

Deep Regional Trade Agreement as a Driver for Global Value Chains in Africa: The Case of ECOWAS Region

Afi Balaki
and
Essotanam Mamba

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By

Afi Balaki

Department of Economics, University of Kara, Togo

and

Essotanam Mamba

Department of Economics, University of Kara, Togo

&

Department of Economics, University of Lomé, Togo

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List of abbreviations and acronyms

2SLS	Two-Stage Least Squares
AfCFTA	African Continental Free Trade Area
CET	Common External Tariff
CU	Customs Union
CUEIA	Customs Union & Economic Integration Agreement
DVA	Domestic Value-Added
DVAI	Domestic Value-Added Indicator
DVX	Domestic Value-Added Exports
DVXI	Domestic Value-Added Exports Indicator
EAC	East African Community
ECOWAS	Economic Community of West African States
ECOWIP	ECOWAS Investment Policy
EIA	Economic Integration Agreement
EPA	Economic Partnership Agreement
ERCPF	ECOWAS Regional Competition Policy Framework
ETLS	ECOWAS Trade Liberalization Scheme
EUDF	European Union Development Fund
FDI	Foreign Direct Investment
FTAs	Free Trade Agreements
FTAEIA	Free Trade & Economic Integration Agreement
FVA	Foreign Value-Added
FVAI	Foreign Value-Added Indicator
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
GVCs	Global Value Chains
GVCIs	GVC indicators
ICT	Information and Communications Technology

IPCR	Index of Protocols and Conventions Ratified
IPRs	Intellectual Property Rights
IV	Instrumental Variables
NTBs	Non-Tariff Barriers
OLS	Ordinary Least Squares
PCRs	Protocols and Conventions Ratified
PCSs	Protocols and Conventions Signed
PPML	Poisson Pseudo Maximum Likelihood
PSA	Partial Scope Agreement
PSAEIA	Partial Scope Agreement & Economic Integration Agreement
PTAs	Preferential Trade Agreements
QMLE	Quasi-Maximum Likelihood Estimation
RECs	Regional Economic Communities
REI	Regional Economic Integration
RoOs	Rules of Origin
RTA	Regional Trade Agreement
SPS	Sanitary and Phytosanitary
SSA	Sub-Saharan Africa
TBs	Tariff Barriers
TBTs	Technical Barriers to Trade
TiVA	Trade in Value-Added
UNCTAD	United Nations Conference on Trade and Development
VIFs	Variance Inflation Factors
WACOMP	West Africa Competitiveness Programme
WAEMU	West African Economic Monetary Union
WDI	World Development Indicators
WEF	World Economic Forum
WGI	Worldwide Governance Indicators
WTO	World Trade Organization

Abstract

The paper investigates the effects of deep regional trade agreement (RTA) on global value chains (GVCs) for 11 countries from the Economic Community of West African States (ECOWAS) region over the period 1996–2018 by applying the fractional logit regression technique. GVCs are calculated as shares of foreign value-added (FVA), domestic value-added (DVA), and DVA exports (DVX) in gross exports. Unlike previous works that often use the binary variable, the deepening of RTA is measured by a new continuous indicator, the ratio between the cumulative number of protocols and conventions ratified and the cumulative number of protocols and conventions signed. Second, the paper analyses control of corruption as a channel through which deep RTA influences GVCs. The findings reveal that, deepening RTA significantly increases FVA while it reduces DVA, but only at the 10% level and the findings become insignificant with the inclusion of control variables. Furthermore, our findings indicate the existence of a complementarity relationship between deep RTA and control of corruption in DVX model. ECOWAS governments should pursue the ratification of protocols and conventions and the fight against corruption to take advantage of deep integration in terms of the participation in GVCs.

Key words: *Deep regional trade agreement; Global value chains; ECOWAS; Fractional logit regression; Panel data.*

JEL classification codes: *C26; F1.*

1. Introduction

Global value chains (GVCs), a central element in the examination of international production, represent fragmented and geographically dispersed production processes where different stages of production are located across economies. The economic literature establishes the connection between preferential trade agreements (PTAs), including regional trade agreements (RTAs) or free trade agreements (FTAs) or customs unions, and GVCs (Osnago et al., 2019; Laget et al., 2020; Fontagné & Santoni, 2021; Sanguinet et al., 2021; Zhang et al., 2021). Participation in GVCs is generally analysed in terms of forward participation (domestic value-added, DVA, embodied in exports) and/or backward participation (foreign value-added, FVA, embodied in exports). The theoretical literature suggests that PTAs stimulate GVCs by reducing trade costs and increasing trade facilitation. But Orefice and Rocha (2014), Osnago et al. (2017), Boffa et al. (2019) distinguish traditional PTAs from deep PTAs. Traditional PTAs increase market access by reducing tariff barriers (TBs) and other border measures, while deep PTAs go beyond a reduction in TBs and include provisions (such as investment provisions, provisions on anti-corruption, and competition policy) that cover a large number of non-tariff measures, both at the border and behind-the-border.

Besides, deep RTAs stimulate integration with non-member States because behind-the-border reforms occur in areas where it is difficult to discriminate between trading partners, thus also benefiting economies that are not signatories to the agreement (Boffa et al., 2019). They postulate that deep forms of integration, specifically deep RTA, through the trade policies harmonization, promote both DVA and FVA. Some recent empirical studies (Obasaju et al. 2019, 2021; Sanguinet et al., 2021) find the insignificant effect of Regional Economic Integration, REI, (also called RTA as mentioned by Rauschendorfer and Twum, 2021) on GVCs (forward and backward participation). Other works indicate that PTAs or economic integrations increase international production networks (Hayakawa & Yamashita, 2011; Orefice & Rocha, 2014; Blyde et al., 2015) and GVCs (Boffa et al., 2019; Zhang et al., 2021). These findings depend on the measurement of the variables of interest (TAs or GVCs), the study area, and the estimation techniques used (Boffa et al., 2019; Laget et al., 2020).

The interest in this paper is to examine the effect of deep RTA on GVCs in the Economic Community of West African States (ECOWAS). ECOWAS, established on 28 May 1975, aims to promote economic integration of the members States. In this vein, the ECOWAS Trade Liberalization Scheme (ETLS) was instituted in 1979 to achieve

this goal. The scheme was initially focused on agricultural, artisanal, handicraft and unprocessed products, and later extended in 1990 to cover processed and industrial goods. The implementation of the ETLs is guided by ECOWAS protocols and conventions, in particular those on rules of origin. Others include those on the free movement of people, goods and transport. The ECOWAS Common External Tariff (CET) entered into force on 1 January 2015. The three criteria for admission of products into the ETLs include, (i) at least 60% local content of products (ii) at least 30% value-addition for products, and (iii) change of tariff headings (reflected in HS-code). The deepening in content of the ETLs and its implementation, especially through ratified protocols and conventions or the ratio between Protocols and Conventions Ratified (PCRs) and Protocols and Conventions Signed (PCSs), can be used to better appreciate the deepening of the RTA in the ECOWAS region. The fundamental question is: does the ECOWAS region as a deep RTA a driver for GVCs? This question can be divided into three sub-questions: What is the effect of deep RTA on FVA (backward linkage)? What is the effect of deep RTA on DVA (total DVA; DVA exports, forward linkage)? Is control of corruption a channel through which deep RTA influences GVCs?

This paper is closely related to the literature on the effects of PTAs on GVCs. But, the present paper contributes to the literature in two ways. First, the present paper applies a new continuous indicator relating to the implementation of the ETLs to capture the effect of deep RTA on GVCs, and not on trade performances. Mamba and Balaki (2021) have used a similar indicator to investigate its effect on trade (exports and imports). Second, this paper goes beyond previous works by examining the channel (control of corruption) by which RTA affects GVCs.

The overall objective of this paper is to investigate the effects of deep RTA on GVCs in the ECOWAS.

The remainder of this paper is structured as follows. Section 2 presents a brief review of literature, while Section 3 shows stylized facts. Section 4 is devoted to the empirical approach, while Section 5 describes the data. Section 6 presents the findings, and Section 7 concludes the study.

2. Brief review of literature

There is a growing body of literature on the link between deeper forms of integration and GVCs. Lawrence (1996) is cited as the first paper that has highlighted the connection between deep integration and GVCs. This paper is followed by those of Antràs and Staiger (2012) and Orefice and Rocha (2014). However, from a policy perspective, TAs are increasing in number and deepening in content (Ruta, 2017; Maggi & Ossa, 2020). The economic literature states that TAs and GVCs can go in both directions. While TA is important for GVC, the latter generates new forms of cross-border policy effects that only deep TAs can solve. Deep PTAs include provisions regulating technical barriers to trade (TBTs), sanitary and phytosanitary (SPS) measures, rules on investment and intellectual property rights (IPRs) protection, provisions on anti-corruption, competition policy, and labour standards (Orefice & Rocha, 2014; Osnago et al., 2017), that go beyond the scope of World Trade Organization (WTO) obligations. This suggests that deep TAs can increase GVCs through the reduction of the credibility issues which States may face behind their border measures, investment, and governance improvements via a wide range of disciplines and coordination of domestic regulations (Zhang et al., 2021) and increased international technology spillovers (Jinji et al., 2019). Backward activities demand more the protection of investment and IPR, and are mostly about processing and assembling foreign inputs and exporting the resulting products, while the development of forward activities, control of the production process in addition to the protection of investment and IPR, requires more policy coordination (Boffa et al., 2019).

