



# TRADE FACILITATION: WHAT EFFECTS ON PARTICIPATION IN REGIONAL VALUE CHAINS IN WEST AFRICA?

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**Abstract:** This research analyses the effect of trade facilitation on participation in regional value chains in West Africa. This article exploits the UNCTAD database to measure involvement in global value chains using GVC participation indices through panel data of West African countries from 2000 to 2018 through the instrumental variable two-stage least squares estimator (IV-2SLS). The results show that any trade facilitation effort made by West African countries has a positive effect on participation in regional value chains in the region. The trial also shows that reducing trade costs (tariffs and non-tariff barriers) improves participation in global value chains in West Africa. In the light of these results, it is desirable that policy makers play an important role in the recovery of African economies, with the advent of the AfCFTA, by supporting trade facilitation to promote increased participation in value chains in West Africa.

**Keywords:** Value Chains, Facilitation, Trade, Trade Barriers, West Africa.

## 1. INTRODUCTION

Since the work of Viner (1950), Meade (1955) and Mundell (1960), economists have been very interested in integration issues. The study of the beneficial effects of regional integration in general, and trade facilitation in particular, has attracted renewed interest in recent years. The work of Corden (1975),

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Flam (1992) and Bhagwati (1993) has enriched these ideas. Trade facilitation aims to reduce trade costs which, in their broadest definition, include all costs, other than production costs, incurred in moving a good from a producer to a final consumer (Anderson and van Wincoop, 2004).

In classical models, the gains from trade result from the fact that countries are assumed to have different relative productivities (Ricardian model) or endowments in factors of production such as labour, capital and land (Heckscher-Ohlin model). Unlike classical theories, the “new trade theory” (Krugman, 1979; 1980) explains why countries engage in intra-industry trade. This is a valuable result because most world trade is intra-industrial rather than inter-industrial.

In the framework of the Heckscher-Ohlin model, the implementation of trade facilitation measures represents an overall effort to improve trade procedures and reduce costs between countries (Kouty, 2013 and Takpara, 2020). In the new neo-institutional theory of international trade, and more specifically in approaches to intra-industry trade, Krugman (1979; 1980; 1981) and Lancaster (1980) highlighted the consequences of an inefficient trade process, which results in higher trade costs and higher prices for foreign products. According to Krugman (1980) and Helpman and Krugman (1985), reducing these trade costs through trade facilitation measures encourages intra-industry trade.

The work of Engel *et al* (2016) examines participation in regional value chains by countries in the Southern African Customs Union. Their work finds that border and trade policies are more critical to the implementation of RVCs.

Shepherd (2016) shows that participation in GVCs is highly sensitive to improvements in logistics and trade facilitation. His results show that the trade facilitation performance of partner countries is a key determinant of participation in GVCs. The recent work of Takpara *et al*, (2023), Okah

(2020) on sub-Saharan Africa leads to the same results. Using Eora’s multi-regional input-output tables on sectoral data, Del Prete *et al* (2018) conclude that improving the participation of North African countries in MVCs could significantly benefit local industries, countries and the region as a whole.

The literature review shows that trade policies, in particular trade facilitation, contribute significantly to participation in global value chains. However, it should be noted that these studies are very limited in the case of

Sub-Saharan African countries, and almost non-existent in the West African context. Furthermore, few, if any, studies address the tangible and intangible infrastructure aspects in the analysis. Our study fills these gaps and also takes into account countries' notification levels in the different categories of the Trade Facilitation Agreement (TFA). This research analyses the effects of trade facilitation on participation in regional value chains in West Africa.

Building on the work of Koopman *et al* (2010), this paper uses an econometric specification that pays particular attention to country-specific factors, including those related to governance and transport infrastructure on participation in global value chains (Takpara *et al*, 2023; Kowalski *et al*, 2015; Moïsé and Sorescu, 2015; Slany, 2019). The instrumental variable 2 SLS method is used to estimate our econometric model with panel data from West African countries covering the period from 2000 to 2018. The results show a significant contribution of trade facilitation measures on participation in regional value chains in West Africa. This suggests that public policies aimed at enhancing participation in RVCs in West African countries should be encouraged.

