to external shocks or supply chain disruptions.

Another key index used to describe the activities of countries in GVCs is the ***GVC position index*** which represent the overall standing of the nation on an aggregate level in the GVCs. The formula below demonstrates how to calculate it (Wang et al., 2017):

$$GVC\_pos = ln\left(1 + \frac{DVX}{DVA + FVA}\right) - ln\left(1 + \frac{FVA}{DVA + FVA}\right) \qquad (3)$$

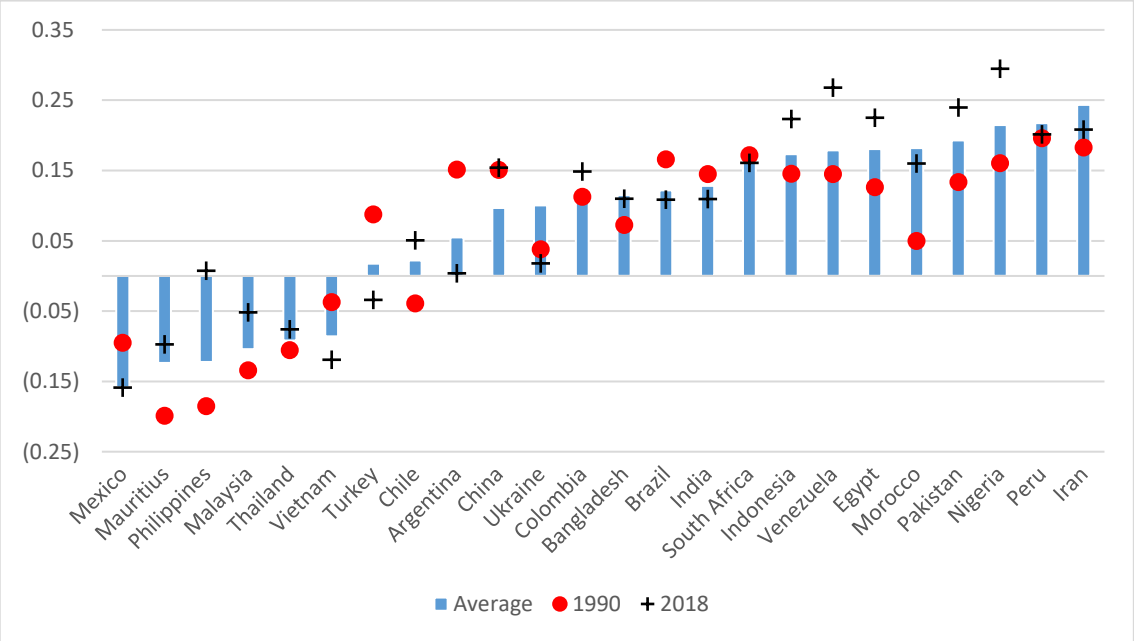
Essentially, formula *(5)* delineates the GVC position index as a logarithmic ratio, contrasting a country's DVX supply with its FVA use. A positive value denotes that the country contributes more value-added to other nations' exports than it receives from theirs, indicating an upstream position in GVCs. Conversely, a negative value implies that the country relies more on FVA inputs for its exports than it provides domestically, signifying a downstream position in GVCs.

Figure 13 depicts the average GVC position index for EEs over the 1990-2018 period together with 1990 and 2018 values, reflecting their involvement in either upstream or downstream activities within the GVCs. A positive GVC position index value denotes a country's upstream activities, meaning it is more engaged in the initial stages of production, such as raw materials and intermediate goods. Conversely, a negative GVC position index value signifies downstream activities, indicating that the country is more involved in the final stages of production, such as assembly, sales, and marketing.

According to the figure, Mexico, with an index of -0.158, demonstrates significant involvement in downstream activities, likely focusing on assembling and manufacturing final products using imported components. This reflects the diversified nature of Mexico's

economy, as despite the substantial contribution of its oil exports, they were not enough to push the figure into positive territory. Mauritius (-0.124) and the Philippines (-0.122) also exhibit strong downstream activity, suggesting a reliance on imported inputs for their production processes. Other countries with notable negative indices include Malaysia (-0.104), Thailand (-0.092), and Vietnam (-0.086), indicating their roles in the final assembly and manufacturing stages. The highest downstream index was recorded by the Philippines in 1997, with a score of -0.261.

Figure 13 GVC Position Index in EEs: 1990, 2018 and Average (1990-2018)



Source: Own construction based on UNCTAD Eora database.

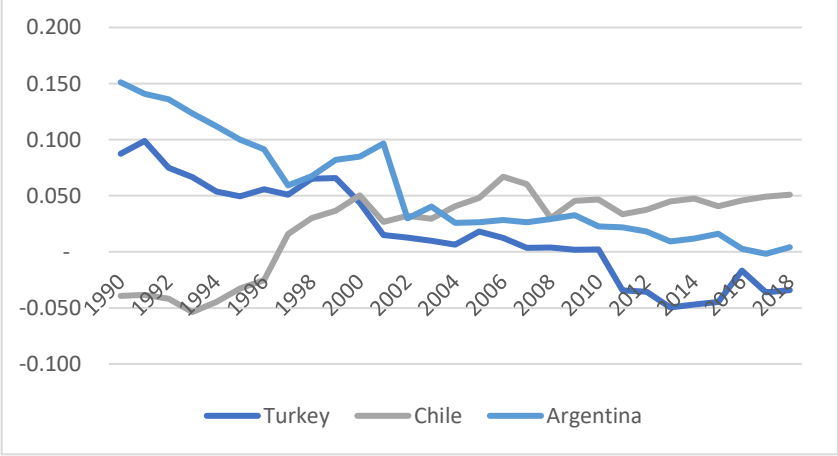
On the other hand, Iran, with an index of 0.243, shows a strong upstream involvement, likely contributing raw materials or intermediate goods to the global production process. Peru (0.218) and Nigeria (0.215) also display significant upstream activities, suggesting they are primary suppliers of raw materials or intermediate inputs. Additional countries with positive indices include Pakistan (0.193), Morocco (0.182), and Egypt (0.181), indicating their contributions to the early stages of the production process. Meanwhile, countries like China (0.097), Ukraine (0.100), and Colombia (0.110) show moderate positive values, suggesting a balanced role with a slight upstream inclination. The highest upstream index was recorded by Nigeria in 2016, with a score of 0.301.

The evolution of the Global Value Chain (GVC) position index among emerging economies between 1990 and 2018 reveals divergent trends in their roles within

international production networks. While some countries experienced significant shifts, others remained relatively stable or even saw declines. Mexico, for instance, maintained a negative GVC position throughout the period, declining slightly from -0.10 in 1990 to -0.16 in 2018, indicating a continued reliance on foreign inputs. A similar trend can be observed for Vietnam, which shifted from -0.04 to -0.12, suggesting a relative downgrade in their positions. In contrast, countries like the Philippines and Indonesia improved their positions significantly, with the Philippines moving from -0.19 to 0.01 and Indonesia increasing from 0.15 to 0.22, reflecting a shift towards higher value-added activities. Some economies, such as China and South Africa, remained relatively stable, with China's position staying at 0.15 and South Africa seeing only a minor decrease from 0.17 to 0.16. Notably, Venezuela, Egypt, and Nigeria exhibited strong upward movements, with Venezuela increasing from 0.15 to 0.27, Egypt from 0.13 to 0.23, and Nigeria from 0.16 to 0.29, suggesting a greater role in upstream activities. These variations highlight the diverse trajectories of emerging economies, shaped by factors such as industrial policies, FDI, and integration strategies within GVCs.

Other countries, such as Argentina (0.055), Chile (0.022), and Turkey (0.017), exhibit near-neutral average values, signifying a relatively balanced blend of upstream and downstream activities on average during this period. It is crucial to examine the trendline of these nations, separately. Figure 14 depicts the GVC position index trends for Turkey, Chile, and Argentina from 1990 to 2018. This index uncovers the changes in these countries' participation in GVCs, emphasizing transitions between upstream and downstream activities.

Figure 14 GVC position index trends for Turkey, Chile, and Argentina, 1990-2018



Source: Own construction based on UNCTAD Eora database.

According to the figure, Turkey starts the period with a positive index of around 0.100, indicating significant involvement in upstream activities. Over the years, the index steadily declines, crossing into negative territory around 2010. By 2018, Turkey's index hovers near -0.035, signifying a shift towards downstream activities. This transition reflects a broader economic shift as Turkey integrates more into the final stages of global production processes. On the other hand, Chile's GVC position index begins slightly negative. Initially, it shows an increase in upstream involvement, reaching its first positive index in 1997. After this, the index stabilizes around 0.050, suggesting that Chile has transitioned from downstream to upstream activities. Meanwhile, Argentina's index shows considerable variation. Starting around 0.150, it experiences a sharp decrease in upstream activities until 1997. Furthermore, after 2001, there is a noticeable downward trend. By 2018, the index is around zero, implying a move towards more balanced involvement in both upstream and downstream activities. This transition suggests that Argentina is evolving from its earlier upstream focus to a more integrated role within global production networks, likely influenced by its turbulent domestic economic conditions and periodic financial crises, which may have reshaped its participation in GVCs.

The figures effectively underscore the diverse roles that countries play in the GVCs, from upstream suppliers of raw materials and intermediate goods with forward participation to downstream manufacturers and assemblers of final products with backward participation. This investigation is crucial for understanding each country's economic structure and its integration into the global economy. Furthermore, the scatter plot with its trend lines provides a comprehensive overview of how EEs participation and positioning within GVCs have evolved. The consistent negative relationship indicates that higher participation traditionally meant moving downstream, however this trend has weakened over time, suggesting a diversification and upgrading of roles within GVCs. This evolution has important implications for economic policy and global trade strategies.

3.4. Consequences of global value chains

The growth of GVCs has transformed the global allocation of resources and production, leading to increased specialization, offshoring and outsourcing. GVCs enable the most efficient allocation of resources, not only across various countries and sectors, but also within different production stages of a particular sector. By potentially dividing

production across borders, there is an opportunity to create a more intricate international labour division and greater benefits from specialisation. The expansion of value chains worldwide has led to a noticeable consequence, namely the increase in offshoring and offshore outsourcing. This practice has been widely adopted by companies in advanced economies to cut expenses and enhance effectiveness, as stated by Pla-Barber et al. (2019) and Baldwin and López-González (2015). Essentially, GVCs enable nations to take advantage of other countries' comparative advantages not just at the sectoral level, but also at specific stages within those sectors. According to Baldwin and Robert-Nicoud (2014), underdeveloped nations and EEs gain advantages by engaging in the outsourcing procedure conducted by advanced nations, resulting in a favourable alteration of the trade conditions for the former. However, critics argue that the primary beneficiaries of GVCs are multinational corporations, which organise, manage, and control these networks to capture disproportionate value. According to Bair and Werner (2011), even as GVCs generate growth, the majority of gains remain concentrated among lead firms, leaving lower-tier producers with minimal bargaining power and fragmented economic upgrading opportunities.

The positioning of countries within GVCs is strongly influenced by their factor endowments, size, and the nature of their economies. According to Amador and Cabral (2017), over time, the networks of FVA in exports have become more tightly interconnected, intricate, and dense, which is in line with the growth and broadening of GVCs. Smaller economies are more likely to have a greater involvement in different GVCs with a higher proportion of FVA, whereas bigger economies tend to exhibit a lower participation in GVCs with a greater DVA share. Factor endowments have a similar impact on specialisation in a world of GVCs, as well as the positioning of nations within GVCs. For example, countries that that possess abundant natural resources and export primary products upstream such as Saudi Arabia, the Russian Federation, Brazil, and Argentina tend to rank the highest on DVA content are anticipated to have substantial involvement in the forward segment of GVCs. On the other hand, countries like Singapore and Luxembourg, which have downstream service-oriented economies, tend to have the highest FVA content and are involved in backward section of GVCs, while Amador and Cabral (2017) claim that the production of service exports through GVCs are relatively less common and they are less likely to employ FVA from multiple sources. Furthermore, Di Stefano (2021) examined two different international production

configurations, namely "snakes" and "spiders," where the "snakes" configuration requires production stages to be completed in sequence, while the "spiders" configuration allows for independent completion of production stages followed by final assembly. Antràs and De Gortari (2020) show that in snake-like GVCs, the costs of trade increase progressively along the value chain, impacting downstream stages more than upstream stages. As a result, distant countries tend to focus on upstream stages, while more central countries specialize in downstream stages.

The contemporary discourse on economic development and GVCs has brought about a heightened interest in the concept of upgrading, thus necessitating an exploration of the underlying factors that have prompted this renewed focus. According to Humphrey and Schmitz (2002), the term "upgrading" refers to the actor's progression within the value chain towards more valuable and efficient activities and according to them, the GVC upgrading can be classified into four types: process, product, function, and chain upgrading, with varying degrees of difficulty. The process upgrading involves enhancing the production system's efficiency, often by using better technology. Product upgrading is when companies transition towards more advanced product lines. Functional upgrading is when companies acquire new functions to increase their value-added. Lastly, chain or inter-sectoral upgrading is when firms shift towards new categories of production altogether. To enhance their competitive stance within a GVC, companies can advance by improving their products or processes, or by assuming more advanced functions within the chain. Furthermore, Gibbon–Stefano (2005) also conclude that producers have the opportunity to enhance their position along the value chain through upgrading and this can be achieved by either transitioning to more lucrative functional roles or by manufacturing goods that possess increased value-added or offer superior returns to producers. Other forms of upgrading, including social upgrading, which refers to the improvement of labour standards and work conditions, contribute to placing a country in a stronger position in GVCs. Li et al. (2021) by applying a system Generalized Method of Moments estimator, claim that a country's economic development and industrial structure often correspond with its technological level.

Countries with higher economic development and technological levels typically occupy a more prominent position in the GVC. The potential for GVCs to promote technology diffusion between nations suggests that their impact on growth rates may surpass that of traditional trade. According to Lipparini et al. (2014), GVC networks that

gain the greatest advantage from knowledge exchange between partners are those that have a mutual identity and language as per their qualitative multiple case study. On the other hand, at a national level, empirical findings of Li et al. (2021) reveal that outward foreign direct investment (OFDI) positively influences the upgrading of the home country's GVC through the enhancement of technological progress and elevation of trade network status. Notably, the effect of OFDI is more pronounced in EEs as compared to developed ones. Additionally, an empirical examination of China's sub-industries demonstrates that the impact of OFDI on GVC upgrading is stronger for high-tech industries as opposed to low and middle-tech industries. On the other hand, according to Hatani (2009), in EEs, an overabundance of inward FDI hinders the diffusion of technology from multinational enterprises to even lower tiers of the supply chain due to the limited connections between local companies and multinational enterprises.

The ICT revolution and the reduction of trade barriers have profoundly impacted GVC dynamics, especially in terms of production organization and innovation. According to Di Stefano (2021), the ICT revolution coincided with the gradual elimination of trade barriers. Computers' processing power and memory capacity increased by twofold approximately every two years, while their real price decreased. Simultaneously, the expense of transmitting a single bit of information through an optical network reduced by half roughly every nine months, and the number of internet users doubled around every two years. As a result of the ICT revolution, businesses in developed countries could remotely organize and manage their production process and separate the manufacturing and design processes, which is a crucial aspect of GVCs production. On the other hand, the findings of Tajoli and Felice (2018) indicate that both advanced and developing economies experience a rise in patenting as a result of receiving inputs from high-income countries. While it is expected that developing countries would benefit from knowledge spillovers, this is not the only potential outcome. It is possible that GVC participation could result in developing countries specializing in low innovative tasks, which could reduce their resources for expanding technological advancements. Additionally, the favourable spillovers rely on the specific GVC partners involved, as neither advanced nor developing nations experience an advantage from obtaining inputs from lower-income countries, according to their study. In accordance with Pietrobelli and Rabellotti (2011), if an innovation system is organised effectively and efficiently, it could diminish the intricacy of transactions and facilitate transactions that rely on relational forms of

governance within the GVC. Meanwhile, the position within the supply chain, as per Van der Marel's (2015) findings, is not correlated with either an innovation-friendly climate or increased research and development expenditures, which is quite unexpected.

Despite the potential benefits of GVC involvement, such as higher trade volumes and improved technology, not all participants are guaranteed to benefit fully from their participation in GVCs, particularly in terms of access to innovation and its benefits. According to the findings of Raei et al. (2019) who applied fixed-effects and instrumental variable approaches, a vast amount of diversity exists regarding the advantages linked to GVCs. This can be due to the involvement of developing countries in specific, less innovative phases of production, which may reduce the incentives to create and patent new products. In fact, some countries may redirect their resources to low-innovation production phases while still accessing innovative inputs through GVC participation, without having to invest in domestic innovation efforts. Developing nations, in particular, are at risk of becoming trapped in low-skilled tasks. Developed countries predominantly take on the stage of production that requires technology and capital due to their comparative advantages in these areas, as well as in social services and skilled labour (Li et al., 2021). Furthermore, they manufacture products that are intended for wealthy consumers in developed countries who prioritize quality (Verhoogen, 2008). This allows them to occupy the links in the division of labour that offer higher added value. On the other hand, developing countries are limited to engaging in standardised production and assembly activities that offer low value-added. They are only able to participate in the international division of labour in a passive manner, despite their abundant resources and lower labour costs. This has been highlighted in research conducted by Schmitz (2006) as well. Thus, in less-developed economies, this factor may lead to an increase in wage inequality.

The structure of international trade is significantly influenced by the determinants of GVC participation, such as trade and factor endowments. Countries that are rich in skilled labour tend to have a comparative advantage in producing goods that require skilled labour, while they also import goods that require low-skill labour from countries with abundant low-skill labour. Moreover, nations that possess a substantial amount of arable land or natural resources in comparison to their production of other factors are expected to specialize in and export primary products. Furthermore, Van der Marel's (2015) also highlights that the participation in GVCs appears to depend on a combination

of traditional trade factors, such as market size, skilled labour, and efficient transportation, as well as favourable conditions for innovation and the labour market. Meanwhile, a country's position within the supply chain is influenced by policies related to capital, trade in services, and FDI, as well as measures to promote competition and labour market efficiency (Van der Marel, 2015). All else being equal, an economy's size is a significant element that intuitively affects the ease of locating appropriate input suppliers (Escaith and Gaudin, 2014). In comparison to a smaller economy, a larger one makes it considerably simpler to find suitable suppliers. Generally, larger countries have more stages in their sequential multi-stage production processes than smaller countries. This is due to the fact that they tend to attract a larger set of stages. Additionally, to avoid cross-hauling of semi processed goods, countries specialize in contiguous stages. Therefore, larger countries are less likely to use imported inputs in their exports, resulting in lower levels of backward GVC integration. However, large countries are more likely to be situated closer to the global demand for final goods, making them more likely to specialize in downstream processes. This proximity to demand and centrality leads to higher levels of backward GVC integration. (Antràs and De Gortari, 2020). In general, the selection of a location plays a vital role in establishing the optimal geographical layout of the GVC. This involves determining the ideal positioning of activities and their distribution to achieve maximum value generation and capture within the GVC as Kano et al. (2020) emphasised. Furthermore, the significance of a nation's institutions and its level of political stability are anticipated to play a crucial role in determining its involvement in GVC as well (Antràs, 2020). Additionally, Jangam and Rath (2021) state that national strategies and institutions have a significant impact in facilitating the progression of economic advancement. Measures targeted at enhancing the internal foundations and promoting the engagement in GVCs assist emerging market economies in harnessing the possible advantages. According to Tajoli and Felice (2018), to make the most of participating in GVC, it is important to improve the institutions that are directly related to the business environment, such as patent protection, contract enforcement, and bureaucracy, in developing countries. This will facilitate the suitable connection between buyers and suppliers situated in various nations.

3.5. Recent challenges for global value chains

An often-asked inquiry within the GVC literature is if supply chains are becoming more "global" in a literal sense, or if the internationalisation of GVCs is more indicative of regional integration, as argued by Baldwin and López-González (2015). With the recent decline in production fragmentation, it is now a matter of determining whether this decrease affects both the intra-regional and extra-regional components of GVCs or whether it leads to a greater regionalisation of value chains. According to Baldwin (2013), the supply chain that operates on a global scale is not truly global in nature, however rather, it is confined to specific regions and the majority of the high figures, which signify a robust supply chain partnership, are concentrated within distinct regional groupings. Furthermore, previous research into the geographical extent of GVCs suggested that these supply chains have a tendency to operate on a regional scale, as opposed to a global one, as noted by Rugman et al. (2009). Additionally, Baldwin and López-González (2015) observed that GVCs are often clustered around one of the three primary economic centres of the world, namely, “Factory Europe”, “Factory North America”, and “Factory Asia”, with Germany, the US, and China serving as the primary suppliers in their respective regions. A high level of coherence is apparent in most of the Eastern Asian economies, as Escaith and Gaudin (2014) highlights, mirroring the situation in Europe. However, according to Amador and Cabral (2017), the transformation of FVA networks in exports from 1995 to 2011 demonstrates that GVCs have adopted a more universal character. While their regional scale is still dominant, worldwide production networks are continuously developing into an authentic global network. Overall, the trend reveals that GVCs are progressively transitioning towards global networks. However, not all the researchers conclude the same results.

In the field of international business, globalisation is typically defined as the growth of interdependence between nations. Conversely, deglobalisation refers to the decline of interdependence among nations. Petricevic and Teece (2019) claim that there is evidence of de-globalisation based on the impact of specific macro-level trends. These trends include protectionism, public policies with an interventionist approach, prioritizing sustainability, and implementing digital technologies in manufacturing. Moreover, James (2018) argues that although innovative technologies in the digital age can still decrease the expenses associated with trading, the advantages gained from obtaining goods and

services from overseas can be cancelled out by protectionism. This, in turn, can prompt businesses to look for local or nearer sources instead and cause a process of deglobalisation. According to Zhan (2021), the length and fragmentation of regional GVCs will decrease while the concentration of value-added at each stage is expected to increase. The process of local development is likely to be promoted by regionalisation, which will lead to greater participation of local firms in value chains, reduced environmental impact for firms, and potential for value-chain upgrading. In the meantime, Sass (2017) and Ancarani et al. (2019) both suggest that the adoption of technologies reducing labour needs can lead to backshoring and diminish the role of GVCs, as companies increasingly compete on quality rather than costs, reducing the incentive to relocate labour-intensive production to low-wage countries and potentially reorganising international production. Furthermore, Barbieri et al. (2020) cite various instances of European businesses that opted to transfer their manufacturing operations back to Europe. The pandemic and the necessity to mitigate risk were the reasons behind their choices. Using the Leontief model in an international setting, Miroudot and Nordström (2020) verify that GVCs are experiencing a reduction in length with regards to both the quantity of production phases and the mean geographical span covered by materials. Furthermore, they also claim that in 2012, there was a 9% reduction in the average distance from 2308 km to 2099 km, indicating a deglobalisation or erosion in globalisation rate of approximately 52 km per year. While it is true that specialised and interdependent GVCs are becoming more regionalised, which could lead to lower transportation costs and decreased exposure to global risks, it is also important to consider the potential drawbacks of such regionalisation as it is stressed by Di Stefano (2021). For instance, if value chains become too strongly regionalised, this could hinder firms and economies from efficiently allocating their scarce resources, improving productivity, or fully leveraging the benefits of specialisation. Furthermore, relying more heavily on a limited geographic area could make manufacturing firms less flexible, limiting their ability to respond to shocks that are specific to certain countries or regions.

Prior to the global financial crisis, there was a growing trend of globalising GVCs, accompanied by an increased usage of inputs from external regions, except for Europe (Miroudot and Nordström, 2020). The scale and global transmission of macroeconomic shocks are influenced by GVCs, as evidenced by the severe and synchronised decline in global trade during the financial and economic crisis. This decline was particularly

noticeable in the trade of intermediate and capital goods. According to Borchert and Mattoo (2010), the services GVCs exhibited a greater degree of resilience to macroeconomic shocks during the great financial crisis, as they were less affected in comparison to other sectors. Meanwhile, Sass and Szalavetz (2014) argue that the financial crisis intensified specialisation, prompting firms to restructure and focus more on high-skill, high-value segments within GVCs. After recuperating from the 2008 economic downturn, an increase in protectionism was identified as a cause for the decline in globalisation (Bown 2018). However, by the beginning of 2020, GVCs had already become a crucial part of the global economy, just in time for the outbreak of COVID-19.

Unlike the global financial crisis that occurred in 2007, the COVID-19 pandemic has caused not just a demand side shock, but also, to a greater degree thus far, a supply side shock. The trend towards GVC reconfiguration has been reinforced by the COVID-19 crisis in the global climate of rising protectionist policies and the push for a more sustainable economy (Javorcik, 2020). The shortcomings of sourcing from far-off economies have been exposed due to supply disruptions in multiple value chains, the scarcity of essential goods, and instability in the prices of particular raw materials and finished products. In the medium to long term, GVCs may be modified to decrease risk by regionalising or localising them, reducing the number of connections, and exchanging productive efficiency for better supply security (Shih, 2020). As participation in GVCs varies greatly across sectors, the sectoral impact of the pandemic may determine the extent to which international supply chains are exposed to the COVID-19 recession. While the COVID-19 pandemic resulted in a decline in domestic demand for all firms, those involved in GVCs also faced a significant reduction in demand from their trading partners. This highlights the vulnerability of GVC-participating firms, as disruptions in one country or sector can disrupt the entire production network, leading to adverse consequences (Gereffi et al., 2005; Antràs, 2015). Therefore, it is crucial to understand and address the vulnerabilities faced by firms in GVCs to enhance resilience and mitigate risks in the future. Furthermore, stability of GVCs is increasingly challenged by geopolitical fragmentation, trade wars, and the resurgence of protectionist policies—exemplified by tariff escalations and supply chain decoupling efforts following the second election of Donald Trump in 2025.