Deep RTA tends to cover a wide range of disciplines (Blyde et al., 2015) that are relevant for governance, especially control of corruption (Al-Marhubi, 2005). This is not surprising because the ETLS includes a protocol A/P3/12/01 on anti-corruption signed in Dakar on 21 December 2001. This suggests that deep integration, through the implementation of the protocol on anti-corruption, is likely to promote control of corruption. Some recent studies analyse the relationship between trade integration (openness) and governance, especially corruption (Anderson & Marcouiller, 2002; Al-Marhubi, 2005; Levchenko, 2007, 2012; Mamba, 2021). Policy and institutional harmonization may help States to overcome weaknesses in governance by increasing the credibility and legitimacy of domestic policy and institutions (Al-Marhubi, 2005). It is widely admitted that greater integration will ameliorate governance quality via diverse channels including reducing rents (greater competition in products markets

lowers rents), creating constituencies for reform, and inducing specialization in sectors that demand good governance (Levchenko, 2012). All these enhance trade, particularly GVCs in trade.

Reciprocally, good governance enhances trade flows, especially GVCs in trade by reducing trade costs and informal trade barriers and leading to deep integration. Based on some institutional indices from World Economic Forum (WEF), Anderson and Marcouiller (2002) suggest that institutional quality may act as proxies for traditional trade barriers. For these authors, inadequate institutions constrain trade as much as tariffs do, while the correlation between institution measures and non-tariff barriers (NTBs) is low. Good governance leads to greater integration and trade flows, especially GVCs in trade, by facilitating contracts, reducing the extorted bribes by customs officials and uncertainty associated with trade, rising investments, productivity, and transparency (Anderson & Marcouiller, 2002).¹ The openness-governance nexus may be the result of the potentially increased costs associated with greater integration.

Some empirical studies examined the effect of deep integration on GVCs using the gravity framework. Blyde and Faggioni (2017) investigate the relationship between RTA (dummy variable of FTA) and FVA using the gravity model for 126 countries. The findings indicate that FTA increases GVCs, but diagonal accumulation has a significant negative effect on GVCs. Boffa et al. (2019) explore the effect of deep TAs on GVCs (DVA and FVA) using the standard gravity model framework. Applying Ordinary Least Squares (OLS) and Poisson Pseudo Maximum Likelihood (PPML) techniques, they conclude that deep RTA has a greater effect on GVCs than other forms of integration such as shallow RTA and bilateral investment treaties. Zhang et al. (2021) explore the export promotion effects of FTAs on Member States' GVC trade over the period 2000–2014 in a gravity model framework. Empirical findings suggest that deep FTA significantly stimulate both the total trade and exports of FVA among Member States. Furthermore, Zhang et al. (2021) demonstrate that gaps in economic development levels among FTA members and FTA structures can both lead to asymmetric and heterogeneous effects on their FTA exports. Laget et al. (2020) found a heterogeneity effect of deep PTAs on GVCs.

Other works explore the non-gravity framework. These studies use an intra-regional share of intermediate imports as a share of total intermediate imports to capture the effects of regional economic integration (REI) or RTA. Kowalski et al. (2015) analyse the effects of a core trade and investment policy-related factors, including RTA coverage of intermediate's imports and exports on GVCs (backward and forward GVC integration indicators) using particularly a non-gravity specification. The trade in value-added (TiVA) data available for five years for 57 countries is the main source, while EORA database covering 187 emerging and developing economies in 22 years is an auxiliary source. The findings indicate that RTAs can facilitate backward GVC participation (FVA), while RTAs have no effect on forward GVC participation (DVX). Obasaju et al. (2019) explore the effect of the REI on GVCs measured by FVA embodied in exports in ECOWAS over the period 2007–2012. Applying the generalized method of moments (GMM), Obasaju et al. (2019) find the insignificant effect of REI on GVCs.²

Besides, focusing on the interaction between different forms of trade integration and governance, there is a growing body of literature. Especially, Mukherjee (2015) investigates the effect of PTA on corruption using the cross-country panel data for 138 countries over the period 1984--2003. Based on the instrumental variables (IV) approach—two-stage least squares, 2SLS—the findings suggest that, PTA significantly reduces corruption. Also, while the empirical literature looking at the effect of governance on trade is growing, empirical studies on the effect of governance on GVCs remain less explored.

In sum, previous studies used both gravity and non-gravity models. In addition, except Kowalski et al. (2015), these studies often use the log of GVC indicators. In line with Kowalski et al. (2015), this paper focuses on GVC indicators measured by fractions of gross exports, but using a new continuous indicator as a proxy of deep RTA. Also, we explore the combined effect of control of corruption and deep RTA on GVCs.

3. Stylized facts

Deep regional trade agreement: State of the ETLS implementation

ECOWAS region established, on 28 May 1975 via the Lagos Treaty adopted in 1979, a trade integration programme called ECOWAS Trade Liberalization Scheme (ETLS). Similar to most other RTAs, the objective of the ECOWAS region is to deepen regional integration and economic development through harmonization and coordination policies, and trade facilitation efforts. While the ETLS aimed to progressively remove TBs and NTBs to completely liberalize trade, some challenges exist. The implementation of the ETLS gave effect to the entry into force of the ECOWAS Common External Tariff (CET) on 1 January 2015. Table 1 displays the structure of the ECOWAS-CET.

Table 1: Structure of the ECOWAS-CET

Categories	Products Concerned	Customs Duties	Tariff Lines
Category 0	Essential social goods: crude and semi-refined petroleum, drugs and medical products, books, newspapers, newsprint	0%	85
Category 1	Basic necessity goods, basic raw materials, equipment goods, specific inputs	5%	2146
Category 2	Other inputs and intermediate products	10%	1373
Category 3	Final consumption goods and other goods	20%	2165
Category 4	Specific goods for development	35%	130

Source: Mamba and Balaki (2021).

Besides, the CET has an exception list of 300 products. Some of these products include bagged cement, ball point pens, birds' eggs, cassava, furniture, paper products, and waters. Until 2018, only Cabo Verde had not implemented the ECOWAS-CET. The ECOWAS-CET, through the harmonization of customs duties and taxes of equivalent effect at the borders of the Member States, aims to deepen the customs union, a platform conducive to the development of the ECOWAS common trade policy and regional trade negotiations such as the Economic Partnership Agreement (EPA) between West Africa and European Union, to boost regional productive capacity and investment, and to consolidate the regional market (ECOWAS, 2016). The need to create an ECOWAS investment market emerged following

the start of negotiations between the ECOWAS Members and the European Union (EU) in October 2003 to agree on the terms of the EPA. The ECOWAS Investment Policy (ECOWIP) aims to establish harmonized regional investment-climate policies which are favourable for national investment and foreign direct investment (FDI), including both intra-regional and extra-regional investment for the Member countries in West Africa.

The ECOWAS Heads of State adopted, on 19 December 2008, a regional investment instrument in Abuja, namely, the Supplementary Act A/SA.3/12/08, adopting community rules on investment and the modalities for their implementation within ECOWAS (ECOWAS Supplementary Investment Act). Also, in 2007, the ECOWAS Regional Competition Policy Framework (ERCPF) was adopted. Besides, the deepening of the ECOWAS RTA is important for the insertion of ECOWAS countries within the African Continental Free Trade Area (AfCFTA) agreement, which was signed on 21 March 2018, and entered into force on 30 May 2019. The AfCFTA is signed by all ECOWAS countries, while four countries, i.e., Benin, Cabo Verde, Guinea-Bissau, and Liberia have not yet ratified this AfCFTA. Until 4 October 2021, Nigeria was the last ECOWAS country that has ratified the AfCFTA.

Beyond the implementation of the ECOWAS-CET, the ETLs has harmonized some policy instruments, including rules of origin (RoOs), anti-dumping measures, countervailing measures, safeguard measures, SPS regulations, technical and sanitary standards, and ECOWAS community levy. Particularly, the RoO governing the eligibility of products for preferential treatment within the West African Economic Monetary Union (WAEMU) and ECOWAS has largely been coordinated since 2003 in the West Africa (West African region is characterized by the coexistence of two zones: ECOWAS and WAEMU). RoOs of the ETLs are defined by Protocol A/01/03 signed in Dakar on 31 January 2003, relating to the definition of the ECOWAS entered into force temporarily upon signature on 31 January 2003 (coded as 41). The first additional protocols relating to the RoO include, Additional Protocol A/SP1/5/79 (coded by 4), Additional Protocol A/SP2/5/79 (coded by 5), and Additional Protocol A/SP3/5/80 (coded by 6).