This research highlights the relative importance of trade facilitation measures in the context of value chains and the participation of West African countries in TRCs. By highlighting the potential benefits of trade facilitation in RVCs, this essay could inspire policy makers, development agencies and economic actors to take concrete steps towards increased participation in RVCs. This could lead to a better understanding of the specific challenges, opportunities and effective strategies to foster better integration of West African countries into TRCs.

This article takes into account the level of involvement of West African countries in the context of the AFE, which is not the case in most articles on the subject. Consideration of the level of engagement of countries in regional value chains is of paramount importance in assessing regional economic integration. By understanding countries' levels of participation, it is possible to measure their contribution to value added and regional competitiveness.

The rest of the article is organised as follows: section 2 presents the review of the thematic literature; section 3 discusses the methodological approach; section 4 presents the results and discussions; and the last section is devoted to the conclusion.

## **2. TRADE FACILITATION AND REGIONAL VALUE CHAINS: AN OVERVIEW OF THE LITERATURE**

### **2.1. Flexibility in Implementation-A New Approach to Special and Differential Treatment**

The uniqueness and historicity of this Agreement lies in the flexibility it grants WTO Members in its implementation. This flexibility has two dimensions: firstly, of the 35 or so technical measures provided for, several are not worded in prescriptive terms (“shall” or “shall not”), but rather in “best endeavour” terms. In other words, these provisions encourage WTO Members or oblige them “to the extent practicable” or “as appropriate” to apply the technical prescriptions.

This inherent flexibility is available to all WTO Members (developed and developing) and allows each to implement the measures in the manner they deem appropriate to their local legal, technical or other capacities and circumstances. Second, the Agreement recognises that, without external technical assistance and capacity building (TACB) support, developing and least-developed country Members may not be able to implement some or all of the technical measures, and that these Members should determine for themselves what support they need and when they are ready to implement the measures.

Countries wishing to benefit must classify their trade facilitation measures in one of the three categories below and notify these categories to the WTO Committee within specific deadlines.

- Category A: provisions that a developing country Member will designate for implementation at the time of entry into force of the Agreement (LDCs have an additional year).
- Category B: provisions that a developing country or LDC Member shall designate for implementation after a transition period following entry into force of the Agreement.
- Category C: provisions that a developing country or LDC Member shall designate for implementation after a transition period following entry into force of the Agreement and requiring the acquisition of implementation capacity through the provision of capacity building assistance and support.

The table below shows the level of commitment of West African countries in each category.

**Table 1: Level of Commitment of West African Countries by Category**

<i>Member</i>	<i>Current rate of implementation of Cat. A</i>	<i>Current rate of implementation of Cat. B</i>	<i>Current rate of implementation of Cat. C</i>
Burkina Faso	13,0%	13,0%	0,8%
Benin	65,5%	21,8%	12,6%
Cabo Verde	37,4%	10,1%	3,8%
Ivory Coast	34,0%	5,0%	8,0%
Gambia	48,7%	1,3%	
Ghana	9,7%	17,2%	34,9%
Guinea	14,7%	53,4%	
Guinea-Bissau			
Liberia	35,7%	32,8%	0,8%
Mali	65,5%	5,5%	
Mauritania	39,9%		
Niger	31,9%	2,1%	
Nigeria	15,1%	39,9%	33,2%
Sierra Leone	0,8%	5,0%	31,5%
Senegal	52,5%		0,8%
Togo	42,9%	8,4%	

*Source:* AFD notifications database

## **2.2. The Role of Transport Infrastructure in Trade Facilitation: An Overview of the Literature**

The economic literature generally shows that transport infrastructure has a direct impact on trade. Investment in transport infrastructure has a direct impact on trade flows. Port efficiency has a particular influence, since the vast majority of port activity for developing countries' trade (by weight) goes through seaports. Airports and seaports can carry more goods, particularly containers, when they are served by efficient rail and road networks. The development of infrastructure beyond national borders can also have as much effect on the length and variability of time to market as on freight services between countries. This is more justified in the case of landlocked countries and countries with a large market share, where inland dry ports have partly evolved to absorb this pain.