3.6. Chapter summary

To conclude, globalisation in business entails the expansion of international trade through the involvement of major corporations in the production and exchange of goods across multiple countries. This process has experienced two stages of unbundling driven by advancements in steam technology and ICT. These stages have facilitated the dispersal of production stages geographically and the emergence of GVCs. GVCs, which encompass a series of activities in manufacturing or service provision, have become a prominent feature of the global economy. They involve the creation of value-added at each step, with multiple countries contributing to the process. Developing nations are increasingly participating in various stages of production and see GVCs as a means to achieve economic development and integration into the global economy. The composition of GVC flows differs by sector, and a country's connections within FVA networks reflect its involvement in GVCs. The fragmentation of production has opened opportunities for EEs to participate in GVCs by either enhancing entire products or undertaking specific tasks. GVC participation facilitates knowledge and technology transfer, capability improvement, and access to external markets. Furthermore, technological progress, reduced transportation and communication costs, and the elimination of trade barriers further stimulate the potential for international production fragmentation. Additionally, managing value chains involves exerting influence and distributing value among participants, with multinational corporations playing a significant role. While the presence of foreign multinational corporations can negatively impact local companies' domestic sales, it can also have a positive effect on their exports. In conclusion, GVCs have transformed the global economic landscape, providing avenues for developed and developing countries alike to engage in international trade. The ongoing integration of EEs in GVCs is likely to shape future patterns of global production and trade.

The traditional method of measuring trade value based on gross exports has become insufficient in capturing the intricacies of modern manufacturing processes and international economic cooperation. The inclusion of imported intermediate goods in exports has significantly boosted gross exports compared to those based solely on DVA. As a solution, there has been a shift towards employing a value-added-based trade analysis, which takes into account both domestic and foreign value-added content in

traded goods. The TiVA method has emerged as a valuable tool for understanding the interdependence between domestic and foreign markets in terms of value-added content. The utilisation of TiVA data has enabled researchers to gain valuable insights into various aspects of international trade and economic relationships. It has shed light on the strength of the relationship between domestic and foreign markets and highlighted the contributions of domestic industries in driving exports. Moreover, TiVA data has facilitated the examination of value-added trade in specific industries and countries, revealing patterns of production fragmentation and involvement in GVCs. By incorporating value-added perspectives, policymakers and researchers can acquire a more accurate understanding of a country's genuine engagement in global production and its trade activities. Overall, the adoption of value-added trade analysis enhances our comprehension of the complexities underlying global trade and production patterns.

The analysis of EEs' engagement in GVCs from 1990 to 2018 revealed significant variations in participation, net value-added contributions and their position. Countries like Malaysia and the Philippines exhibit high GVC participation, indicating their integration into global production networks. Conversely, nations such as Bangladesh and Venezuela display lower participation levels, suggesting limited involvement in GVCs. However, high participation does not guarantee increased net gains. Countries with higher net value-added indices, such as Indonesia and Iran, benefit more from forward linkages, retaining greater domestic value. In contrast, nations with lower indices, like Mexico and Malaysia, rely heavily on foreign inputs, reflecting a focus on assembly rather than value creation. GVC position indices highlight whether countries are more engaged in upstream or downstream activities. Iran and Nigeria demonstrate strong upstream activities, supplying raw materials, while Mexico and the Philippines focus on downstream tasks like assembly. Over time, shifts are observed, with countries like Turkey moving from upstream to downstream roles, reflecting broader economic transitions. The evolution of the relationship between GVC participation and position indices suggests that, while increased participation historically aligned with downstream roles, recent trends indicate more balanced involvement. EEs are starting to engage in upstream activities like R&D and high-tech production, suggesting an opportunity for higher value-added roles in GVCs. This shift underscores the potential for EEs to diversify their contributions and enhance their positions within global production networks, aligning with global trends toward knowledge-intensive and technologically advanced sectors.

GVCs present a chance for effective distribution of resources and specialisation across countries and sectors. They allow for the division of production stages across borders, leading to increased international labour division and specialisation benefits. The expansion of GVCs has led to a rise in offshoring as advanced economies seek to reduce costs and improve efficiency. Participating in GVCs enables countries to leverage the comparative advantages of other nations, not only at the sector level but also within specific stages of those sectors. Smaller economies tend to have a higher proportion of FVA content in their GVC participation, while larger economies have a greater share of DVA. Upgrading within the value chain is crucial for firms to enhance their competitiveness. This can involve improving processes, advancing product lines, acquiring new functions, or shifting to new production categories. The ICT revolution has played a significant role in the development of GVCs by enabling remote organisation and management of production processes and separating manufacturing and design. However, the benefits of GVC involvement in terms of innovation and technology diffusion are not evenly distributed. Developing countries may become stuck in low-skilled tasks without investing in domestic innovation efforts. The determinants of GVC participation include trade and factor endowments, market size, skilled labour, efficient transportation, favourable conditions for innovation and the labour market, and institutional factors. A country's size and proximity to global demand influence its position within the supply chain, with larger countries more likely to specialize in downstream processes. To fully capitalize on GVC participation, countries need to improve institutions related to the business environment, such as patent protection, contract enforcement, and bureaucracy. Overall, GVCs have reshaped the structure of international trade and offer opportunities for potential economic growth and development. However, careful attention must be given to ensure that all participants, particularly developing countries, can benefit and avoid being trapped in low-value activities.

During the last decade there was a debate in the GVC literature regarding whether supply chains were becoming more globally interconnected or if regional integration is the dominant trend. While some argued for regionalisation of value chains, there was evidence suggesting that GVCs were gradually moving towards global networks. However, conflicting viewpoints exist on this issue. The concept of deglobalisation has emerged, indicating a decline in interdependence among nations. This trend is driven by

factors such as protectionism, interventionist public policies, sustainability priorities, and the adoption of digital technologies in manufacturing. Besides regionalisation, another challenge has been crises. The global financial crisis and the COVID-19 pandemic have significantly affected GVCs. During the financial crisis, the global transmission of macroeconomic shocks led to a sharp decline in trade of intermediate and capital goods within GVCs. The COVID-19 pandemic, characterised by both demand and supply shocks, has further reinforced the need for GVC reconfiguration. While all firms have faced reduced domestic demand, those involved in GVCs have also experienced a decrease in demand from their trading partners. In summary, the future of GVCs remains uncertain, with ongoing regionalisation and deglobalisation trends alongside the push for global networks.

Chapter 4

4. AfT and GVCs nexus

Global Value Chains (GVCs) emerged due to the technical developments, deregulation and liberalisation of international trade (Herr and Dünhaupt, 2019). In this dissertation, I rely on the concept of GVCs. It is important to note that Global Value Chains and Global Supply Chains are often mistakenly used interchangeably; however, they represent distinct concepts. While a supply chain refers to the management and coordination of all entities involved in producing and delivering goods to meet customer demands, a value chain encompasses the full range of activities a company uses to create a competitive advantage, from production to final delivery (Adewole and Struthers, 2019). Given that this research focuses on the role of Aid for Trade in enhancing GVC participation in Emerging Economies, a clear distinction between these concepts is necessary to ensure conceptual accuracy. The GVC framework focuses on the various stages of production that occur across different countries, often highlighting how different economies contribute to a product's value. This concept is widely applied in industries such as transportation equipment and electronics, where international production and assembly are key. However, the value chain approach is equally relevant to resource-based industries, including mining and agriculture. In these sectors, activities such as extraction, transportation, and logistics form crucial parts of the value chain (Shepherd, 2016). By participating in GVCs, EEs can tap into new, often more profitable markets, enhancing their ability to add value to their own industries. This may not only boosts local job creation but it can also raise income levels, contributing to broader economic development (World Bank, 2020).

A country's participation in GVCs can be measured by analysing its forward and backward linkages. The proportion of FVA in a nation's total exports is used to measure backward participation, whereas the proportion of DVA in exported intermediate products - which are then used by businesses in other nations for their exports - is used to measure forward participation. However, these patterns can vary significantly across industries; for instance, manufacturing sectors like electronics often show high backward participation due to complex value chains, whereas resource-based industries, such as mining or agriculture, typically exhibit stronger forward participation as they supply raw materials for global production. The GVC participation index specifies a preliminary understanding of a nation's

total involvement in GVCs by aggregating these metrics and reflecting the degree of participation and its relative contribution in the global economy. However, merely examining a nation's relative participation rate is insufficient to comprehend how it participates in the networks of production (OECD and WTO, 2015). Countries' participation in high or low value-added activities matter as well. For a long time, economists have highlighted the advantages of international trade for economies, irrespective of the degree of added value connected to their product or field of specialisation. Despite this, there is frequently a bias in favour of high value-added activities within GVCs in policy debates (Shepherd, 2016). Low value-added activities, including assembly in manufacturing or commodity production in resource-based industries, are common points of entry into GVCs. Contrary to the manufacturing sector, rising through the ranks in resource-based value chains is typically more difficult (Shepherd, 2016). In addition, OECD and WTO (2015) includes the structural attributes of nations, such as their size, location, and manufacturing proportion to GDP, as the primary factors influencing participation.

EEs face numerous barriers when it comes to leveraging the opportunities provided by the Fourth Industrial Revolution (4IR), which is transforming global trade and production processes through advanced digital technologies. The integration of automation, artificial intelligence, and digital connectivity into manufacturing and trade networks has significant implications for GVC participation. However, many EEs struggle to adopt these technologies effectively due to structural limitations. According to Nyagadza et al. (2022), typical challenges in EEs include inadequate ICT infrastructure, limited access to radio frequency licensing, insufficient electricity distribution in rural areas, and underdeveloped skills. Similarly, in the Middle East and North Africa (MENA) region, Dovis and Zaki (2020) identified major obstacles such as political instability, unreliable electrical supply, restricted financial access, widespread corruption, high tax rates, and informal sector activities. These barriers are not unique to the MENA region, while are also prevalent in other regions, including Latin America and the Caribbean, as well as East Asia and the Pacific, where businesses struggle with high tax rates, competition from the informal sector, and limited financial accessibility.

Moreover, according to OECD and WTO (2015), economies' ability to integrate effectively into the global economy is significantly impacted by the quality of transportation, telecommunications, and financial services, as well as border procedures, customs policies, and business and regulatory frameworks. Furthermore, Bamber et al. (2014) highlighted five

aspects that influence developing nations' competitiveness with regard to GVCs: production capacity, infrastructure and services, business environment, trade and investment policy, and industry institutionalisation. In general, economic infrastructure, building productive capacity and trade policy and regulations stand out prominently as primary barriers to GVC integration. Meanwhile, these elements represent focal points within the AfT initiative as well.

4.1. Economic infrastructure and GVCs

The arrangement of international trade is progressively centred on GVCs, can be enabled by enhancements in transportation, the revolution in ICT and energy. The closeness to markets, which inevitably diminishes trade expenses, along with effective logistics and robust institutions, emerges as the primary catalysts for involvement in GVCs (Pathikonda and Farole 2017).

AfT might play a critical role in enhancing GVC participation by improving the infrastructure and trade facilitation that are essential for efficient international production and trade. According to Mayer and Milberg (2013), the primary focus of infrastructure aid appears to be on transportation, which includes improvements to ports, railways, and road networks, which are vital for moving goods along GVCs. Furthermore, a certain amount of the assistance in this category flows toward the development of electrical and communication infrastructure, which further facilitates production and coordination across borders. Moreover, Bamber et al. (2014) emphasize the importance of infrastructure cost and quality, as well as the availability of border services for the economic growth. According to OECD and WTO (2015), improving trade facilitation and infrastructure quality are expected to have a substantial impact on GVC integration. Poor infrastructure and inefficient border crossing processes might substantially raise the cost of product movement from point of origin to final location. Prolonged transit times caused by inadequate infrastructure decrease the efficiency of commodities movement to ports, while poor road conditions raise maintenance costs and decrease the lifespan of transportation vehicles. Furthermore, delays in customs processes for exports might impair product quality or result in the loss of perishable items (Bamber et al., 2014). Moreover, Lanz and Piermartini (2021) also emphasize that the importance of transportation infrastructure and simplified border processes in promoting international trade across supply chains cannot be ignored. Delays or inefficiencies in these areas increase inventory holding costs, impede quick reactions to moves in consumer demand, and limit the

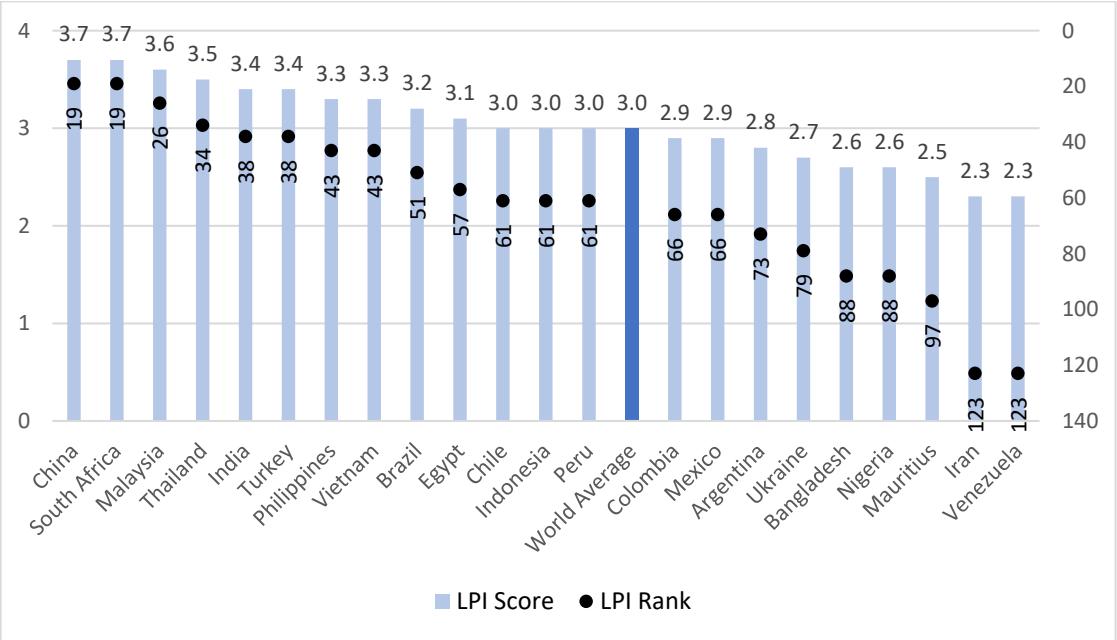
timely replacement of damaged parts. According to their results, robust transportation infrastructure provides a competitive advantage at the initial stages of production, known as upstream industries.

GVCs become difficult to operate effectively in contexts with poor trade facilitation, such as those widespread in certain regions, since items, including components and parts, cannot be transported across borders quickly, reliably, and inexpensively (Shepherd, 2016). Enhancing the trade facilitation and logistics framework emerges as a significant priority for emerging nations looking to increase their participation in GVCs. Investigating the upgrading experiences in cut flower GVC in East Africa, Keane (2019) highlights how insufficient logistical capacities might limit enterprises' capacity to adapt to diverse marketplaces and exploit prospects for advancement. Furthermore, Arvis et al. (2016) emphasize the critical importance of logistics performance in influencing a country's trade costs and, as a result, its ability to integrate into GVCs.

The Logistics Performance Index (LPI) is a significant measuring tool designed by the World Bank to assess the performance of logistics and trade facilitation measures in various nations (Arvis et al. 2023). This instrument provides insights into customs clearance efficiency, infrastructure quality, ease of shipping preparations, logistics service competency, tracking capabilities, and shipment timeliness. The LPI uses questionnaires of worldwide freight forwarders and logistics professionals to rate nations' logistical environment on a scale of 1 to 5, with higher ratings indicating greater performance. The LPI, which is widely used by policymakers, corporations, and researchers, assists in identifying areas where logistics infrastructure needs to be improved and allows for cross-country performance comparisons (Arvis et al. 2023). Figure 15 presents the Logistics Performance Index alongside the corresponding rankings of AfT-recipient EEs, where data is available for the latest year, 2023, as sourced from the World Bank Database. The figure depicts variations in performance among selected countries. While the majority exhibit indexes higher than the world average, several EEs still perform below this benchmark. Notably, China and South Africa lead with an LPI of 3.7, securing the 19th position out of 139 countries with available data. They are closely followed by Southeast Asian nations and Turkey. Conversely, Iran and Venezuela exhibit the lowest LPIs for 2023, standing at 2.3, and occupying the 123rd position in the ranking.

Besides all, the use of modern energy-saving technologies as well can help developing countries improve the efficiency of their manufacturing processes (Yao et al., 2020). According to Dovis and Zaki (2020), electricity is a significant barrier for companies in the MENA region. Enhancing infrastructure, notably in the generation and distribution of electrical power, in that region would allow enterprises to specialize in more complex product lines, thanks to a steady and sustainable energy supply. Furthermore, by investigating thirty-six countries during the period of 1995-2014, Yao et al. (2021) found a positive relationship between energy efficiency and value-added trade.

Figure 15 Logistics Performance Index (left scale) alongside the corresponding rankings (right scale) of AfT-recipient EEs as of 2023



Source: Own construction based on the World Bank database.

Thus, economic infrastructure, including transportation, ICT, and energy, is vital for participation in GVCs. Funds in infrastructure aid are crucial for reducing trade costs and promoting GVC integration. Challenges like poor infrastructure hinder participation, emphasizing the need for improvements in logistics performance. Improving infrastructure, particularly in electricity generation and distribution, is critical for enabling enterprises to thrive in GVCs. The positive relationship between energy efficiency and value-added trade underscores the importance of modern energy technologies in economic development and GVC participation.

4.2. Building productive capacity and GVCs

Aid towards building productive capacity seems to be diverse, including cooperative aid, provision of infrastructure and equipment, as well as training efforts. Shepherd (2016) states that AfT programs allocate considerable funds towards developing productive capacities, emphasizing the importance of continuing this trend within a broader framework aimed at establishing policies for industry and human capital development, which will facilitate medium-term growth and progress. Furthermore, Bamber et al. (2014) also identifies four broad elements that are critical to the growth of productive capacity in all industries: national innovation systems, standards, certification systems, and human capital. According to Nyagadza et al. (2022), capacity building is crucial for controlling support and regulations associated with strategic innovation. Furthermore, Lanz and Piermartini (2021) reveal that efficient institutions offer a competitive advantage in the later stages of the manufacturing process, which are often known as downstream activities.

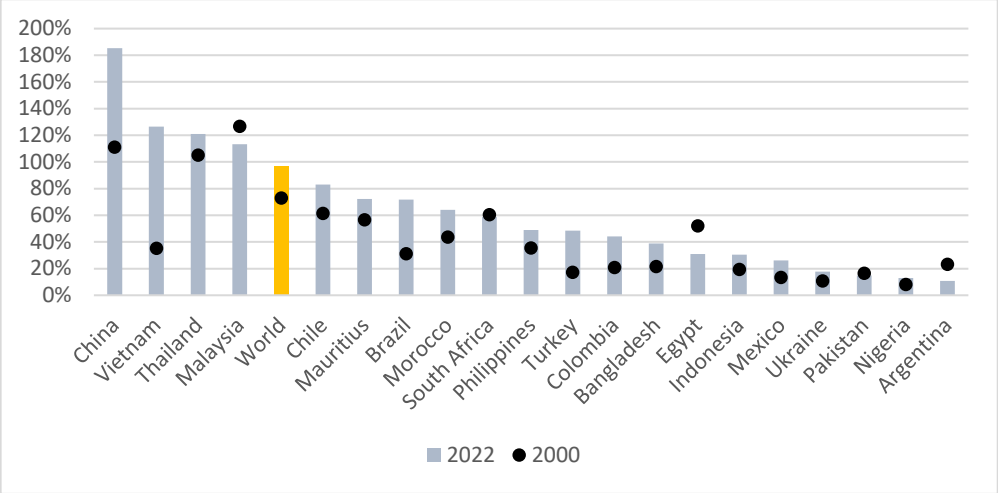
Agriculture is one of the most important sectors of the economy. Since aid organisations are already heavily involved in the agricultural sector, the importance of the sector to both developed and developing economies is demonstrated by the growing amount of funds that are allocated towards this area (Bamber et al., 2014). Farmers in emerging nations would have better chances of obtaining inputs like fertilizers and seeds when trade costs in the agriculture industry were reduced. Consequently, this has the potential to boost productivity and encourage larger-scale manufacturing, which would assist the processing industries. Bamber et al. (2014) emphasize that the modern agriculture system has evolved into a sophisticated agro-foods system, led by major retail chains operating in international markets. Customers' demands for high-quality goods that adhere to precise requirements heighten supplier competitiveness as they compete to keep their places in supply chains.

Improving employee skills and productivity is crucial to raising their level of competitiveness not only in local economies but also in GVCs. First, aid might be provided to employees so they can increase their output by investing in technology and training, which would increase their efficiency and competitiveness along the value chain (Mayer and Milberg, 2013). Similar to this, prioritizing aid efforts on the services sector—that is, on skill development and training programs—can increase a nation's involvement in GVCs and provide observable advantages including better Research and Development (R&D) services,

financial services, and marketing capacities (Banga, 2013a). Additionally, Mayer and Milberg (2013) stress that employee welfare and economic growth can be strengthened by aid programs that encourage the development of producers with backward links or that generate synergistic clusters of economic activity. Nonetheless, it is important to acknowledge that merely enhancing employee efficiency or bargaining power would not be adequate if they are unable to reach global markets, underscoring the need of strategic industrial policy and market connections in aid initiatives. All of these statements have one thing in common: to maximize the benefits of involvement in local and global economies, concentrated aid programs that aim to improve worker productivity, skills, and market connectedness are essential.

The access to financial resources has an important role in enabling the integration of individuals or businesses into GVCs. According to Bamber et al. (2014), financial resources, including bank funding, collateral, credit registries, and bankruptcy laws, are essential for investments to fulfil GVC requirements. Furthermore, Dovis and Zaki (2020) highlight that bank funding gives businesses the chance to grow and incorporate into GVCs, however self-financing could have limitations in terms of quantity and sustainability. Figure 16 presents the domestic credit to the private sector by banks, represented as a percentage of GDP, for the years 2000 and 2022, the latest available year, across EEs that are recipients of AfT, where data is available. The analysis highlights notable trends and variations in bank financing among these economies. Notably, China emerges as the most significant recipient of bank financing in 2022, followed by Vietnam, Thailand, and Malaysia, all of which surpass the global average. Conversely, Malaysia, South Africa, Egypt, Pakistan, and Argentina exhibit a decrease in bank financing from 2002 to 2022, contrasting with an overall increase observed in other countries. Vietnam stands out with the most significant surge, experiencing an exponential rise from approximately 35% in 2002 to 126% in 2022. According to El-Said et al (2015) insufficient funds might limit small and medium-sized businesses' ability to engage in GVCs in a successful way. Thus, improving financial access may substantially increase the possibility that businesses will integrate into GVCs, supporting development and economic progress.

Figure 16 Percentage ratio of bank credit to private sector to gross domestic product in AfT-recipient EEs: comparison between 2000 and 2022



Source: Own construction based on World Bank database.

We can notice that investment in agriculture is particularly crucial, as evidenced by the growing allocation of funds to this sector, which has the potential to enhance productivity and spur manufacturing growth. Improving employee skills and productivity is essential for competitiveness, with aid efforts focusing on technology adoption, training, and skill development in the services sector. Access to financial resources is also pivotal for integrating individuals and businesses into GVCs, with bank funding playing a significant role in enabling growth and integration. These aid programs collectively aim to maximize the benefits of participation in local and global economies by enhancing worker productivity, skills, and market connections.

4.3. Trade policy and regulations and GVCs

A variety of literature emphasises how crucial trade facilitation and effective border crossings are to strengthening GVCs and advancing trade. The seamless operation of GVCs might be negatively impacted by inefficient border crossings that impede the prompt distribution of goods and services to their designated recipients (Bamber et al. 2014). Trade facilitation is becoming increasingly important for the smooth flow of products across borders as GVC operations expand. Hoekman and Shepherd (2015) state that enhanced trade facilitation helps businesses of all sizes by encouraging exports by lowering bottlenecks and logistical challenges. Furthermore, clearing up formal obstacles at borders promotes both importing and exporting economies while also facilitating integration into value chains. According to OECD and WTO (2015), certain policies that promote links within value chains

and increase the overall efficiency of trade regulations include advance rulings, accelerated border procedures, and transparent import/export fees. Thus, encouraging economic growth, facilitating integration into GVCs, and helping businesses of all sizes throughout regions all depend on improving trade facilitation, lowering administrative barriers, and automating border operations.