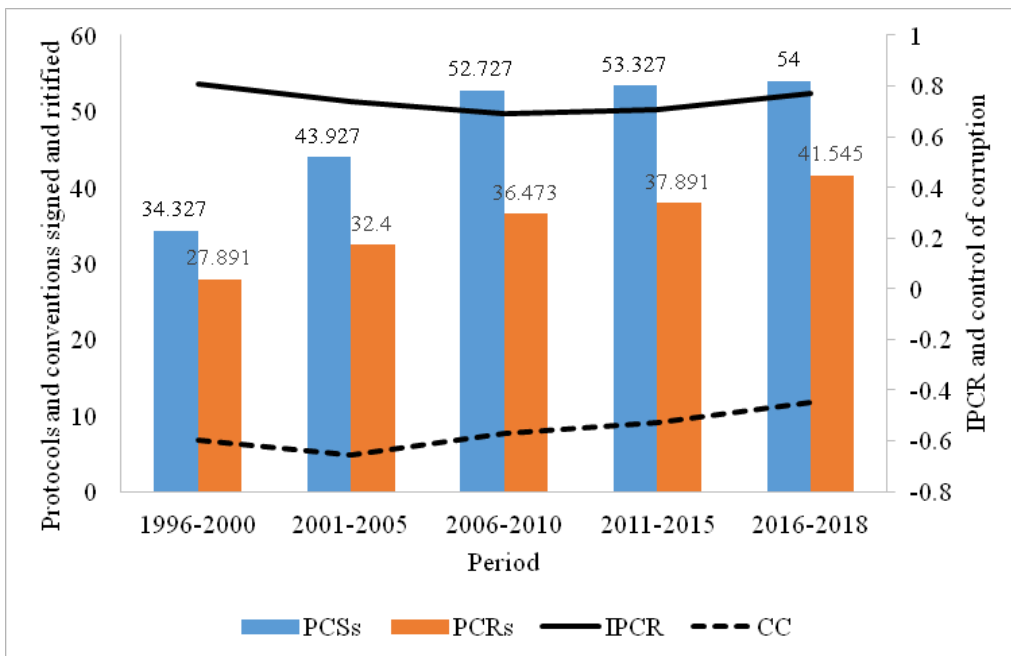
Other protocols and conventions of ETLs include, among others, Protocol A/P1/5/79 (coded by 3) on the free movement of persons, the right of residence and establishment, signed in Dakar on 29 May 1979; Convention A/P5/5/82 (coded by 12), signed in Cotonou on 29 May 1982, on mutual assistance administrative in custom matters; Protocol relating to the conditions of application of the community levy A/P7/96 (coded by 33) signed in Abuja on 27 July 1996; and Protocol A/P3/12/01 on anti-corruption (coded by 39) signed in Dakar 21 December 2001. We note that these protocols and conventions are not fully implemented due to the use of unilateral deviations which enhance tariff and non-tariff barriers by some countries such as Nigeria.

The number of PCSs by the ECOWAS countries increases from two in 1978 to 54 in 2013. Note that until 2014, Guinea Bissau has neither signed nor acceded to the Convention A/P1/8/94 on extradition, signed in Abuja on 6 August 1994 (ECOWAS, 2014, annual report). Also, until 2015, Cabo Verde had neither signed nor acceded to the Protocol, A/SP3/5/81 signed in Freetown on 19 May 1981, relating to mutual assistance on defense; the Protocol A/P1/12/99 signed in Lomé on 10 December 1999, relating to the mechanism for conflict prevention, management resolution, peacekeeping

and security; and the Protocol A/SP1/12/01, signed in Dakar on 1 December 2001, on democracy and good governance supplementary to the protocol relating to the mechanism for conflict prevention, management resolution, peacekeeping and security (ECOWAS, 2015, annual report). In 1978, out of the two PCSs, no country ratified any of these ETLS protocols and conventions. In 2016–2018, out of the 54 PCSs, Burkina Faso and Liberia ratified the highest number which is 52.

The above paragraph suggests that the cumulative number of PCSs, since 1978 at a given date, for Cabo Verde and Guinea Bissau countries differs from the other ECOWAS countries. Considering this information, IPCR is measured as the ratio of each country's cumulative number of PCRs to its cumulative number of PCS. On average, Figure 1 shows an increase in PCSs and PCRs, reflecting the depth of integration in ECOWAS. But the gap between PCSs and PCRs indicates that the ETLS implementation remains a challenge in the ECOWAS region. Besides, the average annual level of control of corruption in ECOWAS region remains negative over the period 1996–2018. Control of corruption varies from -2.5 to +2.5; higher values reflect “good” quality of governance. The comparative analysis by country shows that only Cabo Verde registers a positive average value of control of corruption reflecting “good” quality of governance. Again, this is an indication that ECOWAS region is far from being a deep RTA.

Figure 1: Trends in the averages of the cumulative number of protocols and conventions ratified and signed, their ratio, and control of corruption in ECOWAS (1996-2018)



Notes: PCSs: protocols and conventions signed; PCRs: protocols and conventions ratified; IPCR: ratio between PCRs and PCSs. For these variables, data reported for the period 2016–2018 is relating to the year 2016 and 2017. CC: control of corruption, varies from -2.5 to +2.5. Source: Authors, based on the databases of Mamba and Balaki (2021) and Worldwide Governance Indicators (WGI).

Deep regional trade agreement: Challenges and trade facilitation efforts in ECOWAS

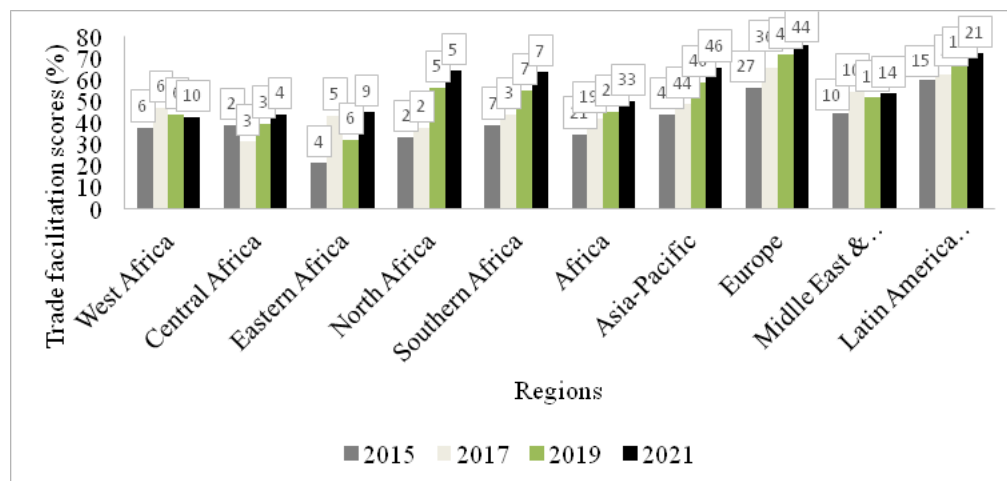
It is important to state that the implementation of the ETLs is primarily the responsibility of member countries. Despite the efforts of integration, there are some implementation challenges. Concretely, ECOWAS region, like many African Regional Economic Communities (RECs), endured on paper but declined in practice. The “Mario Larch’s RTAs Database from Egger and Larch (2008)” includes all multilateral and bilateral RTAs as notified to the World Trade Organization for the last 70 years from 1950 to 2019. These RTAs are measured by the following RTA-type dummy variables: Customs Union (CU), Free Trade Agreement (FTA), Partial Scope Agreement (PSA), Economic Integration Agreement (EIA), Customs Union & Economic Integration Agreement (CUEIA), Free Trade & Economic Integration Agreement (FTAEIA), and Partial Scope Agreement & Economic Integration Agreement (PSAEIA). Besides, there is the following RTA-type dummy variable that captures the combination of all RTA types: Regional Trade Agreement (RTA) equal to 1 if any of the other RTA-type dummies is 1, otherwise 0.

This database shows that, within ECOWAS region, only Benin, Burkina Faso, and Cote d'Ivoire are exporters while other countries are importers. These three countries signed with others members RTAs and CUs from the year 1975 or 1976 to 2019. Finally, only Benin signed a PSA with Ghana (since 1990), Guinea (since 1990) and Nigeria (since 1989). But no country has signed FTA, EIA, CUEIA, FTAEIA, and PSAEIA with other ECOWAS countries. All these observations suggest that cross-border trade remains a challenge in ECOWAS countries, and this hinders the participation of these countries in the GVCs.

Besides, some ECOWAS countries, especially Nigeria, deviate from the implementation of the ETLs using unilateral deviations to increase external protection. Nigeria is cited as a country that does not respect the rules of origin. As noted by de Melo et al. (2020), of the 300 products on the ECOWAS-CET exceptions list, 200 are on Nigeria's import ban list. Also, the CET will likely increase the price of non-ECOWAS imported foods and manufactured goods; this leads to trade diversion towards higher cost to partners³. Monitoring mechanisms are important for effective integration. But, as stated by ECOWAS (2016), apart from regular assessment missions on the implementation of the ECOWAS-CET, there is no monitoring/evaluation mechanism in place at the moment.

Deep integration and trade facilitation can go together. The UN Global Survey on Digital and Sustainable Trade Facilitation provides trade facilitation scores for countries. Trade facilitation score here is an average of five sub-scores relating to cross-border paperless trade, paperless trade (Please, no problem with these two concepts), institutional arrangement and cooperation, formalities and, transparency. The international comparison of the trade facilitation scores shows that the African region suffers from trade facilitation (Figure 2). Data for West Africa concern the ECOWAS region because only some ECOWAS countries have these data.

Figure 2: Trends of trade facilitation scores in ECOWAS (West Africa) and in some regions of the world with the number of countries (2015, 2017, 2019, and 2021)



Notes: West Africa (ECOWAS): six countries in 2015, 2017, and 2019; ten countries in 2021. Central Africa: two countries in 2015, three countries in 2017 and 2019, and four countries in 2021. Eastern Africa: four, five, six, and nine countries in 2015, 2017, 2019, and 2021, respectively. North Africa: two countries in 2015 and 2017, five countries in 2019 and 2021. Southern Africa: seven countries in 2015, three countries in 2017, and seven countries in 2019 and 2021. In 2021, the database explored indicates 33 African countries (rather than 35 when we consider the cumulative number of countries from all African sub-regions).

Source: Authors, based on the data from UN Global Survey on Digital and Sustainable Trade Facilitation.

Africa achieves low implementation rates for all years (34.77%, 42.05%, 44.95%, and 49.98% in 2015, 2017, 2019, and 2021, respectively) while Latin America and the Caribbean has the highest (59.78%). Among the African sub-regions, in 2015, Southern Africa has the highest implementation score (39.17%) while Eastern Africa has the lowest (21.24%). In 2017, West Africa achieved a high implementation score (46.95%) while Central Africa had the lowest (31.18%). North Africa had the highest implementation rates in 2019 (56.34%) and 2021 (64.09%). Especially, except the year 2021, for the first three years (2015, 2017, and 2019) the average implementation rates in West Africa are superior to those observed in Africa. We must relativize this comparison, notably for the African sub-regions, because the data are available for few countries for some of these regions.

Deep RTA and global value chains in ECOWAS countries

The West Africa Competitiveness Programme (WACOMP), adopted under the 11th European Union Development Fund (EUDF) Regional Indicative Programme (for an amount of €120m), consists of one regional component (ECOWAS) and 16 country components (ECOWAS + Mauritania). The aim of the programme is to support several selected value chains at the national and regional level to stimulate structural

transformation and better access to regional and international markets while taking into account social and environmental concerns. Its general objective is to strengthen the competitiveness of West African countries and enhance their integration into the regional and international trading system. As the level of GVC engagement of most countries in sub-Saharan Africa is rather low, especially for their manufacturing sectors (van Biesebroeck & Mensah, 2019), the WACOMP can increase the ability of ECOWAS countries to integrate into GVC. Selected value chains by the WACOMP include cassava (especially in Cote d'Ivoire, Ghana, Liberia, and Sierra Leone), textile and garment (especially in Burkina Faso, Cote d'Ivoire, and Nigeria), mango (mainly in Senegal and Guinea Bissau), information and communications technology, ICT, (especially in Benin, Cabo Verde, Cote d'Ivoire, and Senegal), onion (Senegal and Gambia), pineapple (mainly in Guinea and Togo), and hides, skin and leather (especially in Niger, Nigeria, Mali and Mauritania).

Cassava is one of the most important tropical root crops in West Africa. The level of the total annual production in Africa was about 169 million tons in 2018. The share of West Africa in this production is very important and represents 55% of cassava production in Africa and 33.5% of world production. Textile and garment industry has experienced rapid growth in recent years. The textile and clothing industry presents a lot of potential for value-added benefits and job creation. It is estimated that up to 600% of value can be created along the cotton value chain: from cotton production, spinning and twisting into yarn, to weaving and knitting into fabric, followed by dyeing, printing and designing. West Africa annually produces about 1.5 million tons of mangoes representing about 4% of world production according to the West and Central African Council for Agricultural Research and Development.

The use of mobile phones in West Africa increased from 2010 to 2018; the number of mobile cellular subscriptions addition increased by 60%. This is in line with the observation of Carriolle (2021) that, in sub-Saharan Africa (SSA), mobile phones have spread in response to the lack of fixed telephony infrastructure, representing today the main means of communication and the main platform for access to the Internet. However, African countries' Internet penetration rates were not exceeding 55% of the population by 2015, with some countries from the West African region like Niger, Sierra Leone, and Guinea-Bissau recording penetration rates lower than 5% of the population. Onion is essentially traded intra-regionally by ECOWAS Member States. From 2010 to 2018, the total production of onion in the region has increased by 25.5%, reaching 90,310 tons in 2018. Earlier, in 2013, the support of the ECOWAS and its partners in terms of trade facilitation initiatives led to an increase of US\$2.25 million to the income of the local farmers and lowered their dependence on imports. During the last decade, the production of pineapple has considerably increased, moving from 2,438,717 tons in 2010 to 2,950,214 tons, which also led to a higher rate of exports, especially to the European Union. Hides and skins are one of the by-products in animal production. They are an important and valuable resource used for shoes and bags.⁴

The EORA database from the United Nations Conference on Trade and Development (UNCTAD) is used to analyse GVC participation. Table 2 shows ECOWAS's engagement

in GVCs, especially in DVA (ratio of DVA to gross exports). Casella et al. (2019) observe that the most basic and fundamental GVC indicators (GVCIs) include the domestic value-added as a share of gross exports (DVAI), indirect value-added exports as a share of gross exports (DVXI) known as forward GVC participation, foreign value-added as a share of gross exports (FVAI) which represents backward GVC participation.

Table 2: Evolution of global value chains indices (as a share of gross exports) in ECOWAS (1996-2018)

Period	1996–2000	2001–2005	2006–2010	2011–2015	2016–2018
FVAI	0.155	0.158	0.159	0.170	0.147
DVXI	0.295	0.318	0.335	0.316	0.318
DVAI	0.845	0.842	0.841	0.829	0.853

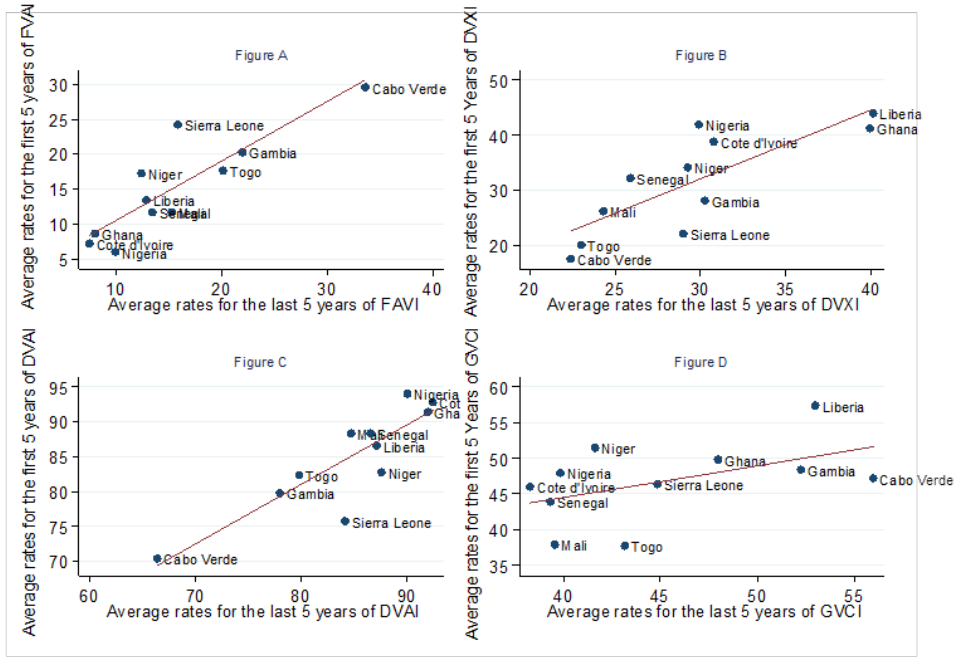
Notes: FVAI: foreign value-added, as a share of gross exports, index. DVX: Indirect value-added, as a share of gross exports, index. DVAI: domestic value-added, as a share of gross exports, index.

Source: Authors' computation, based on the UNCTAD-Eora database.

Still considering the period 1996–2018, Figure 3 shows the evolution of the averages of the first five years (1996–2000) of GVCIs (% of gross exports) and the last five years (2014–2018) of GVCIs (% of gross exports) by country in ECOWAS. Figure 3-A reveals that Cabo Verde records the highest backward GVC rates in both 1996–2000 (33.59%) and 2014–2018 (29.62%), but with a rate that has declined by 3.63 points about since 1996–2000. However, Liberia has the highest forward GVC rates (Figure 3-B) both in 1996–2000 (40.14%) and 2014–2018 (43.95%), a rate that has grown by 3.81% since the period 1996–2000. In terms of participation in domestic value-added, DVAI, (Figure 3-C), Nigeria has the highest rate in 2014–2018 (94.02%), a rate that has grown by about 3.96% points since 1996–2000. Finally, concerning overall GVC, Liberia records the highest rate in 2014–2018 (57.37%), a rate that has grown by about 4.38% points since 1996–2000 (Figure 3-D).