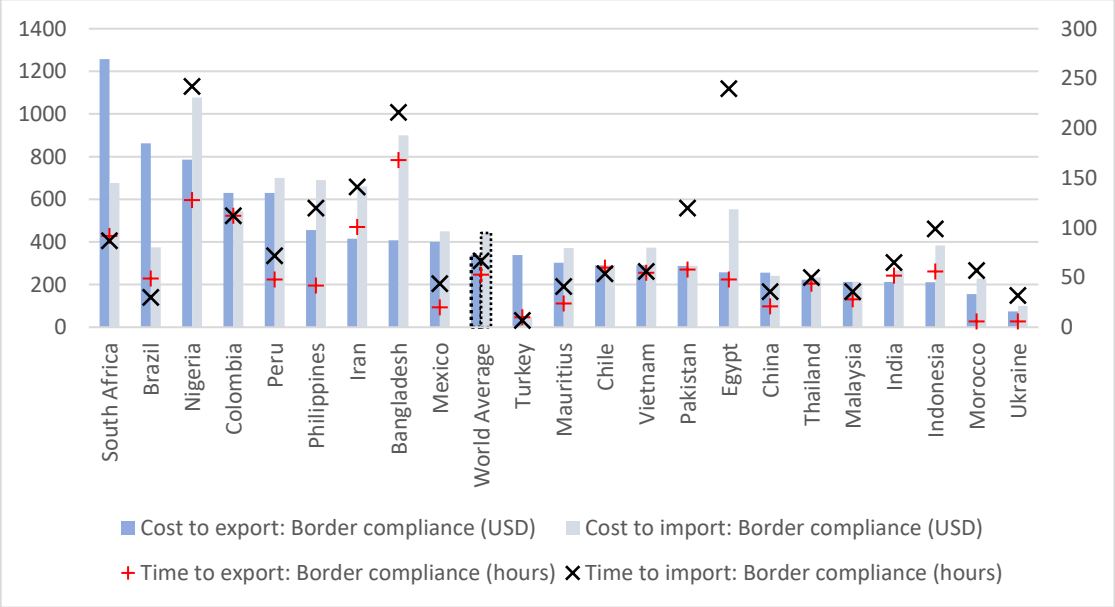
A number of factors, from the complexity of trade laws and regulations to the level of quality of a country's infrastructure, affect how businesses integrate into GVCs. The establishment of a national quality infrastructure, which includes certification, testing, standardisation, and other associated activities that are essential for companies intending to engage in GVCs, is mainly the responsibility of the public sector (Shepherd, 2016). Meanwhile, companies' feasibility of integration is highly dependent on the business environments in which they function; this is especially true in the MENA region as demonstrated by Dovis and Zaki's (2020) research. According to them, a firm's possibility of integrating into GVCs is considerably hampered by elements like the number of procedures needed for fundamental company operations, lengthy procedures including managing insolvencies, and bureaucratic obstacles as paperwork requirements. Smaller businesses and companies in high tariff industries suffer additional difficulties that increase the obstacles to joining GVCs (Dovis and Zaki, 2020).

According to OECD and WTO (2015), the increasing fragmentation of production in an international level highlights the need of an open, predictable, and transparent trade and investment policy, which calls for an encouraging atmosphere for both domestic and foreign enterprises. On the other hand, a nation's competitiveness in international markets is diminished by tariffs, restrictions on imports, and ineffective border processes, which hinder both domestic manufacturers and foreign suppliers (Bamber et al., 2014; OECD and WTO, 2015). Moreover, according to Keane (2019), a company's willingness to engage in intra-regional exports is highly influenced by institutional and governmental constraints, such as labour and customs laws. These factors are considered in the AfTPR channel. According to the finding of Wang and Xu (2018), there is a significant and positive relationship between the improvement of export quality and AfTPR. They emphasize that the impact of AfT is gradual, steadily increasing through cumulative impacts over time.

Figure 17 illustrates Doing Business Indicators, including border compliance costs in USD and the time taken in hours to export and import for EEs that are recipients of AfT,

based on the latest available data from 2019. The figure highlights significant variations in these indicators across countries. South Africa records the highest export compliance cost (USD 1,257), followed by Brazil (USD 862) and Nigeria (USD 786), whereas Morocco and Ukraine report the lowest costs (USD 156 and USD 75, respectively). The world average stands at approximately USD 338 for export compliance costs, providing a benchmark for assessing individual country deviations. A stark contrast between export and import compliance times is evident in certain economies. Nigeria, for instance, exhibits an import compliance time of 1,077 hours, significantly higher than its export compliance time of 242 hours. Similarly, Egypt shows a marked discrepancy, with imports taking 554 hours compared to 240 hours for exports. These variations highlight inefficiencies in trade facilitation processes, potential regulatory bottlenecks, and infrastructure deficiencies that may impede trade performance. Countries such as Turkey, Mauritius, and China demonstrate relatively lower border compliance costs and times, suggesting more efficient customs procedures. Malaysia, Thailand, and Vietnam also report below-average compliance costs and processing times, reinforcing their competitive advantage in trade logistics. These findings underscore the critical role of AfT initiatives in addressing trade barriers and enhancing border efficiency. Reducing excessive compliance costs and delays could significantly improve trade facilitation, enabling EEs to integrate more effectively into Global Value Chains (GVCs) and increase their export competitiveness.

Figure 17 Doing Business Indicators: border compliance costs (USD, left scale) and time (hours, right scale) to export and import in AfT-recipient EEs as of 2019



Source: Own construction based on World Bank database.

Overall, there is a significant amount of variance among the examined EEs with regard to the costs associated with border compliance and the time required to import and export goods, based on the data provided in the graph. Some nations exhibit comparatively cheap costs and effective procedures; however, others have notable obstacles, especially with extended processing timeframes and elevated costs associated with compliance. This implies that there could be chances for focused interventions and changes meant to simplify border processes and lower trade expenses, improving these nations' competitiveness in the international market.

Thus, we can highlight the critical role of trade facilitation in bolstering GVCs and advancing trade. Enhanced trade facilitation promotes exports, lowers logistical challenges, and fosters integration into value chains. Factors like trade laws, infrastructure quality, and business environment complexity affect GVC integration. Institutional and governmental constraints, such as labour and customs laws, impact companies' willingness to engage in exports. The significant variations in border compliance costs and time required for exports and imports among EEs underscores the need for focused interventions to simplify border processes and enhance competitiveness in the international market.

4.4. Chapter summary

The complex relationship between trade aid programs and emerging nations' incorporation into GVCs illustrates the complexity of modern international trade dynamics. This chapter has presented an in-depth examination of the several aspects of this connection, shedding light on the possibilities and challenges associated with promoting growth in the economy globally.

A broader variety of nations have taken an active role in the global production of goods and services, which represents a significant shift from the traditional models of international trade that were caused by the introduction and spread of GVCs. The rise of GVCs is uninterrupted despite the ongoing obstacles and disincentives that are present in many emerging nations, which call for drastic steps to promote trade and economic expansion. Leading in carrying on these strategies is the AfT initiative, a deliberate attempt to offer targeted support with its objectives of strengthening trade infrastructure, building productive capacity, and reforming trade policies and regulations.

It appears evident that developing infrastructure is essential to enable nations to engage in GVCs. In addition to lowering trade costs, funding in essential sectors like energy, ICT, and transportation also improve logistical efficiency and encourage increased connectivity, which strengthens the integration of EEs into the vast networks of global chains. The insights from Table 9 underline the critical role of logistics and trade facilitation as essential components of AfT initiatives aimed at enhancing economic infrastructure. Effective logistics and robust institutions are pivotal for facilitating participation in GVCs. The emphasis on transportation infrastructure improvements, such as ports and railways, highlights how targeted aid in these areas can enhance trade facilitation. The authors indicate that inadequate trade facilitation and logistical capacities can impede GVC operations, thus AfT programs should consider an increase of disbursements in logistics infrastructure. By strengthening these elements, countries can improve their integration into global markets, ultimately driving economic growth.

Table 9 Literatures about logistics and trade facilitation

Authors	***Opinions and findings***
Mayer and Milberg (2013)	Infrastructure aid focuses on transportation improvements (ports, railways, roads) vital for GVC movement.
OECD and WTO (2015)	Improving trade facilitation and infrastructure quality significantly impacts GVC integration.
Arvis et al. (2016)	Logistics performance affects trade costs and a country's ability to integrate into GVCs.
Shepherd (2016)	Poor trade facilitation hinders GVC operations, making transport across borders difficult.
Pathikonda and Farole (2017)	Effective logistics and robust institutions are primary catalysts for involvement in GVCs.
Keane (2019)	Insufficient logistical capacities limit enterprises' adaptability and opportunities in diverse markets.

Source: Own construction.

The interconnectedness of infrastructure quality and energy efficiency are pivotal elements within the framework of AfT, specifically concerning economic infrastructure. Table 10 depicts literatures which reveal that the cost and quality of infrastructure, along with efficient border services, are crucial for facilitating trade and driving economic growth. AfT initiatives focused on improving transportation infrastructure might serve as strategic funds that can yield significant economic benefits, enhancing a country's capacity to participate effectively in GVCs. Moreover, the emphasis on modern energy-saving technologies and improvements in energy infrastructure illustrates how reliable energy sources are vital for

operational efficiency and specialization in complex product lines. The positive relationship between energy efficiency and value-added trade reinforces the idea that targeted funding in energy infrastructure through AfT can enhance competitiveness in global markets. By addressing infrastructure needs, AfT programs can provide comprehensive support for countries seeking to strengthen their economic growth and improve their integration into GVCs.

Table 10 Literatures about the role of infrastructure and energy investments for economic growth and GVC integration

Authors	***Opinions and findings***
Bamber et al. (2014)	Infrastructure cost, quality, and border services are important for economic growth.
Dovis and Zaki (2020)	Enhancing infrastructure for electrical power in the MENA region can help businesses specialize in complex product lines.
Yao et al. (2020)	Modern energy-saving technologies can improve efficiency in developing countries' manufacturing processes.
Lanz and Piermartini (2021)	Transportation infrastructure and simplified border processes are crucial for international trade across supply chains.
Yao et al. (2021)	There is a positive relationship between energy efficiency and value-added trade.

Source: Own construction.

The development of production capacity is also a crucial step towards GVC integration. This calls for an integrated approach that includes efforts to strengthen standards and certification programs, expand innovative ecosystems, and develop a trained labour force. Investing in these fundamental pillars will help EEs become more competitive and increase their capacity to create value in GVCs. Scholars' findings illustrated in Table 11 highlight the potential role of AfBPC in facilitating GVC participation.

According to the authors (Table 11), the development of productive capacities through financial aid, innovation, and human capital is fundamental to driving sustainable economic growth and improving competitiveness along the value chain. Literature underlines that allocating funds towards industrial and human capital development, along with managing innovation-related regulations, is essential for long-term economic progress. Furthermore, it is elaborated that aid directed towards technology, training, and service sectors helps to increase efficiency and competitiveness in GVCs. This aid not only boosts worker productivity but also encourages the development of producers with backward linkages in the value chain. Similarly, the importance of financial resources, particularly bank funding is

highlighted as a key enabler for businesses to grow and meet GVC requirements. By focusing aid efforts on building productive capacity AfT can effectively support EEs in integrating into GVCs.

Table 11 Literatures about building productive capacity for GVC integration

Authors	***Opinions and findings***
Banga (2013a)	Focusing aid on the services sector can boost GVC participation and provide benefits such as improved R&D, financial services, and marketing capacities.
Mayer and Milberg (2013)	Aid directed towards technology and training can increase workers' efficiency, foster producer development with backward linkages, and enhance competitiveness in the value chain.
Bamber et al. (2014)	Financial resources, including bank funding, collateral, credit registries, and bankruptcy laws, are essential for fulfilling GVC investment requirements.
Shepherd (2016)	Allocating funds towards developing productive capacities in industry and human capital is key to facilitating medium-term growth and progress.
Dovis and Zaki (2020)	Bank funding provides opportunities for business growth and GVC integration.
Nyagadza et al. (2022)	Capacity building is crucial for controlling support and regulations associated with strategic innovation.

Source: Own construction.

The domain of trade policy and regulations has paramount importance in shaping the course of GVC integration. Improving the smooth flow of products and services across borders and increasing the operating efficiency of GVCs requires a number of initiatives, including simplifying border processes, lowering trade obstacles, and promoting openness in trade legislation. Table 12 underscores the significant role of AfTPR in facilitating integration into GVCs.

According to the scholars (Table 12), trade policies and regulatory reforms directly affect the smooth functioning and competitiveness of GVCs. Literature emphasizes the importance of eliminating inefficiencies at border crossings and reducing formal trade barriers to promote GVC participation, benefiting both importing and exporting economies. Moreover, scholars provide further insights into the specific policies that promote GVC integration. These include advance rulings, expedited border procedures, and establishing national quality infrastructure that helps businesses meet international trade standards. Furthermore, literature highlights the positive relationship between improving export quality

and AfTPR, showing that targeted aid efforts in policy reform can boost export competitiveness.

Table 12 Literatures about strengthening GVC integration through AfTPR

Authors	***Opinions and findings***
Bamber et al. (2014)	Inefficient border crossings negatively impact the seamless operation of GVCs, delaying the timely distribution of goods and services.
Hoekman and Shepherd (2015)	Removing formal obstacles at borders facilitates trade for both importers and exporters and promotes GVC integration.
OECD and WTO (2015)	Policies that enhance GVC participation and improve trade regulation efficiency include advance rulings, expedited border processes, and transparent import/export fees.
Shepherd (2016)	Establishing national quality infrastructure, including certification, testing, and standardization, is essential for companies entering GVCs.
Wang and Xu (2018)	There is a positive relationship between improving export quality and AfTPR.
Keane (2019)	Institutional and governmental constraints, such as labour and customs laws, strongly affect companies' willingness to engage in intra-regional exports.
Dovis and Zaki (2020)	Smaller businesses and those in high-tariff industries face additional challenges that increase barriers to GVC participation.

Source: Own construction.

Thus, AfT might play a crucial role in reducing barriers, increasing trade efficiency, and promoting GVC integration. By targeting key channels, AfEI, AfBPC and AfTPR, countries can significantly enhance their participation in GVCs, improve their competitiveness, and develop overall trade performance.

Chapter 5

5. Methodology

This chapter details the approach taken to address the thesis's main research question and hypotheses. It starts with a review of the empirical literature, providing insights into the development and challenges of existing models and how they have been refined. Furthermore, the chapter explains the research design, outlining the structure of the analysis. The target population and the sample countries are described next. Following this, the data sources and variables used in the thesis are discussed. The chapter proceeds to elaborate on the model specification, including the empirical methods and their formulas. Finally, the chapter is summarised in the conclusion.

5.1. Empirical literature

In the realm of international trade, the "Gravity Equation" has consistently demonstrated a remarkable and enduring pattern across different nations and research methodologies. The concept of gravity models was originally introduced by Tinbergen (1963). Anderson (1979) laid the theoretical foundation for this model, offering a comprehensive understanding of its principles. Essentially, the classic gravity equation of international trade offers a framework for explaining trade patterns based on the gross domestic product of the home and partner nations, with a direct proportional relationship. Simultaneously, it takes into account a trade barrier in the form of the distance between these nations, where the relationship is inversely proportional. The fundamental formula of the gravity model in the calculation of bilateral trade:

$$T_{ij} = G\frac{GDP_i^{\alpha} GDP_j^{\beta}}{D_{ij}^{\theta}} \qquad (4)$$

where T_{ij} and D_{ij} represent trade flow and distance between the countries i and j, GDP_i and GDP_j correspond to the weights of countries i and j respectively, meanwhile, G is constant term that captures factors affecting trade flows that are not directly included in the model. Furthermore, α and β measures the elasticity of trade with respect to the GDP of the exporting country i and j respectively, while θ captures the sensitivity of trade flows to distance. In the empirical analysis, the main coefficients that should be estimated are α, β, θ, and G.

Over the course of history, the gravity model has undergone significant advancements, and in contemporary research, the structural gravity model is used predominantly. The structural gravity equation can be concisely represented as follows:

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{\varphi_{ij}}{\Omega_i P_j}\right)^{(1-\sigma)} \quad (5)$$

where X_{ij} pertains to the exports originating from country *i* and destined for country *j*. Additionally, Y_iEj/Y signifies the hypothetical level of seamless trade that would occur between countries *i* and *j* in the absence of any trade-related costs. Meanwhile, the term $(\varphi_{ij}/\Omega_i P_j)^{(1-\sigma)}$ captures the multifaceted impact of trade costs, which create a divergence between the actual trade and the frictionless, idealised one. Appendix 3 presents a step-by-step evolution of the gravity model, tracing its development from the theoretical foundation to the structural formulation.

As per the insights of Baldwin and Taglioni (2014), the gravity model demonstrates strong performance when applied to bilateral trade encompassing a wide array of goods, including final products and intermediate inputs, especially in situations involving numerous countries. Additionally, Greaney and Kiyota (2020), in their study, concur that the structural gravity equation effectively represents bilateral trade, particularly for final goods and intermediate inputs.

The most prevalent technique for gravity model estimation involves linearisation through logarithms, followed by ordinary least squares (OLS) estimation of the resultant log-linear model. However, this approach, although relatively straightforward, presents certain challenges. First, the log-linearised model is not suited for observations with zero trade, posing a limitation. Furthermore, in the presence of heteroskedasticity, the OLS estimator for the log-linearised model can exhibit bias and inefficiency. Jensen's inequality points out that when the total expected trade surpasses the actual trade, it raises what is known as the 'adding-up' issue. Models dealing with additive quantities measured in arbitrary units, such as trade, production or population, must adhere to this characteristic for meaningful unit changes. Log-linearisation also encounters complications when dealing with zero-trade observations, resulting in various less-than-ideal solutions, such as the removal of zero-trade pairs from the dataset, the addition of small constant values and the application of non-linear adjustments to the dependent variable.

Addressing these issues, Silva and Tenreyro (2006) proposed the use of the Poisson Pseudo Maximum Likelihood (PPML) estimation method for directly estimating the gravity model in its multiplicative form. Their work underscores substantial evidence suggesting that estimation methods relying on the log-linearisation of the gravity equation are likely to cause significant misspecification issues. These issues persist regardless of whether fixed effects are incorporated into the model, as recommended by Anderson and van Wincoop (2003). In contrast, models estimated through PPML exhibit no signs of misspecification. This approach initially found application in cross-sectional data analysis. Subsequently, Westerlund and Wilhelmsson (2011) extended the examination to panel data and compared the outcomes of OLS and PPML techniques when applied to simulated and real data. The authors' findings corroborate the preference for Poisson estimation, and they specifically advocate the use of Poisson fixed-effects estimation as the method of choice for estimating the gravity equation.

In the context of the PPML method, Arvis and Shepherd (2013) emphasised that it stands as the sole quasi-maximum likelihood estimator, capable of preserving the total flows between the estimated and actual bilateral trade matrices. Their argument in favour of adopting Poisson as the standard gravity model estimator gains substantial support from theoretical and empirical evidence. Additionally, Siliverstovs and Schumacher (2009) conducted an empirical examination to examine the disparities between the outcomes produced by the OLS and PPML estimation methods and to compare their results with the conclusions drawn by Silva and Tenreyro (2006). Their empirical findings align closely with those of Silva and Tenreyro (2006), reinforcing the merits of PPML estimation for the gravity model and advocating its preference over alternative methods. Furthermore, employing panel data, Silva and Tenreyro (2011) conducted an investigation into the performance of the PPML estimator within the context of a constant elasticity model. This analysis is particularly relevant when dealing with a dependent variable that contains a significant proportion of zero values, a common characteristic of trade data employed in gravity equation estimation. In this study, they examined the implementation of both the Gamma Pseudo Maximum Likelihood (GPML) and the PPML which are different consistent multiplicative model pseudo-maximum likelihood estimators. While both the PPML and the GPML are coherent and typically well behaved, the PPML looks to be more resistant to deviations from implicit heteroskedasticity assumptions. Consequently, Silva and Tenreyro (2011) arrived at the same conclusion as

in their previous work: the PPML estimator stands as a promising tool for appraising constant elasticity models such as the gravity equations.

Martinez-Zarzoso (2013) and Martin and Pham (2020), on the other hand, partially refute Silva and Tenreyro's (2006) findings. According to Martinez-Zarzoso's (2013) findings, Feasible Generalized Least Squares, OLS, or sample selection approaches estimation provides superior outcomes than PPML in terms of out-of-sample forecast. Similarly, Martin and Pham's (2020) research does not support PPML as a good estimator, and the authors prefer to use more classic estimate approaches such as truncated OLS with the logarithmic transformation. Furthermore, Gómez-Herrera (2013) argues that within nonlinear techniques the most favoured estimation is method is Heckman, while PPML does not perform well in the case of the existence of unobserved heterogeneity and zero observations.

The Difference-in-Differences (DiD) model is another well-known model which is a widely used econometric technique that identifies causal relationships by comparing the changes in outcomes between a treatment group and a control group before and after an intervention. By assuming that the treatment and control groups would have followed parallel trends in the absence of intervention, the DiD model isolates the impact of the policy change or external shock on the dependent variable (Abadie, 2005). Incorporating a DiD framework in the analysis of AfT and GVC engagement provides a robust empirical strategy to identify the causal effects of aid interventions on trade outcomes. By controlling for time-invariant heterogeneity and external economic conditions, this approach enhances the credibility of the estimated impact, making it a valuable tool for policy assessment in emerging economies.

5.2. Research design

The thesis employs a deductive and quantitative approach, utilizing econometric methods to explore the relationships between AfT and GVCs in EEs. The research is structured to provide a comprehensive analysis through a series of empirical reviews, followed by econometric modelling as it is described in Table 13.

The initial analysis involves a statistical review of AfT data, focusing on its and its subcategories' distribution among EEs. This review will provide insights into how distinct types of AfT are allocated across countries and sectors. Furthermore, a statistical

overview of GVC participation and positioning of EEs will be conducted. This involves analysing how these economies integrate into global production networks and their roles within these chains.

Table 13 List of empirical analysis conducted in the thesis

Analyses	Description	Period	Sample
Analysis 1.	Traditional data versus TiVA data in gravity models application	1995-2018	66 (43 HIC, 23 LMIC) exporters, 66 importers
Analysis 2.	Impact of AfT on exports performance in EEs in gravity models application	2002-2019	24 exporters, 186 (29 donor, 157 non-donor) importers
Analysis 3.	Impact of AfT on GVC engagement in EEs in gravity models application	2002-2020	21 exporters, 76 and 42 (bilateral AfT donor) importers
Analysis 4.	Impact of AfT on GVC engagement in EEs using difference-in-difference model.	1995-2020	21 exporters, 76 importers

Source: Own construction.

Finally econometric analysis will be conducted. First, the thesis will compare traditional trade data with TiVA data to investigate potential differences in the application of gravity models. This comparison aims to highlight the advantages of using TiVA data for more accurate modelling of trade flows and economic relationships. Later, an econometric analysis will be conducted to assess the impact of AfT disbursements on the export performance of EEs. The analysis will consider both the aggregate effects and the impact of specific AfT subcategories. Furthermore, the model will differentiate between exports to donor and non-donor countries to explore if the source of aid influences export outcomes. Lastly, the final econometric analysis will focus on the impact of AfT on GVC indicators. This involves examining how AfT influences participation, positioning, and upgrading within GVCs. The results will provide insights into the role of AfT in enhancing the integration and performance of EEs in GVCs.

5.3. Target population and sample of the thesis

Since the aim of research is to find how AfT can contribute to increasing international trade and achieving a better position in GVCs in EEs, the target population for this thesis consists of EEs that consistently receive AfT. Specifically, 24 countries fall into the category of those that consistently receive AfT, as detailed in Table 14. However, when employing TiVA data to assess the impact of AfT on the GVCs of these EEs

(Analysis 3 and 4), data for all 24 countries is not available. Notably, TiVA data is missing for Mauritius, Iran, and Venezuela. Consequently, the analysis includes a sample of 21 countries for which TiVA data is accessible.

Table 14 List of AfT-recipient EEs used in the analysis

Argentina	Egypt	Mexico	South Africa
Bangladesh	India	Morocco	Thailand
Brazil	Indonesia	Nigeria	Turkey
Chile	Iran	Pakistan	Ukraine
China	Malaysia	Peru	Venezuela
Colombia	Mauritius	Philippines	Vietnam

Source: Own construction.

In contrast, when examining the differences between TiVA data and traditional data within gravity model applications (Analysis 1), the focus shifts from solely AfT-recipient countries to a broader set of nations. This broader inclusion aims to achieve more realistic and comprehensive results. Therefore, the sample for this part of the thesis comprises 66 countries, both OECD and non-OECD, for which TiVA data was available at the time of the research.

5.4. Data, data sources, variables, and model specifications

Given that the thesis encompasses three distinct analyses, the datasets used vary accordingly. Table 15 outlines the variables, their definitions, sources, and the specific analyses in which they are utilised. The table illustrates five types of variables within the context of AfT. These include AfT as a whole and its three subcategories, highlighting different facets of trade-related assistance and total AfT relative to GDP, with a one-year lag. For GVC empirical analyses, value-added variables play a crucial role in understanding economic impacts. Additionally, trade cost variables, such as sharing a border, language, colonial history, and regional trade agreement (RTA) indicators, are utilised in gravity model estimations to analyse trade dynamics. Three primary data sources are employed: the OECD's Query Wizard for International Development Statistics (QWIDS)[18] database for AfT-related variables, the OECD TiVA[19] database for value-added content estimations, and the Centre for Prospective Studies and International Information (CEPII)[20] database for gravity model variables.