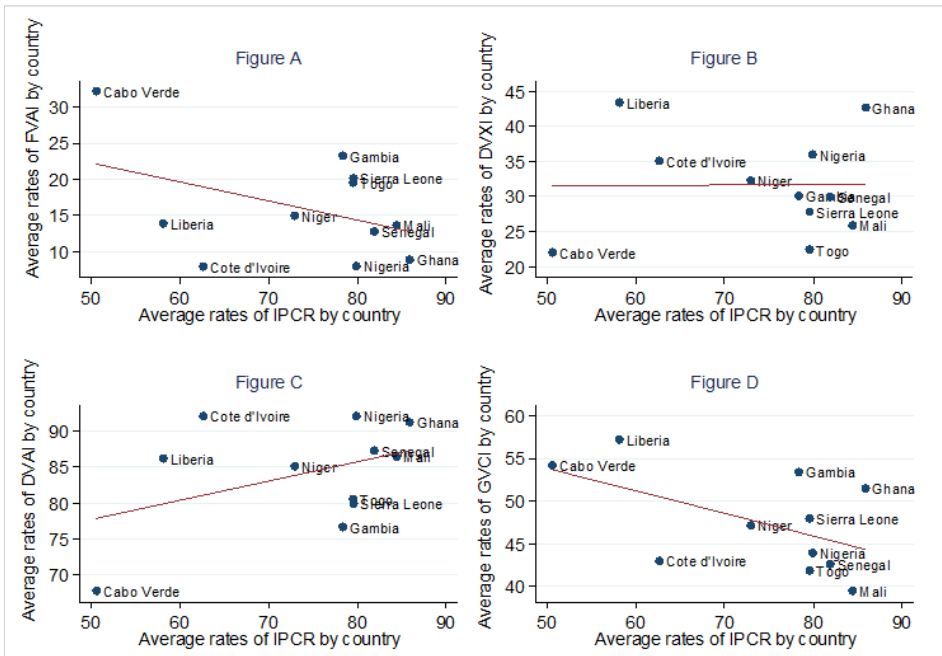
Considering the average rates of GVC indices (% of gross exports) and the IPCR (% PCSs) over the period 1996–2018, Cabo Verde remains the country that records the highest backward GVC participation rate of about 32.20% (Figure 4-A), while Liberia remains a country that registers the highest rate of forward GVC participation of about 43.40% (Figure 4-B), and of overall GVC of about 57.20% (Figure 4-D). On average, Cote d'Ivoire and Nigeria registered the highest rate of DVAI of about 92.10% (Figure 4-C). However, Cabo Verde registers the lowest rate of the IPCR of about 50.52% of PCSs, while Ghana records the highest rate of about 85.85% followed by Mali (84.36%). Besides, using these averages data, as a preliminary analysis of the link between regional integration and GVCs, Figure 4 shows the linear relationship between GVCs indicators (FVAI, DVAI, and DVXI, % of gross exports) and IPCR as a share of protocols and conventions (PCSs). Figure 4 reveals a negative relationship between FVAI and IPCR while there is a positive relationship between DVAI and IPCR. Finally, Figure 4 seems to reveal that DVXI does not vary with the change of the IPCR.

Figure 3: Trends in the first and last five averages of GVC indices by country (% of gross exports) for the period 1996–2018 in ECOWAS countries



Source: Authors' calculations based on the Eora database (UNCTAD).

Figure 4: Correlation between averages of IPCR (% of PCSs) and GVCs indices (% of gross export), 1996–2018



Source: Authors' calculations based on Eora database (UNCTAD) and ECOWAS reports.

4. Empirical approach

The objective of this paper is to examine the effect of deep RTA on GVCs. Following previous studies, GVCs are measured as shares of gross exports (Kowalski et al., 2015; Banerjee & Zeman, 2020; de Melo & Twum, 2021). We estimate the two-way fixed effects equation that allows for differences across both individuals and time. The basic model is:

$$GVCI_i = \alpha_0 + \alpha_1 \cdot IPCR_i + \mu_i + \nu_i + \varepsilon_i \quad (1)$$

Where, GVCI is global value chains indices. In line with Casella et al. (2019), these indices include domestic value-added as a share of gross exports (DVAI), indirect value-added exports as a share of gross exports (DVXI) known as forward GVC participation, foreign value-added as a share of gross exports (FVAI) which represents backward GVC participation. IPCR denotes the indicator of protocols and conventions ratified, measured by the ratio between PCRs and PCSs. It is the variable of interest that captures the effect of deep RTA on GVCs. The expected sign of the parameter of interest for empirical work is positive. The theoretical rationale behind is that the ETLS implementation increases harmonization policies and trade facilitation efforts that may decrease trade costs and promote compliance with international standards, facilitating participation in GVCs.

ν_i represents the country fixed effects and captures differences across individuals. In practice, these differences are estimated by including n-1 individual-specific dummy factors. μ_t controls for time-related common shocks and captures differences across time which reflects technological change. Similarly, these differences are estimated by including T-1 time-specific dummy factors. The identifying restriction is that there are no country-specific time-invariant omitted variables. The inclusion of country and year fixed effects helps to reduce the endogeneity issue (Kowalski et al., 2015). ε represents the error term.

To investigate the indirect effect, we first include control variables (X), notably governance variable (control of corruption). The model is:

$$GVCI_i = \alpha_0 + \alpha_1 \cdot IPCR_i + X_i \cdot \theta + \mu_i + \nu_i + \varepsilon_i \quad (2)$$

Where, X is a vector of control variables. In line with previous studies, X includes real GDP per capita, control of corruption, foreign direct investment, and mobile cellular subscriptions (Banerjee & Zeman, 2020). The real GDP per capita (GDPpc) captures the market size with the positive effect. Control of corruption (CC) captures the level of governance. As previously noted, there is a reciprocal relationship between governance and trade, especially trade in GVC. In particular, the trade-governance literature reveals that governance is a source of comparative advantage and has long-standing impacts on international trade (Anderson & Marcouiller, 2002; Nunn, 2007; Levchenko, 2007). The expected sign of the parameter associated with control of corruption is positive. As Banerjee and Zeman (2020), we examine the effect of control of corruption on GVCs. FDI denotes foreign direct investment inflows. FDI capital inflows help physical-capital-scarce economies to overcome relative scarcity in capital (Antràs, 2020), technology, and knowledge, and thus facilitate their integration into GVCs. The expected sign of the parameter associated with FDI is positive. Kowalski et al. (2015) and Banerjee and Zeman (2020) also have used FDI.

DCR represents domestic credit to private sector, and captures the financial development level. A developed financial system increases GVCs by reducing transaction costs. The literature also suggests that strong financial institutions enhance growth and general activity (Manova, 2013; Mamba & Balaki, 2021), especially GVC activity. MOB denotes mobile cellular subscriptions. The use of mobile increases GVC by facilitating offshoring (de Melo & Twum, 2021). The expected sign is positive for GVC, especially backward participation.

$$GVCI_{it} = \alpha_0 + \alpha_1 \cdot IPCR_{it} + \theta_1 \cdot \ln GDPpc + \theta_2 \cdot CC_{it} + \theta_3 \cdot FDI_{it} + \theta_4 \cdot \ln MOB_{it} + \theta_5 \cdot \ln DCR_{it} + \mu_i + \nu_i + \varepsilon_{it} \quad (3)$$

In the second step, to examine the indirect effect of RTA, we include the interaction term (the product between the indicator of protocols and conventions ratified and control of corruption, $IPCR \cdot CC$) in model (3) to obtain model (4).

$$GVCI_{it} = \alpha_0 + \alpha_1 \cdot IPCR_{it} + \theta_1 \cdot \ln GDPpc + \theta_2 \cdot CC_{it} + \theta_3 \cdot FDI_{it} + \theta_4 \cdot \ln MOB_{it} + \theta_5 \cdot \ln DCR_{it} + \theta_6 \cdot (IPCR_{it} \cdot CC_{it}) + \mu_i + \nu_i + \varepsilon_{it} \quad (4)$$

For the estimation technique, we recall that our dependent variables (GVCs indicators) are measured as fractions and therefore they are bounded between zero and one. Thus, one would use the quasi-maximum likelihood estimation (QMLE) approach for fractional logistic regression.