[18] Database link https://web-archive.oecd.org/temp/2024-06-25/58513-aid-for-tradestatisticalqueries.htm - The OECD is currently migrating its website, and this link points to a temporary archive.
[19] Database link: https://data-explorer.oecd.org/?pg=0&bp=true&snb=14&tm=TIVA
[20] Database link: https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=8

Table 15 List of variables, their definitions, data sources and their usage in analysis

Variables	Definitions	Data sources	Analysis 1	Analysis 2	Analysis 3	Analysis 4
AfT	Aid for Trade	OECD QWIDS		X	X	
AfEI	Aid for Economic Infrastructure	OECD QWIDS		X		
AfBPC	Aid for Building Productive Capacity	OECD QWIDS		X		
AfTPR	Aid for Trade Policies and Regulations	OECD QWIDS		X		
AfT_GDP_L1	Aid for Trade relative to GDP, with a one-year lag	OECD QWIDS, CEPII				X
EXGR	Gross exports	OECD TiVA	X			
EXGR_DVA	Domestic Value-Added content of exports	OECD TiVA	X		X	X
IMGR_DVA	Domestic Value-Added content of imports	OECD TiVA			X	X
FFD_DVA	Domestic value added embodied in foreign final demand	OECD TiVA			X	X
DFD_FVA	Foreign value added embodied in domestic final demand	OECD TiVA			X	X
X	Exports	CEPII		X		
DIST	Distance	CEPII	X	X	X	X
DIST2	Distance square	CEPII				X
CNTG	Contiguity	CEPII	X	X	X	X
LANG	Language	CEPII	X	X	X	X
CLNY	Colony	CEPII	X	X	X	X
RTA	Regional Trade Agreement	CEPII	X	X	X	X
GDP_cap	GDP per capita of recipient country	CEPII			X	
CRIS	Global Financial Crisis dummy			X		

Source: Own construction.

5.4.1. The first (1st) analysis: TiVA data versus Traditional data in gravity models application[21]

The primary objective of the first analysis is to compare traditional trade data with value-added data in the application of gravity models. The thesis aims to determine whether TiVA data yields different outcomes when considering all available country data and when categorizing countries based on their income levels. To attain these objectives, two primary databases were employed in this thesis. The first is the Centre for Prospective Studies and International Information (CEPII) database, furnishing data on trade cost variables essential for the gravity model estimations. The second database employed is the TiVA database, a collaborative effort between the OECD and WTO. It encompasses data on both gross trade and value-added trade from 66 countries, comprising 38 OECD and 28 non-OECD nations. The data spans the period from 1995 to 2018, as availability was restricted to this timeframe during calculations[22]. In this thesis, beyond analysing all countries collectively, the 66 countries were also categorised into two income groups: high-income countries (HIC) that has a Gross National Income per capita above the World Bank's annually adjusted threshold, and low- and middle-income countries (LMIC) that includes low-income and lower-middle-income economies, as per World Bank classification[23]. This resulted in three panel datasets spanning from 1995 to 2018: one encompassing all 66 nations (66 exporters, 66 importers), and two additional datasets with 43 exporters and 66 importers in the HIC group, and 23 exporters and 66 importers in the LMIC group, respectively.

Following the practical recommendations of Yotov et al. (2016), first, the panel data with a 3-year interval were used in OLS estimations with fixed effects[24] as the initial step to overcome outward and inward multilateral resistance terms, as described in formula *(6)*:

$$lnX_{ij,t} = \pi_{i,t} + \chi_{j,t} + \beta_1 lnDIST_{ij,t} + \beta_2 CNTG_{ij,t} + \beta_3 LANG_{ij,t} + \beta_4 CLNY_{ij,t} + \beta_5 RTA_{ij,t} + \varepsilon_{ij,t} \quad (6)$$

[21] This methodological approach and its findings have undergone rigorous peer review and have been published in Applied Economics Letters (https://doi.org/10.1080/13504851.2022.2145010), a high-impact journal in the field.
[22] The analysis was conducted before the database update. In the course of the study, TiVA data was updated to the year 2020, encompassing 76 countries, while the CEPII database was updated to the year 2021.
[23] Lists of HICs and LMICs are provided in Appendix 4.
[24] Derivation of the equations from the structural gravity model is provided in Appendix 5 in details.

where the natural logarithm of ***bilateral trade*** (EXGR or EXGR_DVA) from exporting country *i* to importing country *j* at time *t* is shown as $lnX_{ij,t}$. Additionally, the natural logarithm of the geographical ***distance*** between the two countries is represented as $lnDIST_{ij,t}$, while the presence or absence of a ***shared border, official language, historical colonial ties***, and ***regional trade agreement*** are captured through dummy variables known as $CNTG_{ij,t}$, $LANG_{ij,t}$, $CLNY_{ij,t}$, and $RTA_{ij,t}$, respectively. In the meantime, the exporter- and importer-time fixed effects, denoted as $\pi_{i,t}$ and $\chi_{j,t}$ respectively, serve to manage both observed and unobserved characteristics associated with exporters and importers that can influence bilateral trade. They are called time-fixed effects as they vary by country and time period while remaining constant across trading partners within a given time period. Estimating them as fixed effects ensures that all relevant country-specific factors are accounted for, avoids endogeneity, and makes gravity models more robust and interpretable. Finally, $\varepsilon_{ij,t}$ is error term. Additionally, taking one year each from the three-year interval can highlight structural trends rather than short-term volatility, making it easier to observe long-run effects of trade policies or shocks, allowing adjustments in trade flows. In addition, I used the PPML approach, which is the most recommended, as depicted in equation *(7)*:

$$X_{ij,t} = exp(\pi_{i,t} + \chi_{j,t} + \beta_1 lnDIST_{ij,t} + \beta_2 CNTG_{ij,t} + \beta_3 LANG_{ij,t} + \beta_4 CLNY_{ij,t} + \beta_5 RTA_{ij,t}) \times \varepsilon_{ij,t} \quad (7)$$

PPML method is employed due to its ability to address heteroscedasticity and the challenges of zero trade flow in bilateral trade. To apply this method, exporter- and importer-time fixed effects are included in estimation *(7)*, in a multiplicative form. Additionally, to ensure the robustness of the results, the same procedures were repeated using a 5-year interval.

5.4.2. The second (2nd) analysis: Impact of AfT on exports of Emerging Economies in gravity models application[25]

The primary objective of the fifth analysis is to explore how the extent AfT disbursements, both in their entirety and when considered as distinct subgroups, influence the exports of EEs. Moreover, the thesis seeks to discern whether this impact varies if

[25] This methodological approach and its findings have undergone rigorous peer review and have been published in Hungarian Statistical Review (https://doi.org/10.35618/HSR2024.01.en089), a high-impact journal in the field.

exports are directed towards donor or non-donor countries. In pursuit of these objectives, two major databases were employed for the analysis. The initial source is the CEPII database, which furnishes data pertaining to trade cost variables essential for the gravity model estimations. Additionally, trade statistics for EEs were sourced from this database due to its extensive coverage of trade data across multiple countries. The second source is the OECD QWIDS, from which data on AfT disbursements were extracted. A sample of 24 aid-recipient EEs was selected as the focal point of this thesis. Subsequently, two distinct panel datasets were constructed. The first dataset comprises the 24 EEs and 29 importing nations that are donors, while the second dataset expands to include the same 24 EEs along with 157 importing nations that are non-donors. The thesis covers data from 2002 to 2019, aligning with the availability of AfT records from 2002 onwards (Cali and Te Velde, 2011), and utilizes the latest data from the CEPII database up to 2019, the latest available year when the calculations are conducted. Analysis is performed at biennial intervals to precisely capture trends over the designated period.

This thesis as well adopts the methodology recommended by Yotov et al. (2016). As an initial step, panel data with a 2-year interval was employed, and OLS estimations with fixed-effects were conducted. This approach was selected to address outward and inward multilateral resistance terms, as defined in the following formula:

$$lnX_{ij,t} = \pi_{i,t} + \chi_{j,t} + \beta_1 lnDIST_{ij,t} + \beta_2 lnAfT^{m}_{i,t} + \beta_3 CNTG_{ij,t} + \beta_4 LANG_{ij,t} + \beta_5 CLNY_{ij,t} + \beta_6 RTA_{ij,t} + \beta_7 CRIS + \varepsilon_{ij,t} \quad (8)$$

where the natural logarithm of bilateral trade from an exporting emerging country *i* to an importing country *j* at time *t* is denoted as $lnX_{ij,t}$. Furthermore, trade cost factors of the gravity model that have been involved in the fourth analysis - $lnDIST_{ij}$, $CNTG_{ij,t}$, $LANG_{ij,t}$, $CLNY_{ij,t}$ and $RTA_{ij,t}$ - have been employed in the fifth analysis too. In this phase of the analysis the main independent variable, $lnAfT^{m}_{i,t}$, is introduced. $lnAfT^{m}_{i,t}$ stands for the natural logarithm of the AfT and its subgroups Aid for Economic Infrastructure (AfEI), Aid for Building Productive Capacity (AfBPC) and Aid for Trade Policy and Regulation (AfTPR), are disbursed from all donors to the EE country *i*, at time *t*. Furthermore, to account for the influence of the global financial crisis, a dummy variable denoted as *CRIS* for the year 2008 is introduced into the equation as well. To manage observed and unobserved characteristics associated with exporters and importers that can impact bilateral trade, exporter- and importer-time fixed effects are presented as $\pi_{i,t}$ and

$\chi_{j,t}$,. Finally, $\varepsilon_{ij,t}$ accounts for the error term. Notably, the preferred approach for estimation used in this thesis is the PPML method, as illustrated in the following equation:

$$X_{ij,t} = exp(\pi_{i,t} + \chi_{j,t} + \beta_1 lnDIST_{ij,t} + \beta_2 lnAfT_{i,t}^{m} + \beta_3 CNTG_{ij,t} + \beta_4 LANG_{ij,t} + \beta_5 CLNY_{ij,t} + \beta_6 RTA_{ij,t} + \beta_7 CRIS) \times \varepsilon_{ij,t} \quad (9)$$

The utilisation of the PPML method is motivated by its capacity to manage issues related to heteroskedasticity and the complexities associated with zero trade flows in bilateral trade data. To implement this method effectively, exporter- and importer-time fixed effects are integrated into estimation *(9)* in a multiplicative format. This approach is particularly valuable in addressing the specific challenges posed by the data and in achieving more robust and reliable results.

5.4.3. The third (3rd) analysis: Impact of AfT on GVC engagement of Emerging Economies in gravity model applications

The primary objective of the sixth analysis is to examine the effect of AfT on GVC engagement in EEs. Several calculations will be conducted in this phase of the analysis. First, the total AfT disbursed from all donors to each emerging economy will be analysed to assess its overall impact. Then, bilateral AfT disbursed from each donor country to each recipient emerging economy will be considered to explore potential bi-directional relationships.

The impact of these two styles of AfT on four variables representing GVC engagement will be investigated:

1. ***DVA embodied in foreign final demand (FFD_DVA)*** – This variable assesses how much domestic value-added is ultimately absorbed in foreign final consumption, regardless of direct trade relationships. It captures the upstream effect of global demand on domestic industries and provides insights into how embedded a country is within GVCs through forward linkages. It can be understood as "exports of value-added," reflecting the ability of domestic industries to contribute to foreign consumption beyond simple gross trade measures.
2. ***FVA embodied in domestic final demand (DFD_FVA)*** - This variable indicates the extent of foreign value-added embedded in the final goods and services consumed within the domestic economy, including purchases by

households, government, and businesses. It highlights the role of foreign inputs in domestic consumption and investment, illustrating the depth of backward linkages in GVCs. It can be understood as "imports of value-added," emphasizing the extent to which domestic industries rely on foreign value creation.

3. ***DVA content of gross exports (EXGR_DVA)*** - This variable measures the share of domestic value-added embedded in exported goods and services. Unlike DVA embodied in foreign final demand, which accounts for the ultimate foreign absorption of domestic value, this metric focuses on direct exports and provides a more immediate assessment of how much of a country's exports originate from domestic production. This distinction is important for analysing upgrading opportunities within GVCs, as a higher domestic value share in gross exports suggests stronger domestic production capabilities and reduced dependence on foreign inputs.
4. ***DVA content of gross imports (IMGR_DVA)*** – This variable captures the share of domestically produced value-added that returns to the country through imports, reflecting the degree to which an economy's production is reintegrated into its own consumption via international supply chains. This is a key characteristic of GVCs, as value-added often crosses borders multiple times before reaching its final use. Understanding this measure helps assess the circularity of trade and the extent to which domestic industries are involved in complex, multi-stage production processes.

Thus, four potential research pathways are identified, each offering distinct insights into the relationship between AfT and GVC dynamics:

1. Impact of Total AfT and Bilateral AfT on DVA embodied in foreign final demand (exports of value-added).
2. Impact of Total AfT and Bilateral AfT on FVA embodied in domestic final demand (imports of value-added).
3. Impact of Total AfT and Bilateral AfT on DVA content of gross exports.
4. Impact of Total AfT and Bilateral AfT on DVA content of gross imports.

In pursuit of these objectives, three major databases were employed for the analysis: the TiVA database, which presents data for value-added trade and can measure

GVC engagement; the OECD QWIDS database, which provides AfT data; and the CEPII database, which offers trade cost variables essential for gravity model estimations. Furthermore, a sample of 21 aid-recipient EEs was selected as the focal point of this thesis due to the availability of TiVA data for these countries. Subsequently, two distinct panel datasets were constructed: the first dataset comprises the 21 aid-recipient EEs with 76 nations representing all donors, while the second dataset includes the same 21 recipient EEs along with 42 donor nations[26] for which bilateral AfT data is available.

The analyses cover data from 2002 to 2020, aligning with the availability of AfT records from 2002 onwards (Cali and Te Velde, 2011), and utilizes the latest data from the TiVA database up to 2020, the most recent year available at the time of analysis[27]. The analysis is performed at biennial intervals to precisely capture trends over the designated period. This thesis adopts the methodology recommended by Yotov et al. (2016). Initially, panel data with a 2-year interval was employed, and OLS estimations with fixed effects were conducted to address outward and inward multilateral resistance terms. The corresponding formulas are as follows:

$$\begin{aligned} lnGVC_{ij,t} = {} & \rho_{i,t} + \delta_{j,t} + \beta_1 lnDIST_{ij,t} + \beta_2 lnAfT^{k}_{ij,t} + \beta_3 CNTG_{ij,t} \\ & + \beta_4 LANG_{ij,t} + \beta_5 CLNY_{ij,t} + \beta_6 RTA_{ij,t} + \beta_7 GDP\_cap_{i,t} \\ & + \varepsilon_{ij,t} \end{aligned} \qquad (10)$$

where $lnGVC_{ij,t}$ represents $lnEXGR\_DVA_{ij,t}$, $lnIMGR\_DVA_{ij,t}$, $lnFFD\_DVA_{ij,t}$ and $lnDFD\_FVA_{ij,t}$. $LnEXGR\_DVA_{ij,t}$ and $lnIMGR\_DVA_{ij,t}$ represent the natural logarithms of the domestic value-added content of gross exports and imports, respectively, between aid-recipient emerging country *i* and donor country *j* at time *t*. Similarly, $lnFFD\_DVA_{ij,t}$ and $lnDFD\_FVA_{ij,t}$ denote the natural logarithms of domestic value-added embodied in foreign final demand and foreign value-added embodied in domestic final demand, respectively. Furthermore, trade cost factors of the gravity model that have been involved in the fourth and fifth analysis - $lnDIST_{ij}$, $CNTG_{ij}$, $LANG_{ij}$, $CLNY_{ij}$ and RTA_{ij} - have been employed in the sixth analysis too. The main independent variable in this phase of the analysis is $lnAfT^{k}_{ij,t}$ which represents the natural logarithm of the total AfT disbursed to the recipient country *i* from all donor countries and bilateral transfer between donor

[26] List of countries is provided in Appendix 6.
[27] In the course of the study, TiVA data was updated to the year 2020, encompassing 76 countries, while the CEPII database was updated to the year 2021.

country *j* and beneficiary country *i*, at time *t*. Furthermore, to account the level of labour costs in the recipient country, a variable denoted as *lnGDP_cap* is introduced into the equation as well which is GDP per capita of the recipient country *i*. To manage observed and unobserved characteristics associated with recipients and donors that can impact bilateral trade, recipient- and donor-time fixed effects are presented as $\rho_{i,t}$ and $\delta_{j,t}$. Finally, $\varepsilon_{ij,t}$ accounts for the error term. Notably, the preferred approach for estimation used in this thesis is the PPML method, as illustrated in the following equation:

$$GVC_{ij,t} = exp(\rho_{i,t} + \delta_{j,t} + \beta_1 lnDIST_{ij,t} + \beta_2 lnAfT^{k}_{ij,t} + \beta_3 CNTG_{ij,t} + \beta_4 LANG_{ij,t} + \beta_5 CLNY_{ij,t} + \beta_6 RTA_{ij,t} + \beta_7 GDP\_cap_{i,t}) \times \varepsilon_{ij,t} \quad (11)$$

This method is chosen for its ability to handle heteroskedasticity and the complexities associated with zero trade flows in bilateral trade data. By incorporating recipient- and donor-time fixed effects in a multiplicative format, the PPML method effectively addresses these data challenges, leading to more robust and reliable results.

5.4.4. The fourth (4th) analysis: Impact of AfT on GVC engagement of Emerging Economies in DiD model

To establish a causal interpretation of AfT effects on value-added indicators, I employ a difference-in-differences (DiD) design alongside robustness checks using an event study framework. The DiD specification compares donor-recipient dyads where the recipient received AfT flows (treatment group) to dyads without AfT (control group). The baseline equation is specified as:

$$lnGVC_{ij,t} = \alpha + \zeta\left(Post_t \times Ever\_Treated_{ij}\right) + \gamma\left(lnAfT\_GDP_{ij,t-1}\right) + \beta_1 lnDIST_{ij,t} + \beta_2\left(lnDIST_{ij,t}\right)^2 + \beta_3 CNTG_{ij,t} + \beta_4 LANG_{ij,t} + \beta_5 CLNY_{ij,t} + \beta_6 RTA_{ij,t} + \theta_t + \mu_{ij} + \varepsilon_{ij,t} \quad (12)$$

where $lnGVC_{ij,t}$ represents natural logarithm of GVC indicators such as *lnEXGR_DVA*$_{ij,t}$, *lnIMGR_DVA*$_{ij,t}$, *lnFFD_DVA*$_{ij,t}$ and *lnDFD_FVA*$_{ij,t}$. Logarithms linearise exponential relationships and mitigate heteroskedasticity (Silva and Tenreyro, 2006). Furthermore, $\left(Post_t \times Ever\_Treated_{ij}\right)$ is an interaction term where $Post_t = 1$ for years ≥ 2002 (start of AfT data), and $Ever\_Treated_{ij} = 1$ if recipient *i* ever received

AfT from donor *j*. This captures the average treatment effect (ζ) of AfT. Moreover, $lnAfT\_GDP_{ij,t-1}$ represents a one-year lag of the natural logarithm of AfT flows scaled by recipient GDP. Lagging addresses reverse causality (Arndt et al., 2015), while scaling by GDP controls for economic size (OECD, 2019):

$$AfT\_GDP_{i,t} = \frac{\text{Nominal AfT receipts}_{i,t}}{\text{Nominal GDP}_{i,t}} \times 100 \qquad (13)$$

This measures AfT as a percentage of recipient GDP, ensuring comparability across economies. $LnDIST_{ij,t}$ and $\left(lnDIST_{ij,t}\right)^2$ are representing bilateral distance (logged) and its square to capture nonlinear trade cost decay, where marginal distance effects diminish at greater separations, a pattern empirically validated in developing country trade (Disdier and Head, 2008). Furthermore, $CNTG_{ij,t}$, $LANG_{ij,t}$, $CLNY_{ij,t}$ and $RTA_{ij,t}$ are binary indicators for contiguity, common official language, colonial ties and active regional trade agreements between countries *i* and *j* in year *t*. Finally, while θ_t are year dummies controlling for time-specific shocks, μ_{ij} stand for dyad-specific random effects.

In this analysis, a random effects estimation is preferred over fixed effects to retain time-invariant gravity variables that fixed effects eliminates due to collinearity (Egger & Pfaffermayr, 2004). To test the robustness of the model, event study for dynamic effects is applied. The event study extends the DiD framework to test parallel trends and trace effect dynamics:

$$\begin{aligned} lnGVC_{ij,t} = \sum_{\tau=-5}^{5} \phi_\tau \ (1[\tau = t - 2002] \times Ever\_Treated_{ij}) \\ + \gamma\left(lnAfT\_GDP_{ij,t-1}\right) + \beta_1 lnDIST_{ij,t} \\ + \beta_2\left(lnDIST_{ij,t}\right)^2 + \beta_3 CNTG_{ij,t} + \beta_4 LANG_{ij,t} + \beta_5 CLNY_{ij,t} \\ + \beta_6 RTA_{ij,t} + \theta_t + \mu_{ij} + \varepsilon_{ij,t} \end{aligned} \qquad (14)$$

where ϕ_τ coefficients measure the dynamic treatment effect at event time $\tau = t - 2002$. Pre-treatment coefficient ($\tau = -5, \dots, -1$) test the parallel trends assumption, while post-treatment coefficients ($\tau = 0, \dots, 5$) estimate effect persistence. Event windows are censored at ±5 years to avoid extrapolation bias (Jacobson et al., 1993).

5.5. Chapter summary

The thesis aims to provide comprehensive understanding into the significance of AfT in improving export performance and involvement in the GVC employing a mixture of econometric modelling. The chapter underscores the robustness and reliability of the "Gravity Equation" in international trade, highlighting its evolution from the initial model of Tinbergen (1963) to the contemporary structural gravity model. The empirical literature reveals that while traditional OLS methods have been widely used, they face significant limitations, especially when dealing with zero trade flows and heteroskedasticity. The introduction of the PPML estimation method by Silva and Tenreyro (2006) provides a compelling alternative, addressing these limitations and offering a more accurate and consistent approach to gravity model estimation.

The research design employed in this thesis integrates econometric modelling to explore the role of AfT in GVCs in EEs. By focusing on a group of 24 EEs that consistently receive AfT, this research offers a targeted analysis of AfT's impacts. However, the availability of TiVA data restricts the sample to 21 countries for some analysis, as data for Mauritius, Iran, and Venezuela is unavailable.

The significant portion of the thesis compares traditional trade data with TiVA data to evaluate their respective applications in gravity models. This broader analysis includes 66 countries, encompassing both OECD and non-OECD nations, to achieve more comprehensive results. The next analysis highlights the nuanced effects of AfT disbursements on the export performance of EEs. By differentiating between donor and non-donor countries, the thesis elucidates the varied influence of AfT subgroups on bilateral trade flows. Following analyses extend this exploration to the realm of GVCs, assessing how AfT affects different dimensions of GVC engagement, including domestic value-added content in exports and imports conducting OLS fixed effected, PPML fixed effects and DiD random effects in gravity models application. The incorporation of TiVA data enriches the analysis, providing a granular view of value-added trade and its interplay with AfT. The methodological rigor, involving panel data and fixed effects estimations, ensures that the results are both reliable and reflective of the complex trade environments of EEs. The findings from analyses may underscore the efficacy of the PPML method in addressing heteroskedasticity and zero trade flows, common challenges in bilateral trade data. The methodological framework supported with DiD model, allows for a causal

interpretation of AfT's impact on GVC engagement in EEs, ensuring robustness through the inclusion of lagged variables, gravity controls, and event study validation.

Chapter 6

6. Findings and Discussions

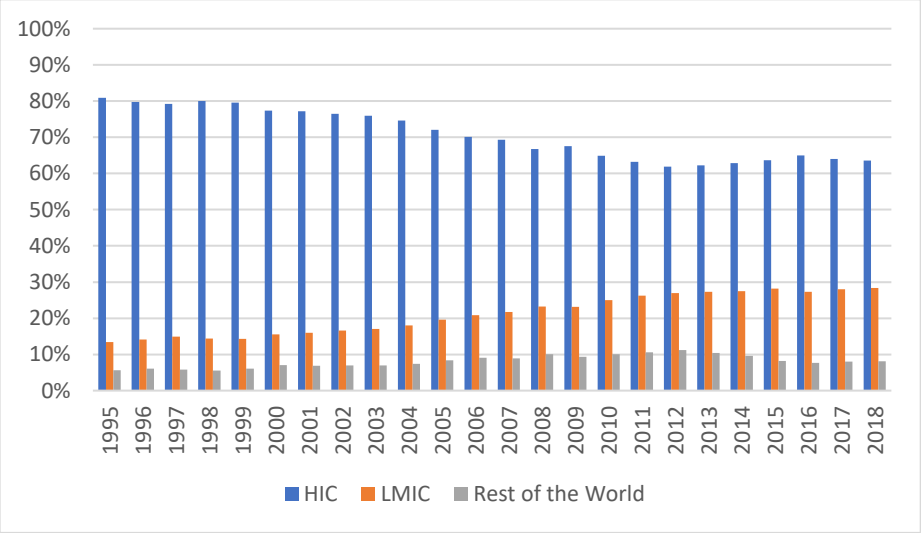
This chapter outlines and analyses the primary findings of the thesis, organised according to the research objectives and questions. Specifically, it addresses how AfT can enhance international trade and develop deeper engagement in GVCs within EEs, ultimately boosting their participation in global trade and improving access to international markets. Firstly, the chapter examines the differences between traditional data and TiVA data in the application of gravity models. This comparison aims to uncover potential discrepancies and their implications for trade analysis. Subsequent sections explore the impact of AfT on the export performance of EEs, considering whether the effect varies depending on whether the importing country is a donor or a non-donor. This analysis seeks to determine if AfT is effective tool for increasing international trade and if the relationship between AfT and export performance is influenced by the nature of the trading partner. Finally, the chapter investigates the impact of AfT on GVC engagement of EEs using key GVC indicators as dependent variables. The aim is to understand how AfT influences the integration and performance of EEs within GVCs, offering insights into the effectiveness of AfT in enhancing the global trade capabilities of these economies. This comprehensive analysis provides a detailed examination of the multifaceted impacts of AfT on EEs, contributing to a deeper understanding of its role in global trade dynamics.

6.1. Traditional data versus TiVA data in gravity models application

Prior to analysing the calculation results, it is worth examining the extent to which sample countries are represented in global trade. Figure 18 illustrates the proportions of total DVA exports of 66 countries, divided into High-Income Countries (HICs) and Low- and Middle-Income Countries (LMICs), as well as the rest of the world, in international trade from 1995 to 2018. Despite HICs having the largest share of global trade throughout the period, their proportion dropped gradually from 81% to 62% by 2012 and then remained stable at around 64%. On the other hand, the share of LMICs in international trade increased steadily from 13% to 28%, with China playing a crucial role in this increase. The figure indicates that 66 sample countries dominate value-added exports, whereas exports from the remaining 130+ countries have fluctuated between 6% and 11%

over the specified period. Consequently, the selected sample in this thesis represents the majority of global trade, ensuring a comprehensive and accurate analysis.

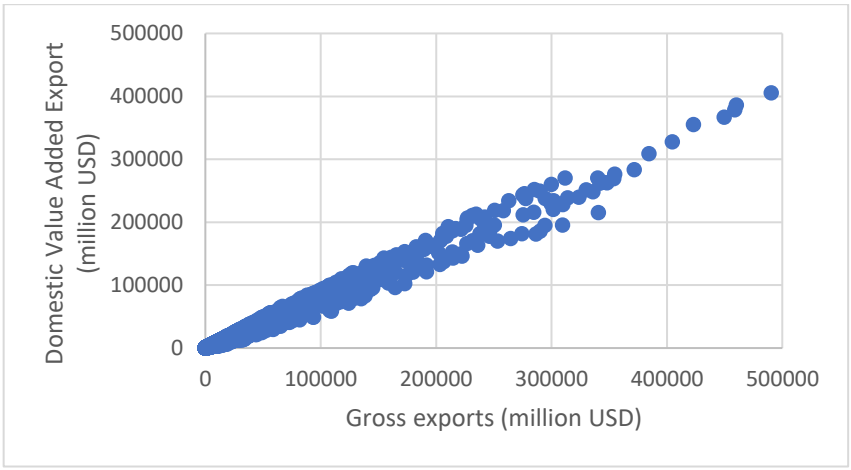
Figure 18 Shares of total domestic value-added exports of HIC, LMIC, and rest of the world in international trade from 1995 to 2018



Source: Kheyirkhabarli (2024b), based on OECD-TiVA database.

The relationship between DVA export data and gross export data for all 66 countries collectively is depicted in Figure 24. According to the figure there is strong relationship between gross exports and value-added exports for 66 countries altogether. However, we can observe some divergence in the middle range of exports value.

Figure 19 Relationship between gross exports and value-added exports in the case of the analysed 66 countries, 1995-2018



Source: Fertő et al. (2024), based on OECD-TiVA database.

The estimation results for 66 sample countries are detailed in Table 16. Contrary to the thesis's initial hypothesis, the results reveal no significant differences between the traditional "gross export" and the "domestic added-value" models. The estimated coefficients generally align with the expectations, except for the "colony" variable in the PPML models, which was anticipated to capture the influence of historical colonial relationships on foreign trade. Notably, all variables are statistically significant at the 1 percent level, with the exception of colonial relations. The coefficients for the gross export and value-added export models exhibit similar magnitudes. In contrast, the coefficients are consistently lower for the PPML models, with the exception of the RTA variable, which indicates membership in a common regional trade agreement.

The findings highlight that the foreign trade propensity of countries is generally consistent across models measured by "gross export" and "domestic value-added." Additionally, the bilateral foreign trade flows, both in gross and DVA terms, are influenced by similar gravity factors. Specifically, the distance between countries negatively impacts trade, while common borders, shared language, and colonial relationships positively affect it. The unexpected results concerning colonial relationships likely stem from their diminishing relevance over time. Moreover, both gross and DVA exports benefit positively from RTAs of the countries involved. To ensure the robustness of the results, the models are re-estimated using data at five-year intervals (Table 16). This additional analysis confirms the stability of our initial findings and underscores the consistency of the gravity factors influencing bilateral trade flows.

Figures 20 and 21 illustrate the relationship between DVA export data and gross export data for HICs and LMICs, respectively. Both figures reveal a strong and positive correlation between the two datasets. Figure 20 highlights that in the middle range, there are noticeable differences in export data for HICs, which are typically headquarter economies. Conversely, for LMICs, which often serve as factory economies, these differences are more pronounced in the lower range of the export data (Figure 21). This distinction suggests that the economic roles of HICs and LMICs in global trade networks influence the observed disparities. HICs, with their advanced infrastructures and higher levels of economic activity, exhibit variations primarily in the middle range of exports. On the other hand, LMICs, which are more focused on production activities, show greater variability at lower levels of export data. This pattern underscores the different contributions and dynamics of HICs and LMICs within the GVC.

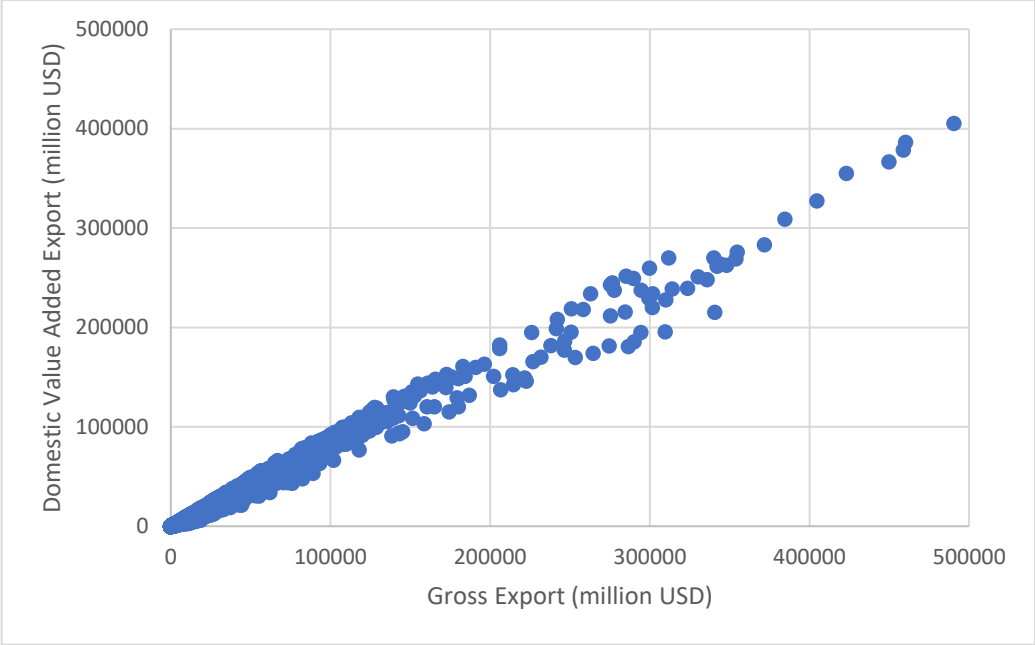
Table 16 TiVA and traditional data in gravity model estimations for 66 countries with 3-year and 5-year interval

	3-year interval				5-year interval			
	Gross exports	Gross exports	Domestic value-added	Domestic value-added	Gross exports	Gross exports	Domestic value-added	Domestic value-added
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
Distance	-0.950**	-0.674**	-0.945**	-0.655**	-0.942**	-0.683**	-0.936**	-0.663**
	-0.011	-0.012	-0.011	-0.012	-0.013	-0.016	-0.013	-0.016
Contiguity	0.305**	0.224**	0.312**	0.238**	0.298**	0.208**	0.307**	0.222**
	-0.035	-0.025	-0.034	-0.026	-0.042	-0.031	-0.042	-0.032
Common language	0.446**	0.185**	0.449**	0.194**	0.438**	0.197**	0.442**	0.204**
	-0.022	-0.027	-0.022	-0.028	-0.027	-0.034	-0.027	-0.035
Colony	0.519**	-0.026	0.518**	0.009	0.519**	-0.02	0.517**	0.022
	-0.048	-0.074	-0.047	-0.072	-0.060	-0.097	-0.060	-0.094
RTA	0.174**	0.244**	0.171**	0.253**	0.184**	0.237**	0.183**	0.248**
	-0.018	-0.026	-0.018	-0.027	-0.023	-0.033	-0.023	-0.035
Constant	5.004**	7.067**	5.061**	6.659**	4.797**	7.279**	4.659**	6.900**
	-0.334	-0.278	-0.361	-0.283	-0.343	-0.282	-0.356	-0.287
Observations	34180	34320	34135	34320	21370	21450	21345	21450
R^2	0.900	0.916	0.900	0.915	0.901	0.913	0.901	0.912
Exporter-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RESET test (p-value)	0.0000	0.1127	0.0000	0.1582	0.0000	0.3388	0.0000	0.4430

Standard errors in parentheses, + p < 0.10, * p < 0.05, ** p <0 .01

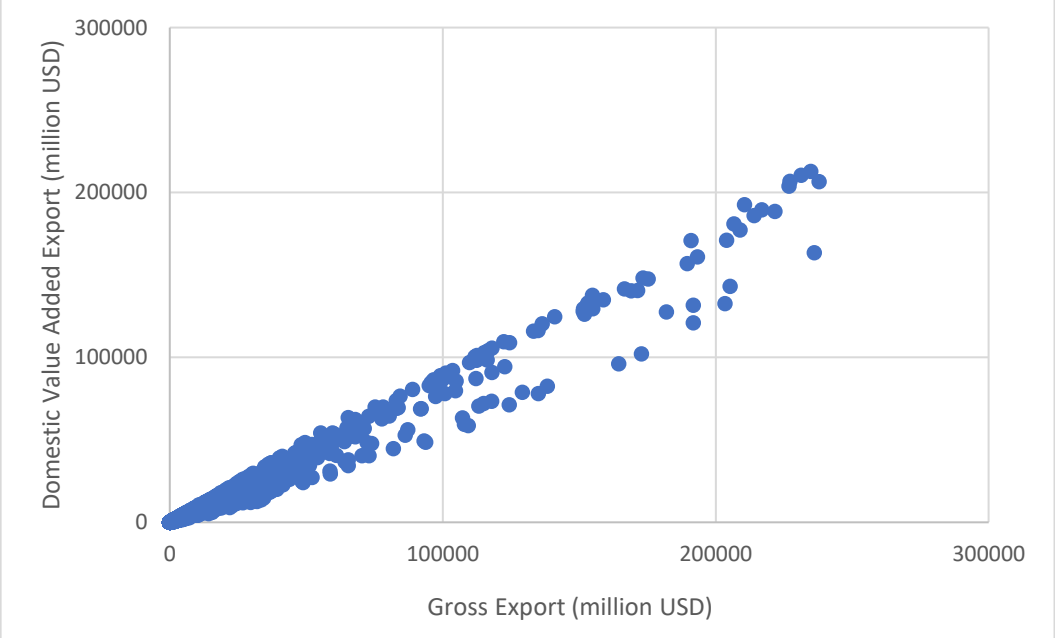
Source: Own construction, based on Fertő et al. (2024)

Figure 20 Relationship between domestic value-added exports data and gross exports data for HICs, 1995-2018



Source: Fertő et al. (2023), based on OECD-TiVA database.

Figure 21 Relationship between domestic value-added exports data and gross exports data for LMICs



Source: Fertő et al. (2023), based on OECD-TiVA database.

Table 17 TiVA and Traditional data in Gravity Model estimations for HIC and LMIC with 3-year and 5-year interval

	HIC and LMIC with 3-year interval								HIC and LMIC with 5-year interval							
	HIC EXGR		HIC DVA		LMIC EXGR		LMIC DVA		HIC EXGR		HIC DVA		LMIC EXGR		LMIC DVA	
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
Distance	-0.944**	-0.629**	-0.941**	-0.611**	-1.021**	-0.748**	-1.010**	-0.739**	-0.937**	-0.634**	-0.933**	-0.615**	-1.008**	-0.761**	-0.995**	-0.753**
	(0.013)	(0.013)	(0.013)	(0.014)	(0.019)	(0.022)	(0.019)	(0.023)	(0.016)	(0.017)	(0.016)	(0.018)	(0.024)	(0.028)	(0.024)	(0.029)
Contiguity	0.367**	0.354**	0.373**	0.359**	0.348**	0.078+	0.363**	0.108*	0.365**	0.349**	0.370**	0.354**	0.355**	0.052	0.376**	0.083
	(0.042)	(0.028)	(0.041)	(0.029)	(0.058)	(0.043)	(0.058)	(0.044)	(0.052)	(0.036)	(0.052)	(0.037)	(0.074)	(0.054)	(0.073)	(0.056)
Language	0.385**	0.124**	0.389**	0.146**	0.497**	0.227**	0.500**	0.227**	0.372**	0.128**	0.379**	0.150**	0.494**	0.239**	0.499**	0.239**
	(0.026)	(0.031)	(0.026)	(0.032)	(0.038)	(0.041)	(0.037)	(0.042)	(0.032)	(0.040)	(0.032)	(0.041)	(0.047)	(0.052)	(0.047)	(0.054)
Colony	0.616**	0.088	0.604**	0.099	0.471**	0.008	0.479**	0.087	0.624**	0.104	0.611**	0.115	0.482**	0.022	0.481**	0.109
	(0.060)	(0.087)	(0.059)	(0.083)	(0.075)	(0.117)	(0.075)	(0.111)	(0.075)	(0.111)	(0.075)	(0.107)	(0.092)	(0.156)	(0.092)	(0.146)
RTA	0.191**	0.300**	0.191**	0.304**	0.127**	0.174**	0.117**	0.185**	0.208**	0.302**	0.210**	0.309**	0.133**	0.133*	0.122**	0.143*
	(0.025)	(0.030)	(0.025)	(0.032)	(0.029)	(0.048)	(0.029)	(0.051)	(0.031)	(0.039)	(0.031)	(0.041)	(0.037)	(0.059)	(0.037)	(0.062)
Constant	5.322**	11.622**	5.146**	11.295**	5.535**	11.668**	6.188**	11.434**	13.575**	11.670**	5.166**	11.328**	13.020**	12.004**	6.059**	11.773**
	(0.423)	(0.417)	(0.430)	(0.424)	(0.431)	(0.349)	(0.366)	(0.345)	(0.271)	(0.436)	(0.432)	(0.445)	(0.315)	(0.520)	(0.389)	(0.526)
Observations	22280	22360	22261	22360	11900	11960	11874	11960	13925	13975	13919	13975	7445	7475	7426	7475
R2	0.905	0.925	0.904	0.923	0.901	0.944	0.902	0.946	0.905	0.922	0.905	0.920	0.903	0.943	0.904	0.944
Exporter-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RESET test (p-value)	0.0000	0.0002	0.0000	0.0009	0.3377	0.0000	0.6146	0.0000	0.0000	0.0006	0.0000	0.0024	0.7390	0.0000	0.3126	0.0000

Standard errors in parentheses, + p<0.10, * p<0.05, ** p<0.01

Source: Own construction, based on Fertő et al. (2023) and Kheyirkhabarli (2024b).

Table 17 presents the results for 43 HICs and 23 LMICs across two intervals: a three-year interval in the initial eight columns and a five-year interval in the last eight columns. The results in the table aim to determine whether there are any differences between the traditional gross export and the domestic value-added exports data of TiVA when used in gravity model estimations employing OLS fixed-effects and PPML fixed-effects methods. This analysis also reveals that the differences between the results obtained from the two databases are negligible for both groups of countries. The signs of the variables align with the expectations; however, it is insightful to compare the results between the two groups of countries. Table 17 provides valuable insights into the impact of cost variables on the exports of countries belonging to different income categories.

According to the results, LMICs, which are typically manufacturing economies, are more sensitive to distance and language factors than HICs, which are generally headquarters economies. Specifically, exports from LMICs show a larger negative response to increasing distance and a more positive response to the use of a common language compared to exports from HICs. As noted by the World Bank (2020), proximity to key hubs in the global trade network plays a significant role in GVC participation. Conversely, HICs benefit more significantly from having a common border, shared colonial history, and participation in an RTA, all of which positively influence their exports to a greater extent than for the LMIC group. To ensure the robustness of these findings, the models were re-estimated at five-year intervals (Table 17). The results from this robustness check confirm the stability of the initial findings, as the coefficients of the variables retain the same signs and remain within one standard error of the results obtained for the three-year period. This consistency reinforces the reliability and generalizability of the analysis across different time intervals.

6.2. Impact of AfT on exports performance in EEs

Gaining insight into the dynamics between EEs and their partners, both donor and non-donor nations, requires analysing the impact of AfT on export performance. This section explores the complex relationship in depth and offers a thorough analysis backed by extensive statistical and empirical research.

Tables 18 and 19 present the descriptive statistics and results of OLS fixed-effects and PPML fixed-effects estimations regarding the impact of exports from EEs to donor countries. The top side of Table 18 reveals the historical properties of the variables by

using data from the original dataset. The table, which highlights the relevant characteristics, shows that AfT varies and fluctuates significantly between economies. Natural logarithm of AfT has a mean of approximately 18.5, a significant standard deviation of approximately 1.92 and a wide range from approximately 10.965 to 21.941. This pattern remains valid for its subcategories. These tables provide insights into the influence of various aid categories on these exports. Additionally, the dataset shows a significant variance in trade volumes for the trade variable, which has a mean trade value of approximately USD 3.3 million and a large standard deviation of nearly USD 17.8 million. The dataset encompasses a broad range of trade operations, representing varying degrees of economic activity and trade links. This range, extending from USD 0 to approximately USD 452.3 million, highlights this diversity. The lower part of the table presents the pairwise correlation analysis and demonstrates that trade volumes are inversely connected with geographic distance and positively correlated with AfT and its subcategories, contiguity and RTA between EEs and donor nations.

According to Table 19, not only AfT in general has a positive and significant impact but also its subcategories, AfEI and AfBPC, exhibit similar effects. Notably, there are distinctions between the results obtained from OLS and PPML estimations. OLS results suggest a positive, yet insignificant impact of AfTPR, while in the PPML estimations, this impact is negative and significant. Moreover, OLS results reveal that the impact of AfEI on exports to donor countries exceeds that of AfBPC. However, PPML results propose the opposite scenario, with AfBPC having a stronger effect than AfEI. Among other variables contiguity, sharing language and RTA yield expected results which is positive and significant impact on exports of EEs to donor countries. However, in one of the estimations, the crisis variable produced results that were contrary to expectations. When AfBPC is included in the PPML fixed-effects estimations, crisis variable demonstrated a positive and significant impact. Furthermore, another disparity between the results in the table pertains to the colony variable. OLS fixed-effects results suggest an insignificant impact of colonial ties between emerging AfT-recipient and donor countries on the exports of the former, while PPML fixed-effects results assert that this impact is positive and significant. Thus, the analysis highlights the intricate nature of trade relationships and its importance of determining appropriate econometric models for reliable evaluation. It demonstrates significant variations in the impact of AfT and its subcategories depending on the estimation method used, with notable variations between OLS and PPML results.

Table 18 Summary Statistics and Pairwise Correlation Analysis for Panel Data of 24 Exporter EEs and 29 Importer Donor Countries

Variable	EXGR	lnDIST	lnAfT	lnEI	lnBPC	lnTPR	CNTG	LANG	CLNY	CRISIS	RTA
Summary Statistics											
Observations	6960	6960	6873	6844	6873	6815	6960	6960	6960	6960	6960
Mean	3030889.8	8.872	18.500	17.547	17.504	13.923	0.006	0.083	0.009	0.200	0.270
Standard Deviation	17822604	0.674	1.920	2.529	1.694	1.919	0.076	0.276	0.092	0.400	0.444
Minimum	0	2.468	10.965	8.901	10.829	8.607	0	0	0	0	0
Maximum	4.523e+08	9.877	21.941	21.869	20.736	19.471	1	1	1	1	1
Pairwise correlation analysis											
EXGR	1.000										
lnDIST	-0.066***	1.000									
lnAFT	0.062***	-0.109***	1.000								
lnEI	0.066***	-0.137***	0.949***	1.000							
lnBPC	0.061***	-0.096***	0.917***	0.790***	1.000						
lnTPR	0.023*	-0.037***	0.668***	0.596***	0.672***	1.000					
CNTG	0.273***	-0.217***	-0.012	-0.004	-0.015	-0.024**	1.000				
LANG	-0.016	0.070***	0.032***	0.012	0.040***	0.010	-0.023*	1.000			
CLNY	-0.015	-0.072***	0.023*	0.025**	0.025**	0.025**	-0.007	0.141***	1.000		
CRISIS	-0.006	0.000	0.026**	-0.001	0.083***	0.010	0.000	0.000	0.000	1.000	
RTA	0.024**	-0.280***	0.107***	0.120***	0.079***	0.025**	0.091***	-0.038***	-0.050***	-0.042***	1.000

****p<0.01, **p<0.05, *p<0.1*

Source: Kheyirkhabarli (2024a).

Table 19 OLS Fixed Effects and PPML Fixed Effects Estimations for Exports from EEs to Donor Countries

	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
Distance	-1.013**	-0.490**	-1.015**	-0.492**	-1.013**	-0.490**	-0.999**	-0.480**
	(0.047)	(0.032)	(0.047)	(0.032)	(0.047)	(0.032)	(0.047)	(0.032)
Aid for Trade	0.590**	0.326**						
	(0.060)	(0.026)**						
Aid for EI			0.499**	0.276**				
			(0.051)	(0.022)				
Aid for BPC					0.453**	0.615**		
					(0.089)	(0.038)		
Aid for TPR							0.061	-0.281**
							(0.056)	(0.069)
Contiguity	1.021**	1.327**	1.015**	1.323**	1.021**	1.327**	1.075**	1.354**
	(0.214)	(0.092)	(0.214)	(0.092)	(0.214)	(0.092)	(0.215)	(0.093)
Language	0.577**	0.185**	0.576**	0.184**	0.577**	0.185**	0.565**	0.184**
	(0.065)	(0.050)	(0.065)	(0.050)	(0.065)	(0.050)	(0.063)	(0.050)
Colony	0.432	1.531**	0.428	1.530**	0.432	1.531**	0.438	1.538**
	(0.343)	(0.167)	(0.343)	(0.167)	(0.343)	(0.167)	(0.344)	(0.168)
RTA	0.189**	0.616**	0.183**	0.620**	0.189**	0.616**	0.193**	0.608**
	(0.055)	(0.050)	(0.055)	(0.050)	(0.055)	(0.050)	(0.055)	(0.050)
Crisis	0.308	-0.619+	0.938	-0.177	-0.157	1.008**	-1.001	-3.217**
	(0.921)	(0.341)	(0.969)	(0.736)	(0.758)	(0.341)	(0.828)	(0.746)
Constant	5.942**	11.312**	7.318**	8.574**	8.463**	5.530**	14.338**	17.509**
	(1.153)	(0.639)	(1.256)	(0.675)	(1.665)	(0.787)	(0.979)	(1.202)
Observations	6825	6854	6796	6825	6825	6854	6772	6795
R2	0.828	0.981	0.828	0.982	0.828	0.981	0.831	0.981
Exporter-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RESET test (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Standard errors in parentheses, + p<0.10, * p<.05, ** p<.01"								

Source: Kheyirkhabarli (2024a).

Table 20 Summary Statistics and Pairwise Correlation Analysis for Panel Data of 24 Exporter EEs and 157 Importer Non-Donor Countries

Variable	EXGR	lnDIST	lnAFT	lnEI	lnBPC	lnTPR	CNTG	LANG	CLNY	CRISIS	RTA
Summary Statistics											
Observations	37680	36513	37209	37052	37209	36895	36240	36753	36753	37680	37473
Mean	503474.73	8.831	18.500	17.547	17.504	13.923	0.030	0.132	0.093	0.200	0.128
Standard Deviation	4760708.1	0.789	1.919	2.529	1.694	1.918	0.170	0.338	0.291	0.400	0.334
Minimum	0	3.491	10.965	8.901	10.829	8.607	0	0	0	0	0
Maximum	3.85E+08	9.886	21.941	21.869	20.736	19.471	1	1	1	1	1
Pairwise correlation analysis											
EXGR	1.000										
lnDIST	-0.094***	1.000									
lnAFT	0.036***	-0.035***	1.000								
lnEI	0.040***	-0.042***	0.949***	1.000							
lnBPC	0.035***	-0.040***	0.917***	0.790***	1.000						
lnTPR	0.019***	-0.015***	0.668***	0.596***	0.672***	1.000					
CNTG	0.179***	-0.371***	0.012**	0.009*	0.021***	0.004	1.000				
LANG	0.052***	-0.172***	-0.016***	-0.039***	0.002	-0.012**	0.093***	1.000			
CLNY	-0.003	-0.072***	0.056***	0.058***	0.049***	0.029***	0.016***	0.293***	1.000		
CRISIS	-0.009*	0.000	0.026***	-0.001	0.083***	0.010*	0.000	0.000	-0.001	1.000	
RTA	0.121***	-0.330***	0.046***	0.046***	0.044***	0.020***	0.294***	0.213***	0.016***	-0.010**	1.000

****p<0.01, **p<0.05, *p<0.1*

Source: Kheyirkhabarli (2024a).