5. Data and some preliminary tests

Four data sources are used. For the explanatory variable of interest (RTA), we use data from Mamba and Balaki (2021) to build a continuous indicator of the ETLs implementation that captures the effect of deep RTA. Deep RTA, noted as IPCR, is measured by the ratio between the number of the ETLs PCRs and the number of the ETLs PCSs since 1978 at a given date. The number of PCSs (PCRs), by each country, is measured by the cumulative number since 1978. This indicator ranges from 0.442 to 1 (0 to 1, if we consider data for the whole period). High values reflect the depth of RTA. Besides, data on protocols and conventions ratified are used in additional regressions. Data on GVCs are from the United Nations Conference on Trade and Development—UNCTAD-Eora GVC database. Control of corruption is from the World Governance Indicators (WGI) database. The rest of the data comes from the World Development Indicators (WDI) database. The sample covers 11 ECOWAS countries. Guinea Bissau is excluded because data on GVCs are unavailable for this country. Also, Benin, Burkina Faso, and Guinea are excluded due to the insufficient quality of data for these countries. Due to the data availability, the period covers annual data from 1996 to 2018.⁵ The unbalanced panel data are processed under the Stata software. Variables and descriptive statistics are reported in Table 3.

Table 3: Variables definition and descriptive statistics

Variables	Obs	Mean	SD	Min	Max
Foreign value-added share in gross exports (FVAI)	253	0.159	0.075	0.057	0.367
Domestic value-added share in gross exports (DVAI)	253	0.841	0.075	0.633	0.943
Domestic value-added exports, indirect value-added, share in gross exports (DVXI)	253	0.316	0.076	0.163	0.482
Indicator of protocols and convention ratified (IPCR)	242	0.739	0.135	0.442	1.000
Control of corruption (CC) varies from -2.5 to +2.5	220	-0.563	0.551	-1.702	1.143
Mobile cellular subscriptions, MOB (per 100 people)	242	2.223	2.652	-6.946	4.938
Foreign direct investment inflows in % of GDP (FDI)	249	5.214	11.417	-3.374	103.337
Domestic credit to the private sector in % of GDP (DCR)	247	2.492	0.772	0.420	4.179
Gross domestic product per capita (GDP), US\$ constant 2010	249	6.806	0.622	5.609	8.227

Notes: FVAI, DVAI, and DVXI are shares varying between 0 and 1. N=11 countries, and T=23.

The findings are supported by some preliminary tests. The correlation, multicollinearity, and autocorrelation tests are reported in Table A1 and the unit-roots test is displayed in Table A2 (in the appendix). While Table A1 reveals the high correlation between certain independent variables (domestic credit and control of corruption, for example), the multicollinearity test shows the average of the Variance Inflation Factors (VIFs) less than five. In this case, the literature indicates that there is no multicollinearity problem (Mamba et al. 2020; Mamba, 2021; Mamba & Evlo, 2022). This indicates that all independent variables could be included in regressions. The unit-roots test (Table A2) also suggests that all variables are stationary at level.

6. Findings and discussion

The discussion is mainly focused on the variable(s) of interest. This option allows streamlining the interpretation section of empirical works and save valuable space (Hünermund & Beyers, 2020; Keele et al., 2020; Mamba & Balaki, 2021). Indeed, while relying on a large vector of control variables might help with the precision of the regressions, some control variables are quite correlated with the variable of interest, and it might be worthwhile to include them step-wise to observe how the coefficient of the variable of interest reacts.

Baseline findings: Model 1

Table 4 displays the findings relating to the effects of the implementation of the ECOWAS Trade Liberalization Scheme (ETLS), captured by the index of protocols and conventions ratified (IPCR), on GVC indicators (FVAI, DVAI, DVXI). These findings relay on the two-way fixed effects equation that allows for differences across both individuals and time. The findings in column (1) show the effect of IPCR on backward linkage (FVA). The basic model shows a positive and significant, but only at the 10% level, correlation between IPCR and FVA. While this finding suggests that the parameter for IPCR is no longer significant, it indicates that an increase in IPCR is associated with a rising in FVA. The finding is in line with the theoretical literature. The finding that RTA (IPCR) significantly increases GVCs only at the 10% level is not surprising when the literature suggests that deeper regional agreements are often signed in developed regions like North America and European economies (Sanguinet et al., 2021). One possible explanation provided by this literature is the existence of other PTAs which are most typically deeper than RTAs (Hayakawa et al., 2020).

The findings reported in column (2) indicate that IPCR is negatively and significantly correlated with DVA, but only at the 10% level. This finding also suggests that the parameter for IPCR is no longer significant. Again, this finding is not surprising when the literature suggests that deeper regional agreements are often signed in developed regions. Finally, the findings in column (3) reveal that IPCR is negatively, but not significantly, correlated with the forward linkages in all regressions. Here, the findings clearly reveal that IPCR is not a determinant of GVC (forward linkage). This finding confirms the literature suggestion which indicates that deeper regional agreements are often signed in developed zones.

Table 4: IPCR as a driver for backward GVC participation (FVAI, DVAI, DVXI), model 1

Models	FVAI	DVAI	DVXI
Explanatory Variables	(1) Flogit	(2) Flogit	(3) Flogit
IPCR	0.313* (0.179)	-0.313* (0.179)	-0.139 (0.153)
Constant	-0.808*** (0.103)	0.808*** (0.103)	-1.309*** (0.093)
Observations	242	242	242
Countries	11	11	11
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively. Robust standard errors are in parentheses.

Additional findings based on model 3 and model 4

To investigate the complementarity/substitutability relationship between IPCR and control of corruption, we first extend model (1) by adding control variables step-wise to observe how the coefficient of the variable of interest, IPCR, reacts. Table 5, Table 6, and Table 7 display the additional findings of the effects of IPCR on FVAI, DVAI, and DVXI, respectively. In Table 5, after controlling for the real GDP per capita or control of corruption, we find that IPCR has an insignificant effect (with the positive sign) on FVA (columns 1 and 2). However, the findings in column (2) show that FVA significantly increases with the reduction of the corruption level. Interestingly, these additional findings reveal that IPCR has an insignificant effect on FVA, once we control for institutional quality (control of corruption). Furthermore, with the inclusion of all control variables in the regression, IPCR is negatively, but insignificantly correlated with FVA (column 3). Some possible explanations of the findings are the quality of data and the correlation between variables. In column (3), some control variables, including GDP per capita and control of corruption, are also insignificant.

However, the findings in column (3) suggest that mobile cellular subscriptions and domestic credit to private sector are significantly and positively associated with FVA. These findings corroborate with the theoretical literature. Mobile cellular facilitates GVC by helping to overcome some barriers that companies face when aiming to participate in backward linkage activities. Mobile cellular, as a component of information and communication technology, reduces search and information frictions and helps to find suitable foreign suppliers or foreign buyers. Mobile development (banking), seen as a sub-channel of financial development (Mamba & Balaki, 2021), facilitates GVC participation by relatively small firms by expanding e-commerce.

In line with model (4), the paper analyses the complementarity/substitutability effect by including the interaction term between IPCR and control of corruption (columns 4 and 5). In comparison to the findings in column (2), the findings in column (4) reveal that IPCR remains insignificant with the positive sign while control of corruption becomes insignificant but with the same sign. Moving from column (3) to column (5), the components of the interaction term remain insignificant, except IPCR which becomes significant, with the same sign. The findings in column (4) and column (5) show the insignificant coefficient of the interaction between IPCR and control of corruption. This suggests the non-existence of the complementarity/substitutability link between IPCR and control of corruption. In sum, with the inclusion of control variables, the findings suggest that there is no significant correlation between IPCR and FVA. Also, the findings reveal the non-existence of the complementarity/substitutability relationship between IPCR and control of corruption.

Table 5: IPCR as a driver for backward GVC participation (FVAI)

Explanatory Variables	(1) Flogit	(2) Flogit	(3) Flogit	(4) Flogit	(5) Flogit
IPCR	0.254	0.209	-0.139	0.200	-0.559*
	(0.178)	(0.190)	(0.185)	(0.259)	(0.337)
lnGDPpc	-0.047		-0.011		-0.057
	(0.113)		(0.149)		(0.163)
CC		0.181**	0.056	0.189	0.412
		(0.079)	(0.082)	(0.210)	(0.260)
FDI			0.002		0.002
			(0.002)		(0.002)
lnMOB			0.053*		0.067**
			(0.027)		(0.027)
lnDCR			0.209***		0.214***
			(0.051)		(0.051)
IPCR_CC				-0.012	-0.546
				(0.294)	(0.341)
Constant	-0.451	-0.925***	-1.186	-0.922***	-0.659
	(0.906)	(0.129)	(1.133)	(0.148)	(1.311)
Observations	238	209	200	209	200
Countries	11	11	11	11	11
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively. Robust standard errors are in parentheses.

Table 6 presents the additional findings of the effects of the implementation of the ETLs (IPCR) on the total domestic value-added indicator (DVAI). As previously, the first step of the interaction model analysis is the progressive inclusion of control variables

(columns 1 to 3). We obtain an insignificant effect (with the negative sign) of IPCR on DVA when we add GPD per capita or control of corruption (columns 1 and 2). However, while GDP per capita is not a determinant of DVAI, control of corruption is negatively associated with DVAI. Also, the findings in column (3) reveal that IPCR remain insignificant but with the positive sign with the inclusion of all control variables. As previously, some possible explanations of the variation of the sign are the quality of data and the correlation between variables. GDP per capita and control of corruption remain insignificant, while both mobile cellular and financial development are negatively correlated with DVA.