Table 21 OLS Fixed Effects and PPML Fixed Effects Estimations for Exports from EEs to Non-Donor Countries

	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
Distance	-1.545**	-0.733**	-1.544**	-0.733**	-1.545**	-0.733**	-1.547**	-0.745**
	(0.019)	(0.046)	(0.019)	(0.046)	(0.019)	(0.046)	(0.019)	(0.046)
Aid for Trade	0.279**	0.191**						
	(0.045)	(0.047)						
Aid for EI			0.234**	0.162**				
			(0.038)	(0.040)				
Aid for BPC					0.691**	0.310**		
					(0.052)	(0.059)		
Aid for TPR							0.002	0.015
							(0.115)	(0.044)
Contiguity	0.123+	0.125*	0.121+	0.124*	0.123+	0.125*	0.109	0.119*
	(0.069)	(0.053)	(0.070)	(0.053)	(0.069)	(0.053)	(0.069)	(0.053)
Language	0.739**	0.176**	0.736**	0.176**	0.739**	0.176**	0.740**	0.200**
	(0.036)	(0.058)	(0.036)	(0.058)	(0.036)	(0.058)	(0.036)	(0.057)
Colony	0.369**	0.600**	0.367**	0.600**	0.369**	0.600**	0.367**	0.595**
	(0.042)	(0.075)	(0.042)	(0.075)	(0.042)	(0.075)	(0.042)	(0.075)
RTA	0.419**	0.203**	0.421**	0.204**	0.419**	0.203**	0.428**	0.190**
	(0.035)	(0.073)	(0.035)	(0.073)	(0.035)	(0.073)	(0.034)	(0.073)
Crisis	2.517**	1.048**	3.917**	-3.737**	-2.498**	1.432**	3.578**	0.605*
	(0.810)	(0.310)	(0.820)	(0.551)	(0.808)	(0.493)	(0.970)	(0.303)
Constant	10.359**	15.464**	11.334**	16.119**	5.944**	14.201**	14.658**	17.824**
	(1.080)	(1.050)	(0.957)	(0.910)	(1.144)	(1.144)	(1.737)	(0.790)
Observations	31979	34858	31849	34711	31979	34858	31773	34565
R2	0.778	0.926	0.779	0.926	0.778	0.926	0.781	0.931
Exporter-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RESET test (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Standard errors in parentheses, + p<0.10, * p<.05, ** p<.01"								

Source: Kheyirkhabarli (2024a).

Tables 20 and 21 offer insights into the descriptive statistics and the results of OLS fixed-effects and PPML fixed-effects estimations regarding the influence of exports from the EEs to non-donor countries. As evident in Table 20, the dataset pertaining to non-donor countries contains over five times as many observations as that of donor countries. The situation for the trade variable shows that EEs exporting to non-donor countries exhibit higher trade volumes compared to those exporting to donor countries. The substantial standard deviation of around USD 4.7 million highlights significant variability or dispersion around this mean, while the mean value of approximately USD 503.5 million reflects the typical trading volume. The value range of USD 0 to over USD 385 million illustrates the wide range of trade transactions in the dataset and demonstrates the diversity of trade values. In the meantime, the pairwise correlation analysis indicates that trade with non-donor countries is positively correlated with AfT and its subcategories, contiguity, sharing a common language and participation in RTA, while it is negatively correlated with distance and financial crises.

These findings align with the results of previous studies such as Helble et al. (2012), Ojeaga (2014) and Ghimire et al. (2016), which demonstrate an overall positive impact of the AfT on recipients' exports. Additionally, the results support the conclusions of Hühne et al. (2014), suggesting the effectiveness of AfT in countries not heavily dependent on it and categorising emerging nations as such. Conversely, the findings contradict the results of Kiute et al. (2015) and Nowak-Lehmann et al. (2013), who reported insignificant outcomes. Furthermore, the results for AfEI align with the assertions of Cali and Te Velde (2011), Vijil and Wagner (2012), Pettersson and Johansson (2013), Ferro et al. (2014), Ojeaga (2014) and Udvari (2017), supporting the claim that aid directed towards EI positively impacts exports. Regarding the positive impact of AfBPC, the results correspond with those of Masunda (2020). Lastly, the findings for AfTPR differ from those of Helble et al. (2012) and Hühne et al. (2014) and partially align with the results of Lee and Oh (2022), who found an insignificant AfTPR impact for the European and African regions. My thesis is particularly novel since it differs from aforementioned studies in a number of significant ways. Firstly, it offers a fresh perspective by specifically focusing on EEs. Furthermore, it provides a more comprehensive assessment of the long-term consequences of AfT by including a broader range of EEs over an extended period of time compared to previous studies.

Finally, additional novel result of this thesis is the finding that the impact of AfT as a whole and its subcategories differs based on whether the importer is a donor or a non-donor. The results indicate that AfT exerts a more substantial influence on exports from EEs to donor countries than to non-donor countries. This trend is observed for AfEI, too. Regarding AfBPC, the results diverge. The findings from OLS fixed-effects suggest that the impact of AfBPC is greater when the importer is a non-donor, while the PPML fixed-effects present a contrary perspective, asserting that the impact is higher when the importer is a donor country. Furthermore, the calculations yield largely insignificant impacts for AfTPR, with the exception of the model using PPML estimation, showing a negative and significant impact on exports from the EEs to donor countries (Table 19). These results suggest a novel finding: aid receiving EEs are more likely to engage in trade with donor nations than with non-donor countries. This demonstrates a unique trade pattern influenced by AfT and emphasizes the unequal influence of aid on trade relations between donors and recipients.

6.3. Impact of AfT on GVC engagement in EEs

Table 22 presents the descriptive statistics of the input data used to estimate the impact of AfT on GVCs. The top part of the table shows the historical properties of the variables using data from the original dataset. The table highlights the relevant characteristics, revealing that total AfT, which is the total funds received by an emerging country from all countries in a year, varies and fluctuates significantly between economies. The natural logarithm of total AfT has a mean of approximately 19.0, with a significant standard deviation of about 1.4, and ranges widely from approximately 14.6 to 21.9. This pattern also holds for bilateral AfT, which represents the funds received by an emerging economy from a single donor country. Analysing this variable can provide insights into bilateral relationships and donor interests. The natural logarithm of bilateral AfT has a mean of approximately 14.6, a significant standard deviation of about 3.0, and a wide range from approximately 3.1 to 21.9. Additionally, the dataset shows substantial variance in GVC variables. Comparing the means of the natural logarithms of GVC variables, we observe that the mean of foreign value-added embodied in domestic final demand (DFD_FVA) is higher than that of domestic value-added embodied in foreign final demand (FFD_DVA), suggesting that, on average, these countries import more FVA than they export DVA. The lower part of the table presents pairwise correlation analysis,

demonstrating that GVC indicators are inversely correlated with geographic distance and positively correlated with AfT, contiguity, language, and RTAs between EEs and their trade partners. Although small, the correlations between GVC indicators and the colony variable are negative and significant, possibly because leading headquarter economies like the US, Germany, and China had no colonies.

Table 23 displays the estimation results for the FFD_DVA and the DFD_FVA of aid-recipient EEs. These metrics represent exports and imports of value-added. According to the table, AfT generally shows a positive and significant impact on both FFD_DVA and DFD_FVA of EEs. Both OLS and PPML estimations confirm that total AfT significantly enhances EEs' participation in GVCs. When comparing the effects, AfT has a greater impact on DFD_FVA than on FFD_DVA, indicating that AfT increases EEs' reliance on imported FVA. This suggests AfT promotes backward linkages, positioning local industries downstream in the value chain over time. For bilateral AfT, reflecting aid from each donor, the same trend is observed. Although the effect of bilateral AfT is relatively small, it remains positive and significant. Results show that AfT increases FVA imports from donor countries more than it boosts DVA exports to them. Thus, AfT not only enhances GVC participation but also increases EEs' reliance on donor value-added, allowing donors to gain more from GVCs through their aid.

Examining the other variables, we see that distance has a negative and significant impact on both exports and imports of value-added. Greater distance with a partner country reduces both the exports and imports of value-added at significant level. This finding aligns with observation of the World Bank (2020) that proximity to major hubs in the global trade network, including China, Germany, Japan, and the United States, is essential for GVC participation. Conversely, according to the findings, sharing a border and same language and having an RTA positively increase the engagement. Additionally, higher GDP per capita, used as a proxy for labour cost, also boosts GVC engagement. Comparing the results for FFD_DVA and DFD_FVA, the positive impact is more pronounced for exports of DVA. Thus, these factors not only increase participation in GVCs but also help local industries focus on forward linkages, positioning them upstream over time. Regarding the colonial history variable, its impact is positive and significant for imports of FVA in all estimations, while it shows a significant and positive impact on exports of DVA in only one estimation.

Table 22 Summary statistics and pairwise correlation analysis for panel data of 21 aid-recipient EEs and 42 (individual AfT) and 76 (total AfT) donor countries

Variable	lnFFD_DVA	lnDFD_FVA	lnEXGR_DVA	lnIMGR_DVA	lnDIST	lnAFT_indiv	lnAFT_total	CNTG	LANG	CLNY	RTA	lnGDP_cap
Summary Statistics												
Observations	30324	30324	30324	30324	30324	9760	29868	30324	30324	30324	30324	30324
Mean	18.965	19.011	18.707	13.984	8.795	14.553	18.968	0.032	0.083	0.049	0.215	8.152
Standard Deviation	2.122	2.172	2.434	2.223	0.799	2.953	1.400	0.176	0.275	0.217	0.411	0.889
Minimum	12.206	11.513	11.513	11.513	4.977	3.135	14.577	0	0	0	0	5.849
Maximum	26.812	26.120	26.695	23.342	9.894	21.880	21.941	1	1	1	1	9.666
Pairwise correlation analysis												
lnFFD_DVA	1.000											
lnDFD_FVA	0.912***	1.000										
lnEXGR_DVA	0.971***	0.880***	1.000									
lnIMGR_DVA	0.794***	0.788***	0.820***	1.000								
lnDIST	-0.142***	-0.157***	-0.196***	-0.219***	1.000							
lnAFT_indiv	0.538***	0.565***	0.533***	0.280***	-0.084***	1.000						
lnAFT_total	0.128***	0.169***	0.147***	0.147***	-0.171***	0.177***	1.000					
CNTG	0.166***	0.160***	0.175***	0.234***	-0.342***	0.047***	0.013**	1.000				
LANG	0.123***	0.114***	0.132***	0.084***	-0.119***	0.159***	0.000	0.088***	1.000			
CLNY	-0.099***	-0.074***	-0.080***	0.002	-0.164***	-0.052***	0.028***	0.123***	0.194***	1.000		
RTA	0.155***	0.194***	0.172***	0.196***	-0.307***	-0.007	0.028***	0.166***	0.058***	-0.016***	1.000	
lnGDP_cap	0.234***	0.187***	0.186***	0.134***	0.192***	-0.234***	-0.394***	0.001	-0.056***	-0.173***	0.218***	1.000

****p<0.01, **p<0.05, *p<0.1*

Source: Own construction.

Table 23 Estimations for the domestic value-added embodied in foreign final demand and foreign value-added embodied in domestic final demand of aid-recipient EEs

	FFD_DVA				DFD_FVA			
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
Distance	-0.680**	-0.525**	-0.680**	-0.424**	-0.682**	-0.584**	-0.657**	-0.527**
	(0.011)	(0.019)	(0.028)	(0.027)	(0.011)	(0.013)	(0.021)	(0.018)
Total AfT	0.516**	0.567**			0.691**	0.681**		
	(0.033)	(0.050)			(0.039)	(0.060)		
Individual AfT			0.027**	-0.012			0.056**	0.040**
			(0.004)	(0.008)			(0.004)	(0.007)
Contiguity	0.247**	0.259**	0.672**	1.188**	0.271**	0.156**	0.464**	0.680**
	(0.042)	(0.047)	(0.081)	(0.089)	(0.043)	(0.036)	(0.080)	(0.043)
Language	0.383**	0.256**	0.263**	0.341**	0.260**	0.142**	0.216**	0.114**
	(0.020)	(0.034)	(0.028)	(0.045)	(0.020)	(0.022)	(0.026)	(0.033)
Colony	-0.020	0.381**	0.289	0.034	0.271**	0.396**	0.272*	0.339**
	(0.034)	(0.063)	(0.190)	(0.110)	(0.035)	(0.050)	(0.135)	(0.080)
RTA	0.226**	0.335**	0.254**	0.630**	0.285**	0.266**	0.287**	0.395**
	(0.017)	(0.025)	(0.029)	(0.039)	(0.016)	(0.024)	(0.027)	(0.036)
GDP per capita	0.959**	0.475**	1.253**	1.158**	0.718**	0.407**	0.678**	0.590**
	(0.084)	(0.135)	(0.060)	(0.065)	(0.079)	(0.126)	(0.140)	(0.154)
Constant	8.61**	10.137**	12.49**	11.355**	6.797**	8.646**	16.676**	16.433**
	(1.098)	(1.718)	(0.556)	(0.609)	(0.997)	(1.806)	(1.244)	(1.361)
Observations	15450	15450	5108	5108	15450	15450	5108	5108
R2	0.936	0.963	0.948	0.99	0.940	0.957	0.957	0.981
Exporter-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RESET test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses, + p < 0.10, * p < .05, ** p < .01

Source: Own construction.

Table 24 Estimations for domestic value-added content of gross exports and domestic value-added content of gross imports of aid-recipient EEs

	EXGR_DVA				IMGR_DVA			
	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
Distance	-0.878**	-0.577**	-0.832**	-0.459**	-1.446**	-1.172**	-1.531**	-1.037**
	(0.017)	(0.021)	(0.039)	(0.031)	(0.024)	(0.038)	(0.051)	(0.041)
Total AfT	0.594**	0.332**			-0.857**	0.437**		
	(0.051)	(0.051)			(0.089)	(0.114)		
Individual AfT			0.043**	-0.008			0.099**	0.066**
			(0.007)	(0.010)			(0.009)	(0.020)
Contiguity	0.291**	0.305**	0.814**	1.323**	0.346**	0.561**	1.097**	1.772**
	(0.056)	(0.051)	(0.111)	(0.100)	(0.074)	(0.072)	(0.169)	(0.118)
Language	0.539**	0.313**	0.352**	0.419**	0.468**	0.511**	0.452**	0.295**
	(0.031)	(0.038)	(0.043)	(0.055)	(0.041)	(0.058)	(0.060)	(0.096)
Colony	0.010	0.483**	0.418	0.103	0.397**	0.738**	1.192**	0.711**
	(0.050)	(0.077)	(0.285)	(0.135)	(0.083)	(0.196)	(0.320)	(0.164)
RTA	0.321**	0.410**	0.277**	0.709**	0.588**	0.949**	0.639**	0.741**
	(0.026)	(0.029)	(0.043)	(0.047)	(0.037)	(0.051)	(0.061)	(0.082)
GDP per capita	1.318**	0.381*	1.352**	0.975**	0.236+	1.378**	0.969**	2.33**
	(0.127)	(0.150)	(0.208)	(0.201)	(0.138)	(0.269)	(0.235)	(0.224)
Constant	5.936**	15.085**	12.553**	13.172**	35.301**	4.695	16.539**	7.075**
	(1.712)	(1.928)	(1.897)	(1.831)	(2.270)	-3.837	(1.831)	(1.495)
Observations	15435	15450	5108	5108	9109	15390	4124	5078
R2	0.876	0.946	0.887	0.983	0.834	0.996	0.883	0.999
Exporter-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RESET test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses, + p < 0.10, * p < .05, ** p < .01

Source: Own construction.

Thus, Table 23 highlights the significant influence of various factors on FFD_DVA and DFD_FVA of AfT-recipient EEs. AfT demonstrates a consistently positive and significant impact on both metrics, with a greater effect on DFD_FVA, indicating an increased reliance on imported FVA and a promotion of backward linkages, positioning local industries downstream in the value chain over time. This is particularly important, as it may have implications for upgrading of EEs within the value chain. Bilateral AfT also shows positive, albeit smaller, impacts, enhancing GVC participation and increasing dependence on donor value-added. Additionally, contiguity, shared language, higher labour cost and RTAs significantly boost GVC engagement, while greater distance hinders it. The colony variable shows a mixed impact, being significant for imports of FVA and less so for exports of DVA.

Table 24 displays the estimation results for the DVA content of gross exports (EXGR_DVA) and DVA content of gross imports (IMGR_DVA). According to the table, AfT disbursed to EEs has a positive and empirically significant impact on EXGR_DVA. This indicates that AfT enhances EEs' participation in GVCs by improving infrastructure, building productive capacity, and strengthening trade policy and regulations. AfT enables domestic producers to add more value to exports, boosting EXGR_DVA and facilitating greater engagement in GVCs, leading to increased gains. However, results for bilateral AfT variable are mixed. The impact of bilateral AfT on EXGR_DVA is positive and significant in OLS estimates, while negative and insignificant in PPML estimates. Furthermore, according to the results, factors such as shared borders, common language, RTAs, and higher labour costs increase EXGR_DVA, while greater distance reduces it. The colony variable shows a positive effect only in PPML estimation, with a significant impact when the total AfT variable is included.

According to Table 24, the impact of total AfT on IMGR_DVA yields controversial results. It is positive and significant in PPML estimation, while negative and significant in OLS estimation. However, examining bilateral AfT effects reveals that its impact on IMGR_DVA is positive and significant in both OLS and PPML estimations, which elucidates several points. Firstly, increased IMGR_DVA suggests that disbursed AfT to EEs facilitates the development and upgrading of domestic suppliers, enabling them to meet international quality standards. This attracts foreign producers to source intermediary inputs from the aid-recipient country, thereby increasing the DVA content of imports. Secondly, rising IMGR_DVA can enhance GVC participation through

forward linkages, potentially boosting both upstream and downstream activities. With disbursed AfT, local suppliers in EEs may concentrate on high-DVA upstream activities such as design, branding, or innovation, and on high-DVA downstream activities such as marketing and distribution. In both scenarios, increased IMGR_DVA leads to higher net value-added, indicating greater gains from GVC participation. Additionally, higher DVA content in imports from donor countries contributes to a positive trade balance for the recipient country. Regarding trade cost variables, factors such as sharing a common border, language, and colonial history, along with RTA participation and higher labour costs, all have a positive and significant impact on the IMGR_DVA of EEs.

Analysing the coefficients reveals that those for total AfT are greater than for bilateral AfT, which is a novel finding, suggesting that aggregated aid flows may have a stronger impact on trade than bilateral donor contributions. Several factors account for this discrepancy. Firstly, total AfT encompasses aid disbursed to recipient EEs from all donor countries, thereby capturing a broader range of aid, which may result in higher coefficients. In contrast, bilateral AfT considers aid from specific donor nations, potentially leading to less comprehensive coverage. Additionally, the diversity of donor nations contributing to total AfT, each with different resources and priorities, can exert a more substantial overall impact on GVC engagement compared to aid from bilateral donors, which may be more focused or limited in scope.

In conclusion, the findings presented in Tables 23 and 24 underscore the complex interplay between AfT and GVC metrics. Total AfT demonstrates a positive and significant effect on both EXGR_DVA and IMGR_DVA, indicating that trade aid improves EE's participation in GVCs by enhancing infrastructure, productive capacity and trade policy, which leads to increased DVA in both exports and imports. The greater impact on DFD_FVA compared to FFD_DVA suggests that AfT enhances EE's reliance on imported FVA, promoting backward linkages more and positioning local industries downstream in the value chain. Although bilateral AfT shows positive impacts, it is generally smaller compared to total AfT, reflecting less comprehensive effects from aid provided by bilateral donor nations. Additionally, factors such as shared borders, common language, RTAs, and higher labour costs positively influence GVC engagement, while greater distance hampers it. The colonial history variable has a mixed impact. Overall, the findings underscore the pivotal role of AfT in advancing GVC participation,

improving positioning, and facilitating the upgrading of EEs, a novel insight that highlights AfT's broader strategic impact beyond mere trade expansion.

6.4. Impact of AfT on GVC engagement in EEs: DiD model

The thesis checks the sensitivity of the results by applying the difference-in-differences (DiD) model. Table 25 shows the regression results for the DiD analysis. The DiD estimates reveal that AfT significantly enhances GVC integration in EEs, with effects concentrated in domestic value-added creation rather than foreign input reliance. The DiD coefficient for EXGR_DVA (1.566, ***p<0.01) implies that treated economies experienced a 156.6% increase in domestic value-added content of exports post-2002, relative to non-treated peers. Similarly, IMGR_DVA (6.546, ***p<0.01) reflects a 654.6% rise in domestic value retained in imports, suggesting AfT strengthens both backward linkages (domestic suppliers feeding into foreign production) and forward linkages (domestic firms upgrading to higher-value activities in GVCs). For instance, AfT may enable upstream sectors to supply higher-quality intermediates to foreign partners (boosting EXGR_DVA) while fostering downstream capabilities that allow domestic firms to reclaim value in re-imported goods (IMGR_DVA).

Table 25 Difference-in-Difference estimation results for GVC metrics of aid-recipient EEs, 1995-2020

	EXGR_DVA	IMGR_DVA	DFD_FVA	FFD_DVA
DiD	1.566***	6.546***	1.681***	1.554***
	(0.089)	(0.664)	(0.054)	(0.055)
Total AfT/GDP – L1	0.014***	0.170***	-0.001	0.007**
	(0.005)	(0.048)	(0.003)	(0.004)
Distance	45.176***	30.365***	30.146***	30.018***
	(5.031)	(6.168)	(7.579)	(7.469)
Distance 2	-2.605***	-1.978***	-1.719***	-1.705***
	(0.289)	(0.374)	(0.442)	(0.436)
Language	1.538***	7.213***	1.393***	1.487***
	(0.341)	(1.219)	(0.275)	(0.280)
Contiguity	7.495***	13.950***	5.874***	6.131***
	(0.932)	(1.178)	(0.883)	(0.899)
Colony	-0.673	-6.513***	-0.359	-0.546
	(0.541)	(1.669)	(0.413)	(0.416)
RTA	-0.075	-0.221	0.047	-0.077**
	(0.050)	(0.419)	(0.029)	(0.031)
Constant	-177.358***	-117.339***	-114..202***	-114.043
	(24.844)	(25.233)	(32.265)	(31.775)
Observations	39328	39328	39328	39328
R2	0.391	0.106	0.443	0.439
Random effects	YES	YES	YES	YES
Year variables	YES	YES	YES	YES

**** p<.01, ** p<.05, * p<.1*

Source: Own construction.

The AfT/GDP ratio, lagged by one year, underscores two critical insights: firstly, the one-year lag reflects the delayed effect of AfT investments, as infrastructure upgrades or capacity-building programs require time to translate into operational efficiencies and GVC integration; secondly, a 1% increase in AfT/GDP corresponds to a 0.014% rise in EXGR_DVA and 0.170% rise in IMGR_DVA, indicating that sustained, proportional investments amplify domestic value creation. The strong EXGR_DVA effect suggests AfT strengthens domestic suppliers' ability to provide intermediates to foreign producers. This aligns with AfT's role in reducing trade costs and enhancing quality standards, enabling firms to compete in upstream GVC segments. Furthermore, the IMGR_DVA results signal that AfT helps domestic firms move downstream into higher-value activities such as branding, R&D, allowing them to capture more value in re-imported goods. For example, AfT-funded innovation hubs might enable a country to transition from exporting raw minerals to re-importing high-tech devices containing domestically designed components.

In case of DFD_FVA, the coefficient for AfT/GDP is -0.001 and it is insignificant, indicating that AfT does not systematically increase reliance on foreign inputs for domestic consumption. On the other hand, the DiD estimator for DFD_FVA (1.681, ***p<0.01) suggest that treated economies saw a 168.1% rise in foreign value embedded in domestically consumed goods post-2002. However, this effect is likely driven by broader GVC integration such as importing higher-quality intermediates for domestic production rather than AfT directly incentivizing foreign dependency. Meanwhile, for FFD_DVA, a 1% increase in lagged AfT/GDP corresponds to a 0.007% rise in FFD_DVA (**p<0.05), showing that sustained AfT investments modestly boost domestic value embedded in foreign final products. The lagged AfT/GDP coefficient highlights that AfT's impact on embedding domestic value in foreign demand is gradual. It takes time for firms to leverage AfT-funded infrastructure or training to penetrate foreign markets. Furthermore, the DiD coefficient is 1.554 (***p<0.01), implying a 155.4% increase in domestic value consumed abroad post-treatment. This aligns with AfT's goal of integrating domestic industries into global demand chains.

The lack of significance for DFD_FVA suggests AfT prioritizes domestic capacity building over import reliance, offering a novel insight into its role in strengthening local production rather than deepening foreign input dependence. This aligns with AfT's design to reduce dependency on foreign inputs by strengthening local industries. Additionally,

the rise in foreign value in domestic demand post-treatment could reflect indirect backward linkages. For example, AfT might enable firms to import advanced machinery to upgrade domestic production, indirectly raising productivity without increasing dependency. On the other hand, the significant coefficients for FFD_DVA signal that AfT helps domestic firms move upstream into higher-value activities. For instance, a country receiving AfT might transition from exporting raw cocoa beans which has low domestic value to processing cocoa butter that has higher domestic value embedded in foreign-made chocolates. This reflects forward linkages, where AfT enables domestic producers to contribute more sophisticated inputs to foreign final goods with the potential for upgrading also being inferred as a result of these enhanced capabilities.

Control variables mostly align with theoretical expectations. Bilateral distance exhibits a nonlinear negative effect, consistent with gravity models. Shared language amplifies GVC participation, particularly for IMGR_DVA (7.213***), while contiguity boosts integration across all metrics. Colonial ties reduce IMGR_DVA (-6.513***), reflecting historical trade imbalances, and regional trade agreements (RTA) show mixed effects, likely due to variability in agreement depth.

To assess the robustness of the DiD model results, an event study test was employed, and findings are presented in Table 26. In general, for all GVC metrics, pre-2002 coefficients (1998–2001) are statistically insignificant or small in magnitude, confirming the parallel trends assumption. Coefficients for EXGR_DVA range from -0.067 (1998) to 0.130** (2001), with only 2001 showing significance ($p<0.05$). This minor pre-trend may reflect early anticipation effects. Pre-treatment coefficients for IMGR_DVA are insignificant except for 2000 and 2001, likely due to global trade shifts such as China's WTO accession rather than AfT. Coefficients for DFD_FVA and FFD_DVA are near-zero and insignificant pre-2002, confirming no systematic divergence between treated and untreated economies.

Meanwhile, in case of post-treatment dynamics, the event study reveals lagged but escalating treatment effects, peaking in 2007, consistent with AfT's long-term capacity-building focus. For EXGR_DVA, coefficients rise from 0.209*** (2002) to 1.566*** (2007), reflecting a 156.6% cumulative increase in domestic value-added exports. For IMGR_DVA, coefficients surge from 1.254*** (2002) to 6.546*** (2007), a 654.6% rise, the largest across metrics. In case of DFD_FVA, coefficients increase from 0.129***

(2002) to 1.681*** (2007). Despite this rise, the total AfT/GDP coefficient is insignificant, implying AfT does not systematically boost reliance on foreign inputs. On the other hand, coefficients for FFD_DVA grow from 0.171*** (2002) to 1.554*** (2007), mirroring EXGR_DVA trends[28].

Table 26 Event Study Regression Results for GVC Metrics, 1998-2007

	EXGR_DVA	IMGR_DVA	DFD_FVA	FFD_DVA
Year 1998	-0.067	0.362	0.035**	0.001
	(0.060)	(0.222)	(0.014)	(0.013)
Year 1999	-0.095	0.305	-0.005	-0.018
	(0.064)	(0.241)	(0.015)	(0.014)
Year 2000	0.026	0.822***	0.033*	0.074***
	(0.070)	(0.260)	(0.017)	(0.017)
Year 2001	0.130**	1.147***	0.082***	0.090***
	(0.064)	(0.269)	(0.018)	(0.018)
Year 2002	0.209***	1.254***	0.129***	0.171***
	(0.068)	(0.279)	(0.019)	(0.018)
Year 2003	0.199**	-0.608	0.266***	0.252***
	(0.090)	(0.652)	(0.049)	(0.050)
Year 2004	0.356***	0.526	0.504***	0.472***
	(0.087)	(0.672)	(0.050)	(0.051)
Year 2005	0.635***	1.828***	0.725***	0.707***
	(0.093)	(0.681)	(0.050)	(0.051)
Year 2006	0.841***	2.847***	0.911***	0.916***
	(0.095)	(0.704)	(0.052)	(0.053)
Year 2007	1.566***	6.546***	1.681***	1.554***
	(0.089)	(0.664)	(0.054)	(0.055)
Total AfT/GDP – L1	0.014***	0.170***	-0.001	0.007**
	(0.005)	(0.048)	(0.003)	(0.004)
Distance	45.176***	30.365***	30.146***	30.018***
	(5.031)	(6.168)	(7.579)	(7.469)
Distance 2	-2.605***	-1.978***	-1.719***	-1.705***
	(0.289)	(0.374)	(0.442)	(0.436)
Language	1.538***	7.213***	1.393***	1.487***
	(0.341)	(1.219)	(0.275)	(0.280)
Contiguity	7.495***	13.950***	5.874***	6.131***
	(0.932)	(1.178)	(0.883)	(0.899)
Colony	-0.673	-6.513***	-0.359	-0.546
	(0.541)	(1.669)	(0.413)	(0.416)
RTA	-0.075	-0.221	0.047	-0.077**
	(0.050)	(0.419)	(0.029)	(0.031)
Constant	-177.358***	-117.399***	-114.202***	-114.043***
	(21.845)	(25.233)	(32.265)	(31.775)
Observations	39328	39328	39328	39328
R2	0.391	0.106	0.443	0.439
Random effects	YES	YES	YES	YES
Year variables	YES	YES	YES	YES

**** p<.01, ** p<.05, * p<.1*

Source: Own construction.

[28] Appendix 7 illustrates the dynamic effects of AfT on GVC engagement using event study estimates.

The event study robustly confirms the DiD results: AfT drives sustained GVC integration, with effects intensifying over time as economies upgrade capabilities and strengthen linkages. The lagged AfT/GDP effects and escalating post-treatment coefficients highlight the importance of patient, long-term policy commitments to realize structural transformation. By prioritizing sectors with strong backward/forward linkage potential, policymakers can maximize AfT's impact on inclusive and resilient GVC participation.

6.5. Chapter summary

The chapter presented a detailed analysis of the thesis's primary findings, structured around the research objectives and questions. The analysis conducted to find the any potential differences between traditional data and the TiVA data in gravity model applications revealed that there is a robust correlation between gross and DVA exports, with negligible differences between these metrics across both OLS and PPML fixed-effects models. This may be attributed to the possibility that countries have similar preferences for trade regarding both gross and value-added measures. Key gravity factors, such as distance, common borders, language, and RTAs, consistently influence trade flows for both HICs and LMICs. Notably, HICs show variations primarily in middle-range export values due to their role as headquarters, while LMICs display greater variability in lower-range exports, reflecting their production-centric role. Re-estimations at different intervals confirm these findings' stability.

The analysis of AfT's impact on EEs' export performance unveils the intricate dynamics between EEs and their donor and non-donor partners. The findings, derived from OLS and PPML fixed-effects estimations, provide valuable insights into how AfT influences export outcomes. Consistently, the results highlight AfT's significant positive impact, particularly through AfEI and AfBPC, on EEs' exports to both donor and non-donor countries. The variability in AfT's influence is evident, with AfTPR showing mixed effects across OLS and PPML models, indicating different sensitivities to trade policy reform. The empirical analysis suggests that EEs gain more from exports to donor countries, affirming their higher trade activity with these nations. This emphasizes the strategic importance of aid in enhancing export performance. Such patterns underscore the effectiveness of targeted AfT initiatives in fostering trade relationships, aligning with established research.

The analysis of AfT's impact on EEs' engagement in GVCs underscores the strategic role of aid in fostering trade relationships. Using OLS and PPML fixed-effects methods in gravity models estimations, the findings highlight that AfT significantly boosts GVC engagement, with a pronounced effect on DFD_FVA, indicating increased reliance on imported FVA and promoting backward linkages in local industries. As there is no prior literature that specifically examines the impact of AfT on GVC engagement in EEs with recent data and the combined perspectives of donors and recipients, these results present novel insights. While bilateral AfT has a smaller impact, it remains positive, enhancing GVC participation and dependence on donor value-added. Key variables such as contiguity, shared language, higher labour costs, and RTAs positively influence GVC involvement, whereas greater distance negatively affects it. The colonial history variable shows a nuanced impact, being more significant for FVA imports than DVA exports. For EXGR_DVA, AfT strengthens domestic value addition and export capabilities, with shared borders, common language, and RTAs further boosting exports. Furthermore, AfT's impact on IMGR_DVA is positive in PPML and mixed in OLS estimates, suggesting improved domestic supplier capabilities and forward linkages. The more substantial coefficients for total AfT reflect its broader donor diversity and comprehensive aid coverage, emphasizing its effectiveness in enhancing EEs' engagement in GVCs. The use of PPML method, alongside the consideration of both total AfT and bilateral AfT disbursed by each country, also constitutes a significant contribution to the literature.

Finally, the findings from the DiD analysis underscore the pivotal role of AfT in fostering GVC integration among EEs, with notable enhancements in domestic value-added exports and imports. The DiD and event study results consistently demonstrate that AfT investments yield long-term benefits, enabling economies to strengthen both backward and forward linkages within GVCs. While AfT does not significantly increase reliance on foreign inputs, it effectively bolsters domestic industries, allowing firms to move up the value chain and capture greater economic gains. The lagged effects of AfT/GDP further highlight the necessity of sustained policy commitment, as the full impact materializes gradually over time. By strategically targeting sectors with high linkage potential, AfT can serve as a catalyst for deeper and more resilient GVC participation. These insights provide valuable guidance for policymakers seeking to

enhance trade competitiveness and drive structural transformation in emerging economies.

Based on the novel insights highlighted in this thesis, it can be concluded that AfT plays a crucial role in shaping the trade dynamics and GVC engagement of EEs. The thesis introduces a fresh perspective by specifically focusing on EEs, offering a comprehensive analysis of the long-term consequences of AfT through an expanded dataset that covers a broader range of countries and a longer time frame than previous studies. A key finding is the significant difference in the impact of AfT depending on whether the importer is a donor or a non-donor, revealing an asymmetric trade relationship that influences the patterns of trade between aid-receiving EEs and donor nations. Moreover, the thesis uncovers that aggregated AfT flows have a greater impact on trade than bilateral aid contributions, which suggests that broader, multilateral support may be more effective in fostering trade growth.

The novel results also highlight AfT's pivotal role in advancing GVC participation, improving the positioning of EEs, and facilitating their upgrading—insights that extend beyond the traditional view of AfT simply as a mechanism for trade expansion. Notably, the lack of significance for DFD_FVA supports the argument that AfT tends to prioritize domestic capacity building over increasing import reliance, strengthening local production capabilities rather than deepening foreign input dependence. This thesis, by analysing the impact of AfT on GVC engagement in EEs with recent data and incorporating both donor and recipient perspectives, presents new and valuable contributions to the literature on international trade and development.

Chapter 7

7. Conclusions, summary and recommendations

This chapter presents a summary, conclusions, and limitations of the thesis. The summary outlines the primary objectives, and the methodology employed to achieve these goals. The conclusions section highlights the key findings of the research and discusses their implications. Furthermore, the chapter addresses the novelty of the thesis and offers recommendations for policy-making and future research directions.

7.1. Summary of the thesis

The thesis aimed to explore how AfT can enhance international trade and foster deeper engagement in GVCs within EEs. To achieve this, the research examined five key hypotheses. To test the hypotheses, the thesis employed various statistical and empirical methods, including descriptive statistics, pairwise correlation analysis, OLS fixed-effects and PPML fixed-effects and DiD random effects methods in gravity models. These analyses utilised several panel datasets involving aid-recipient EEs over different periods, depending on data availability. The analyses covered the following[29]:

1. Analysing the distribution of AfT and its subcategories among EEs.
2. Assessing the engagement of EEs in GVCs.
3. Comparing traditional trade data with value-added data in the application of gravity models.
4. Evaluating the impact of AfT on the export performance of EEs.
5. Examining the effect of AfT on GVC engagement in EEs.

The first objective of the thesis was analysing the distribution of AfT and its subcategories among EEs. The findings reveal that a significant portion of AfT, averaging 38% of total trade assistance, is directed towards EEs. The thesis highlights that the largest share of AfT within EEs is allocated to Aid for Economic Infrastructure (AfEI), followed by Aid for Building Productive Capacity (AfBPC), while Aid for Trade Policies and Regulation (AfTPR) receives a comparatively minor portion. The AfEI develops essential

[29] For some of these aspects, previous studies exist; however, this study benefits from a longer time series. Additionally, certain aspects of the analysis offer novel insights that have not been previously explored in the literature.

trade infrastructure, AfBPC enhances firms' competitiveness, and AfTPR, though smaller, supports regulatory improvements for market access. Notably, AfEI disbursements increased significantly following the global financial crisis. Until 2008, AfEI and AfBPC grew at similar rates, while AfTPR declined. During the financial crisis, all categories saw decreased aid, however post-crisis, AfEI showed marked growth, while AfBPC and AfTPR exhibited fluctuations. The peak disbursement occurred in 2017, totalling USD 11 billion, with USD 8 billion allocated to AfEI, highlighting its predominance. In contrast, AfBPC received just over USD 2 billion. These findings demonstrate that the AfT initiative's significance is robust and growing. Moreover, results showed that Bangladesh, Morocco, Vietnam and the Philippines received the highest shares of AfT relative to their GDP, underscoring their reliance on external support to enhance trade capacity.

The second objective of the thesis was assessing the engagement of EEs in GVCs. The findings indicate that Malaysia leads with a participation index of 0.65, reflecting high integration into GVCs, followed by the Philippines at 0.63. South Africa ranks third with an index of 0.54, showing substantial involvement. In contrast, Argentina, Colombia, Pakistan, Venezuela, and Bangladesh have lower participation levels, with indices ranging from 0.36 to 0.29, and Bangladesh at 0.29 indicates minimal engagement. Concerning the trends in NVA_GDP ratios underscore the diverse experiences of EEs in capturing domestic value-added within GVCs. While some countries, such as Indonesia, Iran, South Africa, and Morocco, have successfully enhanced their domestic value retention through industrial upgrading and local supply chain development, others, like Malaysia, Mexico, Thailand, and Vietnam, continue to rely heavily on foreign inputs. These disparities suggest that policy interventions, investment in domestic industries, and strategic trade diversification play crucial roles in determining the extent to which economies benefit from GVC participation. Mexico, with a GVC position index of -0.158, is notably involved in downstream activities, likely focusing on assembly using imported components. Mauritius (-0.124) and the Philippines (-0.122) also show strong downstream activity. Conversely, Iran, with an index of 0.243, and Peru (0.218) and Nigeria (0.215) display significant upstream roles, contributing raw materials or intermediate goods. These results demonstrate that EEs exhibit diverse participation levels and distinct roles within GVCs up until the COVID-19 pandemic.

H_1: The TiVA and traditional trade data yield significantly different results when applied to the Gravity Model.

Next objectives of the research was to compare whether the estimates of the structural gravity model differ using "traditional" foreign trade and TiVA data for a large group of countries. The results show that the differences are small, which can be explained by the fact that countries' inclination for gross and value-added trade can be very similar. This finding is important as it suggests that, despite theoretical differences, traditional trade data can serve as a reasonable proxy for TiVA in gravity models, reinforcing the robustness of AfT impact assessments on trade. In our model estimation, the variables have the expected sign and are significant with the exception of colonial relations. Bilateral trade is negatively affected by distance, while positively affected by a common border, a common language, a common colonial past, and participation in the same regional trade agreement. Another result of the research is the so-called separate examination of the group of manufacturing economies and headquarters economies. In general, the results showed that the share of HICs (headquarter economies) is dominant in global trade, however this has gradually decreased over time, while the share of LMICs (manufacturing economies) in international trade has steadily increased, with China playing a decisive role. However, the country groups did not produce significantly different results for the models calculated with TiVA and gross exports. The results also showed that LMICs (manufacturing economies) are more sensitive to distance and language factors than HICs, whereas HICs (headquarter economies) benefit more from a common border, a common colonial past and regional trade from participating in an agreement. The results indicate that ***H_1*** is rejected, as no significant differences were found between TiVA and traditional data when used in gravity model analyses.

H_2: AfT leads to a substantial increase in exports in EEs.

- ***H_{2a}:*** Aid for Economic Infrastructure (AfEI) has a significant positive impact on export performance in EEs.
- ***H_{2b}:*** Aid for Building Productive Capacity (AfBPC) has a significant positive impact on export performance in EEs.
- ***H_{2c}:*** Aid for Trade Policy and Regulations (AfTPR) has a significant positive impact on export performance in EEs.

The following objective was to investigate how AfT disbursements, both in their entirety and when analysed as separate subcategories, impact the export activities of EEs. The research focused on a sample of 24 aid-recipient EEs. It became evident that AfT, in its entirety, as well as its subcategories (AfEI and AfBPC), exert a positive and significant influence on exports from EEs to donor countries. However, differences emerged in the results of OLS and PPML estimations, particularly with respect to AfTPR. In contrast, when exporting to non-donor countries, the results remained consistent, revealing a positive and significant impact of AfT in general, along with its subcategories. However, AfTPR did not appear to significantly influence exports to non-donor countries. Based on the findings, $\boldsymbol{H_2}$, $\boldsymbol{H_{2a}}$ and $\boldsymbol{H_{2b}}$ are accepted, as AfT overall, along with its subcategories, AfEI and AfBPC, has a positive and significant impact on the exports of EEs, while $\boldsymbol{H_{2c}}$ is rejected as AfTPR yields mixed results, this may be due to its relatively small share of total AfT, limiting its overall impact on the exports of EEs.

$\boldsymbol{H_3}$: The positive impact of AfT is more pronounced in the exports of EEs to donor countries.

The research also emphasised the importance of examining the influence of AfT when considering if the importer is a donor or non-donor. It was evident that AfT and AfEI have a more substantial impact on exports to donor countries than to non-donor countries. In the case of AfBPC, the results diverged between OLS and PPML estimations, suggesting that its impact could vary depending on the importer. The influence of AfTPR was generally insignificant, except for a negative and significant impact on exports to donor countries identified in the PPML model. Based on the results, $\boldsymbol{H_3}$ is partially accepted, as the positive impact of AfT, particularly the AfEI subgroup, is more pronounced on the exports of EEs to donor countries, whereas the results for AfBPC and AfTPR subgroups vary. This suggests that donor countries may allocate AfT in a way that indirectly benefits their own exports; however, further research is needed to confirm this potential strategic motivation.

$\boldsymbol{H_4}$: AfT has a positive and significant impact on GVC engagement.

- $\boldsymbol{H_{4a}}$**:** AfT has a positive and significant impact on enhancing the participation of EEs in GVCs.
- $\boldsymbol{H_{4b}}$**:** AfT contributes to improving the positioning of EEs within GVCs.
- $\boldsymbol{H_{4c}}$**:** AfT facilitates the upgrading of EEs within GVCs.

The final objective of the thesis was examining the effect of AfT on GVC engagement in EEs. The findings of analysis 3 showed that AfT has a generally positive and significant effect on both domestic value-added embodied in foreign final demand (FFD_DVA) and foreign value-added embodied in domestic final demand (DFD_FVA) for EEs. Both OLS and PPML estimations confirm that total AfT significantly boosts EEs' participation in GVCs. This trend also applies to bilateral AfT from each donor, which, despite its relatively smaller impact, remains positive and significant. Moreover, AfT disbursed to EEs has a positive and statistically significant effect on domestic value-added content of gross exports (EXGR_DVA), indicating that AfT promotes GVC participation by improving infrastructure, building productive capacity, and enhancing trade policies and regulations. This support enables domestic producers to add more value to exports, thereby increasing EXGR_DVA and fostering deeper GVC engagement, leading to higher gains. Additionally, the impact of total AfT on domestic value-added content of gross imports (IMGR_DVA) is controversial, being positive and significant in PPML estimation while negative and significant in OLS estimation. When considering the effects of bilateral AfT, its impact on IMGR_DVA is consistently positive and significant in both OLS and PPML estimations, which reveals several insights. First, the increase in IMGR_DVA suggests that AfT disbursed to EEs helps develop and upgrade domestic suppliers, enabling them to meet international quality standards, thereby attracting foreign producers to source intermediate inputs from the aid-recipient country and increasing the DVA content of imports. Second, rising IMGR_DVA can enhance GVC participation through forward linkages, potentially boosting both upstream and downstream activities. With AfT, local suppliers in EEs may shift toward higher-DVA activities, potentially moving from assembly to parts production and, in some cases, applied R&D.

Furthermore, the DiD results also confirm that AfT fosters deeper GVC integration by enhancing domestic value-added exports (EXGR_DVA) and imports (IMGR_DVA), reinforcing backward and forward linkages. While AfT does not significantly increase reliance on foreign inputs, it effectively strengthens domestic industries, enabling firms to move up the value chain and capture greater economic gains. The long-term benefits of AfT investments are evident, as they enhance trade capacity, improve supplier capabilities, and facilitate greater participation in GVCs. These findings support the hypothesis that AfT positively impacts GVC engagement (***H_4***: partially

accepted) by enhancing EEs' participation (H_{4a}: accepted) and enabling upgrading within GVCs (H_{4c}: Accepted). However, the extent to which AfT reshapes EEs' positioning in GVCs remains nuanced, as its impact is more evident through domestic value-added improvements rather than external integration (H_{4b}: partially accepted).

H_5: AfT increases EE reliance on donor value-added, allowing both parties to gain more from the GVCs.

According to the results of the fourth analysis, AfT does not have significant impact on DFD_FVA, while according to the third analysis, AfT has a stronger impact on DFD_FVA than on FFD_DVA. The findings demonstrate that AfT significantly increases FVA imports from donor countries more than it enhances DVA exports to them, indicating that AfT leads to a greater reliance of EEs on imported FVA. This suggests that AfT promotes backward linkages, gradually positioning local industries downstream in the value chain. Additionally, bilateral AfT also shows positive, though smaller, effects, further boosting GVC participation and increasing reliance on donor value-added. These findings are novel, as no previous studies have analysed such effects with a focus on EEs, nor have they used recent data to assess both donor and recipient perspectives. Furthermore, the use of PPML method with TiVA data offers more robust results compared to traditional methods. As the findings brought mixed results I partially confirm H_5, affirming that AfT not only enhances GVC participation but also raises EEs' dependence on donor value-added, enabling donors to gain mutually from GVCs through their aid, a conclusion not previously explored in the literature.

7.2. Conclusion of the thesis

EEs constitute a unique subgroup of nations that do not fit into the conventional categories of developed or developing countries. These EEs are predominantly found in regions such as Latin America, Southeast Asia, Eastern Europe, the Middle East, and some African economies. The opening of markets has provided expanded opportunities for international companies and substantially increased the scope for trade and investment. Currently, EEs hold a notable position in the global economy, with five out of the top ten and eleven out of the top twenty nations based on adjusted nominal GDP. These countries encompass a significant portion of the global population and territory, consistently exhibiting faster expansion when compared to developed nations. Their presence has greatly propelled globalisation. Despite variations in interpretations, EEs

share common characteristics such as vast territories, substantial populations, a focus on accelerated growth, increased trade and investment, prioritisation of middle-class expansion, and concerns for improving living standards, social stability, and tolerance. These shared attributes shape the identity of EEs in the global landscape and underscore their pivotal role in driving economic development and facilitating globalisation.

GVCs have fundamentally transformed the global economic landscape, offering both opportunities and challenges for developed and developing countries. They enable the fragmentation of production across borders, allowing countries to specialize in specific tasks and leverage comparative advantages. This specialisation has facilitated economic growth and integration into the global economy, particularly for EEs. Meanwhile, GVCs also present challenges, such as the risk of developing countries becoming trapped in low-value activities and the complexities introduced by regionalisation and deglobalisation trends. As global trade patterns continue to evolve, countries must navigate these dynamics, balancing global integration with regional strategies, to maximize their participation in GVCs and foster sustainable economic development.

The thesis examined the GVC engagement of aid-recipient EEs and identified diverse patterns. Countries such as Malaysia and the Philippines show high levels of GVC participation, reflecting their deep integration into global value chains. In contrast, nations like Bangladesh and Venezuela have lower participation rates, indicating more limited involvement in GVCs. Countries with higher net value-added indices, such as Indonesia, Iran, South Africa, and Morocco, gain more from forward linkages, retaining more domestic value within their economies. Meanwhile, countries with lower indices, like Malaysia, Mexico, Thailand, and Vietnam, depend heavily on foreign inputs, indicating a greater focus on assembly rather than on higher value-added activities. Additionally, Iran is characterised by strong upstream activities, serving as a supplier of raw materials, whereas Mexico and the Philippines are more focused on downstream tasks such as assembly. Over time, there have been notable shifts, with countries like Turkey transitioning from upstream to downstream roles, highlighting broader economic changes.

GVCs have become more widespread in the world economy in recent decades, so traditional foreign trade data are less relevant when analysing the role of individual

countries in international trade. New databases are now available, including the TiVA compiled by the OECD, which distinguish between gross trade and DVA distributed in international trade. By using them, we obtain a clearer picture of the role of countries in international trade. All of this is also indicated by the publications published in the international literature, which use all or part of the new databases to compare the results obtained in this way with those calculated on the basis of traditional foreign trade data. In this thesis, the analysis aimed at identifying potential differences between traditional trade data and TiVA data in gravity model applications revealed a strong correlation between gross exports and DVA exports, with minimal differences observed across both OLS and PPML estimations. This suggests that countries may have similar trade preferences when considering both gross and value-added measures.

In the current global landscape, exports serve as vital benchmarks of a nation's economic well-being, significantly impacting the standards of living of its people. Emerging and developing countries face diverse challenges in international trade, including trade barriers, inadequate infrastructure, supply-side limitations, economic shocks and limited resource access, hindering effective global participation. The international community recognised the significance of AfT and introduced the AfT initiative in 2005, designed to help less developed countries overcome domestic hurdles, in their integration into the global economy, and attain export driven growth. The AfT is delivered through three primary channels: AfEI, AfBPC and AfTPR. On average, the analysis revealed that 69% of aid was allocated by economic infrastructure channel, highlighting a focus on infrastructure development. In contrast, AfBPC and AfTPR received 29% and 2% of the aid, respectively. The findings from OLS and PPML fixed-effects estimations offer valuable insights into the impact of AfT on export outcomes. The results consistently demonstrate a significant positive effect of AfT, especially through AfEI and AfBPC, on the exports of EEs to both donor and non-donor countries. However, the influence of AfTPR varies, displaying mixed effects across OLS and PPML models, which suggests differing sensitivities to trade policy reforms. The empirical analysis indicates that EEs benefit more from exports to donor countries, confirming higher trade activity with these nations. The thesis is particularly novel as it focuses specifically on EEs, provides a more comprehensive assessment of the long-term effects of AfT by analysing possible extended period, and uniquely finds that the impact of AfT and its subcategories varies depending on whether the importer is a donor or a non-donor.