Table 6: IPCR as a driver for total domestic value-added (DVAI)

Explanatory Variables	(1) Flogit	(2) Flogit	(3) Flogit	(4) Flogit	(5) Flogit
IPCR	-0.254 (0.178)	-0.209 (0.190)	0.139 (0.185)	-0.200 (0.259)	0.559* (0.337)
lnGDPpc	0.047 (0.113)		0.011 (0.149)		0.057 (0.163)
CC		-0.181** (0.079)	-0.056 (0.082)	-0.189 (0.210)	-0.412 (0.260)
FDI			-0.002 (0.002)		-0.002 (0.002)
lnMOB			-0.053* (0.027)		-0.067** (0.027)
lnDCR			-0.209*** (0.051)		-0.214*** (0.051)
IPCR_CC				0.012 (0.294)	0.546 (0.341)
Constant	0.451 (0.906)	0.925*** (0.129)	1.186 (1.133)	0.922*** (0.148)	0.659 (1.311)
Observations	238	209	200	209	200
Countries	11	11	11	11	11
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively. Robust standard errors are in parentheses.

Here also, in line with the model (4), the paper introduces the interaction term between IPCR and control of corruption (columns 4 and 5) to assess whether there is a complementarity or substitutability relationship between these two variables. In comparison to the findings in column (2), the findings in column (4) reveal that IPCR remains insignificant with the negative sign while control of corruption becomes insignificant, but with the same sign. Moving from column (3) to column (5), control of corruption remains insignificant with the negative sign while IPCR becomes significant with the positive sign (as in column 3). However, overall, the findings in column (4)

and column (5) show the insignificant coefficient of the interaction between IPCR and control of corruption, indicating the absence of the complementarity/substitutability link between these two variables. Finally, when the control variables are included, the findings reveal that IPCR is not a determinant of DVA. Also, the findings reveal the non-existence of the complementarity/substitutability relationship between IPCR and control of corruption.

First, Table 7 presents the effects of IPCR on forward linkages, DVXI, (a component of DVA) by introducing progressively control variables in line with model (3). The findings reveal that IPCR is negatively, but not significantly, correlated with the forward linkages in column (1) and column (2) when GDP per capita and control of corruption are added, respectively. Also, GDP per capita and control of corruption are not determinants of DVA. But, IPCR is positively, but not significantly, related with FVA when all regressors are included. Again, the change of the sign can be explained by the correlation among explanatory variables and the quality of the data.

Table 7: IPCR as a driver for domestic value-added export, DVXI, (forward GVC participation)

Explanatory Variables	(1) Flogit	(2) Flogit	(3) Flogit	(4) Flogit	(5) Flogit
IPCR	-0.139	-0.164	-0.043	0.249	0.449*
	(0.154)	(0.157)	(0.168)	(0.238)	(0.269)
lnGDPpc	0.014		0.002		0.026
	(0.069)		(0.087)		(0.087)
CC		0.029	0.058	-0.354**	-0.353*
		(0.034)	(0.049)	(0.172)	(0.191)
FDI			-0.001		-0.000
			(0.001)		(0.001)
lnMOB			0.005		-0.010
			(0.020)		(0.019)
lnDCR			-0.079**		-0.079**
			(0.036)		(0.038)
IPCR_CC				0.556**	0.627**
				(0.247)	(0.276)
Constant	-1.429***	-0.158***	-1.214*	-1.467***	-1.608**
	(0.540)	(0.103)	(0.723)	(0.118)	(0.754)
Observations	238	209	200	209	200
Countries	11	11	11	11	11
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively. Robust standard errors are in parentheses.

Focusing on the complementarity/substitutability effect (model 4), the findings in column (4) show that the interaction term and control of corruption are significant while all constitutive terms and their interaction term are significant, as shown in column (5). Besides, all the interaction terms are positive. Based on the findings in column (5), for the constitutive terms, we should note that the effect of a change in IPCR on DVX depends on the value of the conditioning variable, control of corruption. Indeed, as the effect of the IPCR depends on the level of institutional quality, it is not correct to say that an increase in IPCR should increase DVX. In other words, the marginal effect of IPCR on DVX at governance = 0 is not obviously “independent of governance”, in fact, but rather connected with a specific value of governance. The parameter on IPCR (0.449) only captures the marginal effect of IPCR when control of corruption is zero. Focusing on the complementarity/substitutability relationship analysis, which is our goal, we conclude that there is a complementarity link between IPCR and control of corruption. This suggests that the marginal effect of IPCR is rising with the level of the reduction of corruption. Therefore, IPCR acts as a complement for governance in stimulating DVX.

7. Conclusion

The paper examined the effects of deep regional trade agreement (RTA) on global value chains (GVCs) over the period 1996–2018. The sample covers 11 countries from the Economic Community of West African States (ECOWAS) region. Following the literature, GVCs are measured by the shares of total domestic value-added, DVA, domestic value-added exports, DVX (forward linkage) and foreign value-added, FVA (backward linkage) in gross exports. The data are from the UNCTAD-Eora database. Also, we use a new continuous indicator to measure the depth of RTA. This indicator is measured by the ratio between the cumulative number of the ECOWAS trade liberalization scheme (ETLS) protocols and conventions ratified and the cumulative number of the ETLS protocols and conventions signed since 1978 at a given date. High values reflect the depth of RTA. Finally, control of corruption is investigated to assess whether this variable is a channel or not.

Using the fractional logit regression technique, the basic regressions reveal that deepening RTA, as measured by IPCR, significantly increases backward linkages (FVA) while it reduces total DVA, but only at the 10% level. However, IPCR has no effect on forward linkages (DVX). Besides, to investigate the complementarity/substitutability effect, the paper first includes control variables, notably institutional quality variable (control of corruption). After controlling for the control of corruption, we find that IPCR has an insignificant effect on GVCs (FVA, DVA) while control of corruption significantly influences GVCs. Furthermore, the interaction terms analysis (complementarity/substitutability) indicates the existence of a complementarity relationship between IPCR and control of corruption only in DVX model.

The findings have important policy implications. Policy makers must encourage the ratification of the ETLS protocols and conventions in order to take advantage of deep integration in terms of the participation in GVCs. Also, policy makers should promote the implementation of the ETLS by strengthening the competitiveness in order to reduce the vulnerability of value chains. Therefore, they should stimulate the implementation of the West Africa Competitiveness Programme (WACOMP). Finally, policy makers must encourage the fight against corruption to increase transparency and enhance the GVCs effects of deep RTA in the ECOWAS region.

While the findings have important implications for the ECOWAS region seeking to develop international GVCs, a limitation is that our variable of interest only captures the adoption, and tells us little about the application of these protocols and

conventions. Another limitation is that the conclusion in this paper is based on the whole ECOWAS region. Further research could explore the disaggregated analysis by country. Some countries, like Nigeria, deviate from the ETLs implementation while others effectively implement this programme. Also, while deep RTA is supposed to influence GVCs, further research could investigate the regional value chains if data are available (as mentioned above, the paper has tried to use sectoral data on GVC but due to some inconsistencies of the findings, they are not reported. This problem could be explained by the absence of sectoral data on the other variables, in particular the IPCR). Finally, other channels could be explored.

Notes

1. See also Handley and Limao (2017) and Martínez-Zarzoso and Márquez-Ramos (2019).
2. Obasaju et al. (2021) obtain similar findings as Obasaju et al. (2019) for ECOWAS and East African Community (EAC) regions.
3. In comparison to ECOWAS, de Melo et al. (2020) assert that the East African Community (EAC) stands with a more transparent trade policy. Rauschendorfer and Twum (2021), indicate that the EAC, the 'only fully operational customs union in Africa', has long been considered a rare example for an African REC that has completely liberalized trade among its member States. However, Rauschendorfer and Twum (2021) mentioned that ECOWAS, as well as EAC, deviated from the CET with exceptions.
4. Information available at <https://wacomp.projects.ecowas.int/value-chains/>
5. The paper has tried to use sectoral data on GVC but due to some inconsistencies of the findings, they are not reported. This could be explained by the unavailability of data by sector on some variables, notably on IPCR.