Meanwhile, several challenges associated with AfT have been highlighted, including donors' self-interest, poor institutional quality, capacity gaps, difficulties in accurately assessing needs, and issues with reporting overstated AfT disbursements which can be analysed through future research.

The relationship between trade aid programs and the integration of EEs into GVCs underscores the intricate nature of modern international trade. This thesis has explored the potential and challenges associated with leveraging trade aid to foster global economic growth. The expansion of GVCs has allowed a diverse range of countries to participate in global production, requiring substantial investments in infrastructure, productive capacities, and regulatory reforms to overcome barriers and promote growth. AfT initiatives, by focusing on enhancing trade infrastructure, building productive capacities, and refining trade policies, play a critical role in supporting EEs' integration into GVCs. Strengthening infrastructure in sectors such as energy, ICT, and transportation, alongside fostering innovation and skilled labour development, is crucial for enhancing competitiveness and value creation within GVCs. Furthermore, effective trade policies and regulations are vital for reducing trade costs, streamlining cross-border processes, and promoting transparency, which together facilitate deeper integration into GVCs. This thesis's findings underscore that AfT significantly enhances GVC engagement. Although bilateral AfT has a more modest effect, it remains positive, contributing to increased GVC participation and a greater dependence on donor value-added. In terms of EXGR_DVA, AfT improves domestic value addition and export capabilities. Additionally, AfT's influence on IMGR_DVA is positive and significant in DiD and PPML estimates, suggesting that it bolsters domestic supplier capabilities and forward linkages. The more substantial coefficients for total AfT highlight its broader donor diversity and extensive aid coverage, reinforcing its effectiveness in strengthening EEs' involvement in GVCs. The novelty of my thesis lies in its specific focus on EEs, using the most recent data available, while considering both donor and recipient perspectives. It employs the more robust PPML estimation method in gravity models together with DiD model, examines both total AfT and bilateral AfT disbursements by each country, and incorporates several TiVA data variables to provide a comprehensive analysis of GVC engagement from multiple perspectives.

7.3. Policy recommendations

This thesis contributes to our understanding of how international development aid, specifically AfT, impacts the exports of EEs and their engagement in GVCs, suggesting valuable implications for policymakers. The thesis highlights the complexity of aid dynamics and the need to consider various subcategories and perspectives when assessing the effects of AfT. Policymakers can take into consideration a number of recommendations based on the research findings to improve the effectiveness of the AfT initiative and encourage the sustainable development of EEs.

Overall, the findings indicate a positive impact of AfT on both exports and participation in GVCs, suggesting that AfT should remain a crucial component of the SDGs due to its demonstrated effectiveness. Given the sizeable portion of AfT these economies devote to economic infrastructure (AfEI), policymakers might think about keeping or sharpening this emphasis to promote sustainable development. Improved infrastructure eases trade flows, reduces transaction costs, and raises logistical efficiency, relevant to the purpose of integrating EEs into GVCs. This would facilitate activities both upstream and downstream, which would now have easier access to global markets and suppliers. It is also advised to maximise AfBPC, with an emphasis on figuring out which relevant industries or activities add the most to productive capacity. Increasing AfBPC will enable EEs to progress along the GVCs by transforming their role from that of low-value added performers in early production stages to more sophisticated production stages such as design, branding and technology. Consequently, this increase in DVA share in exports is expected to improve the general competitiveness of these countries.

Moreover, policymakers should promote AfT initiatives that bolster both upstream and downstream functions in EEs. Strengthening both ends of the value chain enables EEs to develop a more complete GVC strategy to realize more value and contribute to sustainable growth. The dual focus reduces reliance on foreign value-added components in responses to increased domestic contributions to upstream and downstream functions. Furthermore, policymakers should reconsider the distribution of AfT, leading to a relatively more balanced distribution of AfT, enabling backward and forward linkages. Characteristically, there is a need to sustain some commitment to backward linkages and initial engagement in GVCs, however the real investment should be committed to forward

linkages and higher value-added activities, thereby moving local industries further toward greater economic independence and global economic contribution.

Given that the impact of AfT and its subcategories varies depending on whether the importer is a donor or non-donor country, policymakers should adjust aid programmes to better meet the particular requirements and distinctive features of these groups. Policymakers should work with EEs to diversify both their trade relationships and their sources of aid beyond traditional donor countries, as a diversified portfolio of donors not only expands export markets and reduces dependence on donor value-added but also contributes more effectively to GVC integration as per the findings of this thesis. Finally, continuous monitoring and evaluation should be conducted to assess the effectiveness of AfT programs to enable the aid to meet the evolving needs of EEs and dynamics of world trade.

7.4. Thesis limitations and future research directions

In the analysis comparing traditional data with TiVA data in the application of gravity models, a limitation is that, despite examining a relatively large sample, the calculations primarily focus on developed countries due to data availability constraints. Dividing the countries into two groups did not alter the results; however, this may be influenced by the fact that the OECD TiVA database provides better coverage for high-income economies than for low- and middle-income (manufacturing) economies. Furthermore, there might be discrepancies in the quality of the data, with potential issues like inconsistent or incomplete records impacting the reliability of the results. For future research, I suggest exploring the differences in results at the industry level, as sectors vary significantly in their degree of integration into GVCs. Some industries may be more deeply involved in GVCs than others, Thus, conducting analysis at the sectoral level could be a valuable direction for further research, as well as exploring the group of less developed countries, which may yield new insights.

The displayed findings in the analysis of impact of AfT on exports of EEs highlight opportunities for further exploration too. There is a chance that the thesis might have focused on a narrow range of variables, possibly ignoring other relevant variables that could affect the results. Considering a larger range of factors, such as institutional factors, technology and innovation, corruption and transparency and financial stability, could yield a more comprehensive understanding. Moreover, broadening the range of

countries included in the thesis can similarly yield beneficial outcomes. The effectiveness of AfT can be greatly impacted by the qualitative aspects of policy implementation, which may not be sufficiently explored in this thesis. It is essential to comprehend the implementation challenges that exist on the ground. Furthermore, the results revealed significant heterogeneity among EEs, highlighting the importance of detailed country-level studies.

In analysing the impact of AfT on the GVC engagement of EEs, several limitations can be noted. First, the analysis is constrained by the limited time period covered, concluding in 2020, due to the availability of data. However, significant changes have happened since then, including COVID-19 pandemic, the Russia-Ukraine war, an increase in protectionism and a change in the dynamics of global trade. These events might potentially alter trade patterns and GVC structures in ways that are not reflected in the analysis. As a result, the findings may not fully capture long-term trends or the evolving nature of GVCs and AfT. Additionally, the use of aggregate data for AfT and GVC variables could mask significant sectoral or industry-level differences. This aggregation might overlook how specific sectors are uniquely affected by AfT, leading to a potentially oversimplified understanding of the relationship between AfT and GVC integration. Future research should focus on examining the impact of AfT on GVCs at the sectoral level to provide more detailed insights. Moreover, the role of China, particularly its Belt and Road Initiative, could influence these outcomes, as China's involvement in global trade and infrastructure development may shape the results in ways not fully captured in broader analyses. Furthermore, incorporating qualitative analysis could offer more comprehensive results by addressing the qualitative aspects of AfT and GVC engagement.

Furthermore, future research should address some of the limitations associated with the TiVA data used in this dissertation, particularly its treatment of direct and indirect traded value-added. This is especially relevant for the FFV_DVA and DFD_FVA variables used in testing the final hypothesis. Incorporating indirect export value-added (i.e., value-added that reaches foreign markets through intermediaries) into a gravity model presents methodological challenges, particularly when donor and recipient economies differ significantly in their level of development. A more refined approach that separates direct and indirect value-added trade flows could enhance the accuracy of such analyses. Additionally, the economic and market power of donor countries plays a crucial role in

shaping trade and aid relationships, as aid disbursements vary significantly across donors. Future studies could explore these asymmetries in greater detail to provide a more nuanced understanding of how Aid for Trade influences GVC participation.

Overall, the conclusions presented in this chapter highlight the complex relationship that exists between trade assistance programs and the incorporation of EEs into GVCs. Trade aid initiatives have the potential to stimulate EEs' involvement in GVCs and promote inclusive growth on a global level by addressing infrastructure limitations, fostering productive capacities, and improving trade policy and regulatory frameworks. To achieve these goals, nevertheless, will require continued study into the complex dynamics of this connection and how best to maximize trade assistance measures in the context of GVC integration.

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Appendices

Appendix 1 List of emerging economies

Argentina	Nigeria
Bangladesh	Oman
Brazil	Pakistan
Bulgaria	Peru
Chile	Philippines
China	Poland
Colombia	Qatar
Czech Republic	Romania
Egypt	Russia
Greece	Saudi Arabia
Hungary	South Africa
India	South Korea
Indonesia	Taiwan
Iran	Thailand
Israel	Turkey
Kuwait	Ukraine
Malaysia	United Arab Emirates
Mauritius	Venezuela
Mexico	Vietnam
Morocco	

Source: Own construction based on classifications of several research groups and financial organisations.

Appendix 2 Total funds disbursed to EEs through AfT and its subcategories, 2002-2020

Countries	AfT	AfEI	AfBPC	AfTPR
IND	$31.42 B	$24.31 B	$7.06 B	$.06 B
VNM	$18.61 B	$15.36 B	$3.05 B	$.19 B
IDN	$12.84 B	$8.84 B	$3.37 B	$.63 B
BGD	$9.95 B	$7.96 B	$1.96 B	$.03 B
CHN	$8.97 B	$5.54 B	$3.37 B	$.07 B
EGY	$8.88 B	$4.01 B	$3.66 B	$1.21 B
MAR	$7.74 B	$5.03 B	$2.65 B	$.05 B
PHL	$7.08 B	$5.25 B	$1.77 B	$.07 B
PAK	$5.76 B	$3.73 B	$1.92 B	$.11 B
TUR	$5.71 B	$3.90 B	$1.80 B	$.00 B
THA	$5.31 B	$4.77 B	$.52 B	$.02 B
BRA	$3.59 B	$2.52 B	$1.06 B	$.02 B
ZAF	$3.26 B	$1.77 B	$1.37 B	$.12 B
COL	$2.74 B	$.57 B	$2.11 B	$.06 B
MEX	$2.49 B	$2.02 B	$.46 B	$.01 B
PER	$2.47 B	$.63 B	$1.74 B	$.10 B
NGA	$2.34 B	$.73 B	$1.54 B	$.07 B
UKR	$1.89 B	$1.04 B	$.77 B	$.08 B
CHL	$.81 B	$.32 B	$.48 B	$.00 B
MYS	$.69 B	$.51 B	$.16 B	$.02 B
MUS	$.44 B	$.25 B	$.19 B	$.00 B
ARG	$.30 B	$.04 B	$.24 B	$.01 B
IRN	$.10 B	$.06 B	$.04 B	$.00 B
VEN	$.06 B	$.04 B	$.02 B	$.00 B

Source: Own construction based on OECD QWIDS database.

Appendix 3 Step-by-step evolution of the gravity model from theoretical to structural formulation

The gravity model of trade has undergone significant theoretical and empirical advancements since its inception. Below, I a detailed, step-by-step explanation of how the basic gravity model (Equation 4) evolves into the structural gravity model (Equation 5) is provided, drawing on insights from trade theory and the work of Yotov et al. (2016).

Step 1. Theoretical Foundation of the Basic Gravity Model

The basic gravity model, inspired by Newton's law of gravitation, is expressed as:

$$T_{ij} = G\frac{GDP_i^{\alpha}GDP_j^{\beta}}{D_{ij}^{\theta}} \qquad (4)$$

where:

- T_{ij} represents trade flows from country *i* to country *j*,
- G is a constant,
- GDP_i and GDP_j are the economic sizes (GDP) of countries *i* and *j*,
- D_{ij} is the distance between the two countries,
- α, β, and θ are parameters to be estimated.

This formulation captures the intuitive idea that trade flows are proportional to the economic size of the trading partners and inversely proportional to the distance between them. However, this model lacks microeconomic foundations and does not account for multilateral resistance terms or trade costs in a theoretically consistent way.

Step 2. Incorporating Microeconomic Foundations

To derive the structural gravity model, we start with a framework based on monopolistic competition and trade costs, as in Anderson and van Wincoop (2003) and Yotov et al. (2016). Consider a world with *N* countries, each producing differentiated goods under increasing returns to scale. Consumers have constant elasticity of substitution (CES) preferences over these goods.

The utility function of a representative consumer in country *j* is:

$$U_j = \left(\sum_{i=1}^{N} c_{ij}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \quad (15)$$

where:

- c_{ij} is the consumption of goods from country *i* in country *j*,
- σ >1 is the elasticity of substitution between goods.

The consumer's budget constraint is:

$$\sum_{i=1}^{N} p_{ij} c_{ij} = E_j \quad (16)$$

where:

- p_{ij} is the price of goods from country *i* in country *j*,
- E_j is the total expenditure of country *j*.

Step 3. Introducing Trade Costs

Trade costs are introduced as "iceberg" costs, where $\phi_{ij} \geq 1$ units of a good must be shipped from country *i* for one unit to arrive in country *j*. The price of goods from country *i* in country *j* is then:

$$p_{ij} = p_i \phi_{ij} \quad (17)$$

where p_i is the factory-gate price of goods from country *i*.

Step 4. Demand for Goods and Trade Flows

Using the CES demand function, the quantity of goods demanded from country *i* in country *j* is:

$$c_{ij} = \left(\frac{p_{ij}}{P_j} \right)^{-\sigma} \frac{E_j}{P_j} \quad (18)$$

where P_j is the price index in country *j*, defined as:

$$P_j = \left(\sum_{i=1}^{N} (p_i \phi_{ij})^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \quad (19)$$

Multiplying the quantity demanded by the price, we obtain the value of trade flows from *i* to *j*:

$$X_{ij} = p_i \phi_{ij} c_{ij} = \left(\frac{p_i \phi_{ij}}{P_j} \right)^{1-\sigma} E_j \quad (20)$$

Step 5. Market Clearing and General Equilibrium

In equilibrium, the total production of country $i(Y_i)$ must equal the sum of its exports to all countries:

$$Y_i = \sum_{j=1}^{N} X_{ij} = \sum_{j=1}^{N} \left(\frac{p_i \phi_{ij}}{P_j} \right)^{1-\sigma} E_j \quad (21)$$

Solving for $p_i^{1-\sigma}$, I get:

$$p_i^{1-\sigma} = \frac{Y_i}{\sum_{j=1}^{N} \left(\frac{\phi_{ij}}{P_j} \right)^{1-\sigma} E_j} \quad (22)$$

Step 6. Introducing Multilateral Resistance Terms

Define the outward multilateral resistance term Ω_i and the inward multilateral resistance term P_j as:

$$\Omega_i = \sum_{j=1}^{N} \left(\frac{\phi_{ij}}{P_j} \right)^{1-\sigma} E_j \quad (23)$$

$$P_j^{1-\sigma} = \sum_{i=1}^{N} \left(\frac{\phi_{ij}}{\Omega_i} \right)^{1-\sigma} Y_i \quad (24)$$

These terms capture the fact that trade between two countries depends not only on their bilateral trade costs but also on their trade costs with all other countries.

Step 7. Deriving the Structural Gravity Model

Substituting $p_j^{1-\sigma}$ and the multilateral resistance terms into the trade flow equation, I obtain the structural gravity model:

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{\phi_{ij}}{\Omega_i P_j}\right)^{(1-\sigma)} \quad (5)$$

where:

- $Y = \sum_{i=1}^{N} Y_i$ is global GDP,
- ϕ_{ij} represents bilateral trade costs,
- Ω_i and P_j are the multilateral resistance terms.

Step 8. Linking Equation 4 to Equation 5

The structural gravity model (Equation 5) generalizes the basic gravity model (Equation 4) by:

1. Introducing microeconomic foundations (CES preferences, monopolistic competition),
2. Explicitly modelling trade costs ϕ_{ij},
3. Incorporating multilateral resistance terms (Ω_i and P_j) to account for general equilibrium effects.

The basic gravity model can be seen as a special case of the structural gravity model, where:

- $\phi_{ij} = D_{ij}^{\theta}$,
- Ω_i and P_j are ignored or assumed constant,
- α=β=1 and σ is not explicitly considered.

The evolution from the basic gravity model (Equation 4) to the structural gravity model (Equation 5) reflects the incorporation of microeconomic foundations, trade costs, and multilateral resistance terms. This theoretical advancement, as detailed in Yotov et al. (2016), provides a more rigorous and empirically robust framework for analysing bilateral trade flows. The structural gravity model has become the standard in trade policy analysis, enabling researchers to account for the complex interplay of bilateral and multilateral factors in determining trade patterns.

Appendix 4 HICs and LMICs utilised in the first analysis

HICs		**LMICs**
Australia	Latvia	Argentina
Austria	Lithuania	Brazil
Belgium	Luxembourg	Bulgaria
Brunei Darussalam	Malta	Cambodia
Canada	Netherlands	China
Chile	New Zealand	Colombia
Croatia	Norway	Costa Rica
Cyprus	Poland	India
Czech Republic	Portugal	Indonesia
Denmark	Romania	Kazakhstan
Estonia	Saudi Arabia	Laos
Finland	Singapore	Malaysia
France	Slovakia	Mexico
Germany	Slovenia	Morocco
Greece	Spain	Myanmar
Hong Kong SAR	Sweden	Peru
Hungary	Switzerland	Philippines
Iceland	Taiwan, Province of China	Russia
Ireland	United Kingdom	South Africa
Israel	United States of America	Thailand
Italy		Tunisia
Japan		Turkey
Korea, Republic		Vietnam

Source: Own construction based on World Bank database.

Appendix 5 Correspondence between the structural gravity model (Equation 5) and empirical specifications (Equations 6 and 7)

In this section, I explain how the empirical specifications in Equations (6) and (7) correspond to the structural gravity model (Equation 5). This explanation draws on the theoretical foundations of the gravity model and the empirical implementation as discussed in Yotov et al. (2016).

Step 1. Linearizing the Structural Gravity Model

To estimate the structural gravity model empirically, it is common to take the natural logarithm of Equation (2). This linearizes the multiplicative relationship and allows for the use of linear regression techniques. Taking logs of both sides, I get:

$$lnX_{ij} = ln\left(\frac{Y_i E_j}{Y}\right) + (1-\sigma)ln\phi_{ij} - (1-\sigma)ln\Omega_i - (1-\sigma)lnP_j \qquad (25)$$

This can be rewritten as:

$$lnX_{ij} = lnY_i + lnE_j - lnY + (1-\sigma)ln\phi_{ij} - (1-\sigma)ln\Omega_i - (1-\sigma)lnP_j \qquad (26)$$

Step 2. Incorporating Bilateral Trade Costs

Bilateral trade costs (ϕ_{ij}) are typically modelled as a function of observable trade cost variables, such as distance, contiguity, common language, colonial ties, and regional trade agreements. A common specification is:

$$ln\phi_{ij} = \beta_1 lnDIST_{ij} + \beta_2 CNTG_{ij} + \beta_3 LANG_{ij} + \beta_4 CLNY_{ij} + \beta_5 RTA_{ij} \qquad (27)$$

Substituting this into the log-linearized gravity equation, I get:

$$\begin{aligned} lnX_{ij} = lnY_i + lnE_j - lnY + (1-\sigma)(\beta_1 lnDIST_{ij} + \beta_2 CNTG_{ij} + \beta_3 LANG_{ij} \\ + \beta_4 CLNY_{ij} + \beta_5 RTA_{ij}) - (1-\sigma)ln\Omega_i - (1-\sigma)lnP_j \end{aligned} \qquad (28)$$

Step 3. Introducing Fixed Effects

The terms lnY_i, lnE_j, $ln\Omega_i$, and lnP_j are typically unobserved or difficult to measure directly. To address this, exporter-time fixed effects ($\pi_{i,t}$) and importer-time fixed effects ($\chi_{j,t}$) are introduced. These fixed effects capture:

- The economic size of the exporter (Y_i) and importer (E_j),
- The multilateral resistance terms (Ω_i and P_j),

- Any other time-varying exporter- or importer-specific factors.

The log-linearized gravity equation then becomes:

$$lnX_{ij,t} = \pi_{i,t} + \chi_{j,t} + \beta_1 lnDIST_{ij} + \beta_2 CNTG_{ij} + \beta_3 LANG_{ij} + \beta_4 CLNY_{ij} + \beta_5 RTA_{ij} + \varepsilon_{ij,t} \quad (6)$$

where:

- $\pi_{i,t} = lnY_i - (1-\sigma) ln\Omega_i$,
- $\chi_{j,t} = lnE_j - (1-\sigma) ln\mathrm{P}_j$,
- $\varepsilon_{ij,t}$ is the error term.

This is the empirical specification in Equation (6). The fixed effects ($\pi_{i,t}$ and $\chi_{j,t}$) absorb the economic size of the exporter and importer, as well as the multilateral resistance terms.

Step 4. Multiplicative Form of the Gravity Model

Equation (9) is the multiplicative form of Equation (8), obtained by exponentiating both sides:

$$X_{ij,t} = exp(\pi_{i,t} + \chi_{j,t} + \beta_1 lnDIST_{ij} + \beta_2 CNTG_{ij} + \beta_3 LANG_{ij} + \beta_4 CLNY_{ij} + \beta_5 RTA_{ij}) \times \varepsilon_{ij,t} \quad (7)$$

This form is useful for simulations or counterfactual analysis, as it directly expresses trade flows as a function of the explanatory variables. Thus, Equations (6) and (7) are empirical implementations of the structural gravity model (Equation 5). They incorporate the economic sizes of the exporter and importer through fixed effects ($\pi_{i,t}$ and $\chi_{j,t}$) and explicitly model bilateral trade costs using observable variables. This approach allows for the estimation of the gravity model while controlling for unobserved heterogeneity and multilateral resistance terms, making it a powerful tool for trade policy analysis. This explanation is equally applicable to Equations 8-11.

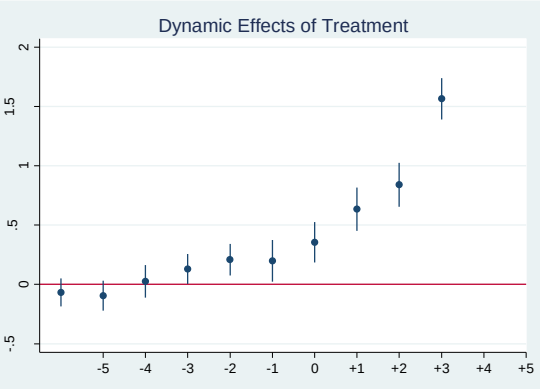
Appendix 6 Countries that provide bilateral AfT as donors and for which TiVA data is available

Austria	Hungary	Poland
Austria	Iceland	Portugal
Belgium	Ireland	Romania
Bulgaria	Israel	Saudi Arabia
Canada	Italy	Slovakia
Croatia	Japan	Slovenia
Cyprus	Kazakhstan	South Korea
Czech Republic	Latvia	Spain
Denmark	Lithuania	Sweden
Estonia	Luxembourg	Switzerland
Finland	Malta	Thailand
France	Netherlands	Turkey
Germany	New Zealand	United Kingdom
Greece	Norway	United States

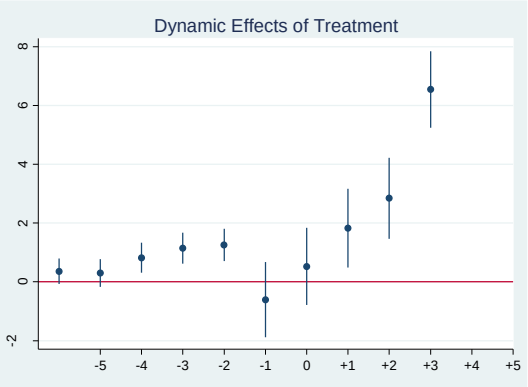
Source: Own construction based on OECD QWIDS and OECD TiVA database.

Appendix 7 Graphical Illustration of Event Study Estimates: Dynamic Effects of AfT on GVC Engagement

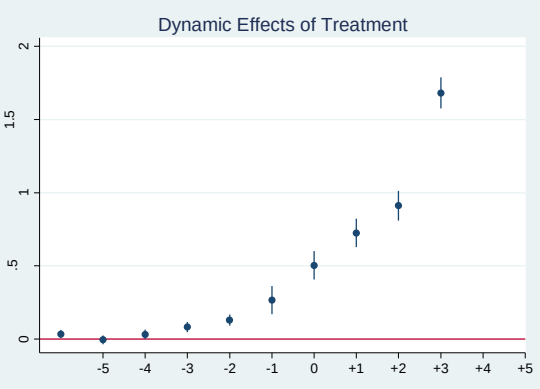
EXGR_DVA



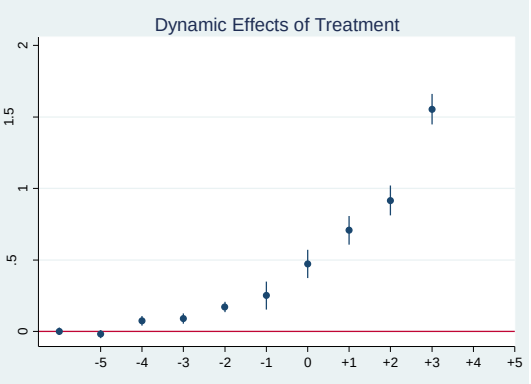
IMGR_DVA



DFD_FVA



FFD_DVA



Source: Own construction.