References

- Al-Marhubi, F. 2005. "Openness and governance: Evidence across countries". *Oxford Development Studies*, 33(3-4): 453–71.
- Anderson, J. and D. Marcouiller. 2002. "Insecurity and the pattern of trade: An empirical investigation". *The Review of Economics and Statistics*, 84(2): 342–52.
- Antràs, P. 2020. "Conceptual aspects of global value chains". *World Bank Economic Review*, 00(0): 1–24.
- Antràs, P. and R. Staiger. 2012. "Offshoring and the role of trade agreements". *American Economic Review*, 102(7): 3140–83.
- Banerjee, B. and J. Zeman. 2020. "Determinants of global value chain participation: Cross-country analysis". NBS Working Paper No. 1/2020. National Bank of Slovakia.
- Blyde, J. and V. Faggioni. 2017. "International supply chains and trade agreements". *Applied Economics Letters*, 25(17): 1198–1203.
- Blyde, J., A. Graziano and C. Volpe. 2015. "Economic integration agreements and production fragmentation: Evidence on the extensive margin". *Applied Economics Letters*, 22(10): 835–42.
- Boffa, M., M. Jansen and O. Solleder. 2019. "Do we need deeper trade agreements for GVCS or just a BIT?" *World Economy*, 42: 1713–39.
- Cariolle, J. 2021. "International connectivity and the digital divide in sub-Saharan Africa". *Information Economics and Policy*, 55. doi:10.1016/j.infoecopol.2020.100901
- Casella, B., R. Bolwijn, D. Moran and K. Kanemoto. 2019. "Improving the analysis of global value chains: The UNCTAD-Eora database". *Transnational Corporations*, 26(3): 115–42.
- de Melo, J. and A. Twum. 2021. "Prospects and challenges for supply chain trade under the Africa Continental Free Trade Area". *Journal of African Trade*, 8(2): 1-13. doi:10.2991/jat.k.210105.001
- de Melo, J., J.-M. Solleder and Z. Sorgho. 2020. "A primer on African integration with a hard look at progress and challenges ahead". FERDI Working Paper No. 268. FERDI, July.
- ECOWAS. (2014). *2014 Annual Report*.
- ECOWAS. (2015). *ECOWAS at 40: achievements, challenges and prospects. 2015 Annual Report*.
- Economic Community of West African States (ECOWAS). 2016. *ECOWAS Common External Tariff (CET): Achievements, Challenges and Prospects*. Economic Community of West African States.
- Egger, P. and M. Larch. 2008. "Interdependent preferential trade agreement memberships: An empirical analysis". *Journal of International Economics*, 76(2): 384–99.

- Fontagné, L. and G. Santoni. 2021. "GVCs and the endogenous geography of RTAs". *European Economic Review*, 132: 103656. <http://dx.doi.org/10.1016/j.euroeconrev.2021.103656>
- Handley, K. and N. Limao. 2017. "Policy uncertainty, trade and welfare: Theory and evidence for China and the US". *American Economic Review*, 107(9): 2731–83.
- Hayakawa, K., Laksanapanyakul, N., & Matsuura, T. (2020). Do regional trade agreements really help global value chains develop? evidence from Thailand. *Journal of the Japanese and International Economies*, 58. doi:10.1016/j.jjie.2020.101092
- Hayakawa, K. and N. Yamashita. 2011. "The role of preferential trade agreements (PTAs) in facilitating global production networks". *Journal of World Trade*, 45(6): 1181–1207.
- Hünermund, P. and L. Beyers. 2020. "On the nuisance of control variables in regression analysis". arXiv preprint arXiv:2005.10314v3.
- Jinji, N., X. Zhang and S. Haruna. 2019. "Do deeper regional trade agreements enhance international technology spillovers?" *World Economy*, 42(8): 2326–63.
- Keele, L., R. Stevenson and F. Elwert. 2020. "The causal interpretation of estimated associations in regression models". *Political Science Research and Methods*, 8(1): 1–13.
- Kowalski, P., J. Lopez Gonzalez, A. Ragoussis and C. Ugarte. 2015. "Participation of developing countries in global value chains: Implications for trade and trade-related policies". OECD Trade Policy Paper No. 179. OECD Publishing, Paris. <http://dx.doi.org/10.1787/5js331fw0xxn-en>
- Laget, E., A. Osnago, N. Rocha and M. Ruta. 2020. "Deep trade agreements and global value chains". *Review of Industrial Organization*, 57: 379–410.
- Lawrence, R. 1996. *Regionalism, Multilateralism and Deeper Integration*. Washington, D.C.: Brookings Institution.
- Levchenko, A. 2007. "Institutional quality and international trade". *Review of Economic Studies*, 74: 791–819.
- Levchenko, A. 2012. "International trade and institutional change". *Journal of Law, Economics, and Organization*, 29(5): 1145–81.
- Maggi, G. and R. Ossa. 2020. "The political economy of deep integration". NBER Working Paper No. 28190. National Bureau of Economic Research, Cambridge, MA, December. DOI 10.3386/w28190
- Mamba, E. 2021. "Role of governance in open trade policies-growth nexus in ECOWAS countries: The use of extended IV approach in panel data". *Journal of International Trade and Economic Development*, 30(5): 661–84. doi:doi.org/10.1080/09638199.2021.1889643
- Mamba, E. and A. Balaki. 2021. "Effects of trade policies on external trade performances of ECOWAS countries (1996–2017)". *Economics of Transition and Institutional Change*. doi:10.1111/ECOT.12303
- Mamba, E. and K. Evlo. 2022. "Deep investigation of the effects of open trade policies on economic growth in West Africa: The case of the ECOWAS region". *Research Square*, 1–40. doi:10.21203/rs.3.rs-1239712/v1
- Mamba, E., M. Gniniguè and E. Ali. 2020. "Effect of foreign direct investment on structural transformation in West African Economic and Monetary Union (WAEMU) countries". *Cogent Economics & Finance*, 8(1): 1783910. doi.org/10.1080/23322039.2020.1783910
- Manova, K. 2013. "Credit constraints, heterogeneous firms, and international trade". *Review of Economic Studies*, 80: 711–44.

- Martínez-Zarzoso, I. and I. Márquez-Ramos. 2019. "Exports and governance: Is the Middle East and North Africa region different?" *World Economy*, 42(1): 143–74.
- Mukherjee, D. 2015. "Did pre-WTO agreements curb corruption?" *Economic Analysis and Policy*, 47: 1–10.
- Nunn, N. 2007. "Relationship-specificity, incomplete contracts and the pattern of trade". *Quarterly Journal of Economics*, 122(2): 569–600.
- Obasaju, B., W. Olayiwola, H. Okodua and B. Adekunle. 2019. "Regional economic integration and the backward integration of ECOWAS subregion into global value chains". *International Journal of Economic Policy and Emerging Economies*, 12(3), 243–63.
- Obasaju, B., W. Olayiwola, H. Okodua, O. Adediran and A. Lawal. 2021. "Regional economic integration and economic upgrading in global value chains: Selected cases in Africa". *Heliyon*, 7(2). doi:<https://doi.org/10.1016/j.heliyon.2021.e06112>
- Orefice, G. and N. Rocha. 2014. "Deep integration and production networks: An empirical analysis". *The World Economy*, 37(1): 106–36.
- Osnago, A., N. Rocha and M. Ruta. 2017. "Do deep trade agreements boost vertical FDI?" *World Bank Economic Review*, 30(1): S119–S125.
- Osnago, A., N. Rocha and M. Ruta. 2019. "Deep trade agreements and vertical FDI: The devil is in the details". *Canadian Journal of Economics*, 52(4): 1558–99.
- Rauschendorfer, J. and A. Twum. 2021. "Unmaking of a customs union: Regional (dis) integration in the East African Community". *World Trade Review*, 1–12. doi:10.1017/S1474745621000367
- Ruta, M. 2017. "Preferential trade agreements and global value chains: Theory, evidence, and open questions". World Bank Policy Research Working Paper No. 8190. The World Bank, Washington, D.C., September.
- Sanguinet, E., A. Alvim and M. Atienza. 2021. "Trade agreements and participation in global value chains: Empirical evidence from Latin America". *World Economy*, 1–37. <https://doi.org/10.1111/twec.13185>
- van Biesebroeck, J. and F. Mensah. 2019. "The extent of GVC engagement in sub-Saharan Africa". World Bank Policy Research Working Paper No 8937. The World Bank, Washington, D.C., July.
- Zhang, R., J. Zhao and J. Zhao. 2021. "Effects of free trade agreements on global value chain trade---a research perspective of GVC backward linkage". *Applied Economics*, 53(44): 5122–34.

Appendix

Table A1: Correlation and multicollinearity (Variance Inflation Factors test), tests

	IPCR	CC	lnMOB	FDI	lnDCR	lnGDPpc
IPCR	1.000					
CC	-0.304	1.000				
lnMOB	-0.288	0.197	1.000			
FDI	-0.347	0.033	0.048	1.000		
lnDCR	-0.227	0.608	0.501	-0.033	1.000	
lnGDPpc	-0.298	0.549	0.186	-0.219	-0.133	1.000
VIF	1.400	1.810	1.370	1.260	2.410	1.980
MVIF	1.710					

Notes: VIF: Variance Inflation Factors. MVIF=Mean Variance Inflation Factors.

Table A2: Stationarity test

Variables	Chi2	Prob	Decision
FVAI	76.719	0.007	I(0)
DVXI	57.787	0.000	I(0)
FVAI_AGR	62.885	0.000	I(0)
DVXI_AGR	95.105	0.000	I(0)
FVAI_MAN	100.674	0.000	I(0)
DVXI_MAN	103.749	0.000	I(0)
FVAI_SER	94.123	0.000	I(0)
DVXI_SER	67.695	0.000	I(0)
IPCR	76.904	0.000	I(0)
CC	64.613	0.000	I(0)
FDI	105.124	0.000	I(0)
lnDCR	62.429	0.000	I(0)
lnMOB*	263.885	0.000	I(0)
lnGDPpc	47.806	0.000	I(0)



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Contact Us

African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@aercafrica.org