Infrastructure has long played an important role in the integration of markets between countries. Unfortunately, there is little empirical work on the impact of infrastructure on trade. The realisation of gains from trade

liberalisation will be hampered by the fact that high trade costs act as a barrier to trade. Work by Anderson and van Wincoop (2004) argues that international trade costs and local distribution costs are very high and dominate the marginal cost of production. This suggests that customs duties are no longer the only and main obstacle to trade, given the substantial reductions they have undergone in recent decades. An improvement in the quality of infrastructure is needed to reduce business costs.

The work of Aschauer (1989) examining the link between infrastructure and trade showed a slowdown in US productivity and a slowdown in investment in infrastructure. Bougheas *et al* (1999), using the gravity model and data from European countries, demonstrated that a higher level of infrastructure would reduce transport costs, thereby facilitating trade. The work of Rojas *et al* (2005) includes the infrastructure variable in the augmented gravity equation. They find that with better infrastructure, transport costs, which tend to increase with distance, can be reduced.

Brooks (2008) argues that transport infrastructure has a direct impact on trade. Consequently, airports and seaports can be more efficient when they are served by efficient rail and road networks. In other words, a more developed transport system tends to reduce transport costs and may be able to increase trade opportunities, as it is more reliable and can handle more movements. Using the gravity model on a sample of sub-Saharan African countries, Limao and Venbles (2001) indicate that the relatively low level of trade flows is largely due to inadequate infrastructure. This study estimates that the elasticity of trade flows with respect to trade costs is around -3.0, while differences in infrastructure explain 40 per cent of the variation in transport costs for coastal countries and up to 60 per cent for landlocked countries. Their study also shows that land transport is around seven times more expensive than sea transport, and that a 10% reduction in trade costs through infrastructure development could increase exports by more than 20%.

Testing the empirical relationship between infrastructure and bilateral trade between Malaysia and its trading partners, Ahmed *et al* (2011) found a relatively large and positive relationship using mobile and fixed telephone subscribers, personal computers and internet users. In addition to transport infrastructure, investments in telecommunications and IT infrastructure influence trade patterns. They reduce time costs, including search costs and

customs clearance at the border. The quality of communications infrastructure services correlates with the costs of implementing and monitoring contracts with suppliers. It also has an impact on the costs associated with the time elapsed between the perception of demand and the supply of products to retailers (Nordas and Piermartini, 2004).

The work of De (2008) concludes that a reduction in customs duties and transport costs of ten per cent each would increase bilateral trade by two per cent and six per cent respectively. Following this logic, we could deduce that a reduction in transport costs would have a greater impact on trade than a reduction in tariffs, and that it would therefore be preferable to act on transport costs rather than tariffs. Differences in transport costs between several countries, including the relative costs of different modes of transport, are a source of absolute and comparative advantages, which influence the volume and composition of trade. For example, a country may have a comparative advantage for time-sensitive goods if it has relatively lower air transport costs. However, a comparison between value and weight shares suggests that products with a high value/weight ratio are mainly transported by air, while those with a low value/weight ratio are mainly shipped by sea.

These authors note that the relatively low level of trade flows is largely due to inadequate infrastructure. De (2009) goes further and estimates that the cost of trade transport would increase if the country were landlocked. Since almost all shipments from landlocked countries have to transit through neighbouring countries, costs rise, multiplying transport costs. In addition, the study showed that commercial transport costs in South Asia are very high and vary depending on the goods. Landlocked countries have relatively high transport costs, and trade can be facilitated by improving transport facilities and infrastructure.

Ramli and Ismail (2014), considering a panel dataset from 1980 to 2009, found that railways and paved roads significantly reduce trade costs in ASEAN countries. This confirms the theoretical and empirical literature that the development of basic infrastructure increases the accessibility of goods from producer to consumer, thereby significantly minimising trade costs. Using data on US imports of electrical and electronic products from Malaysia, Tham *et al* (2009) showed that average freight and insurance rates for all modes are higher than average tariff rates for almost all products due to the gradual liberalisation of tariffs under Malaysia's World Trade Organisation (WTO) commitments.

The results imply that relative shipping costs significantly determine the relative number of exports transported by air. The relationship is negative, indicating that the higher the relative average costs of air transport compared to sea transport, the fewer exports of electrical and electronic products are transported by air.

Almost all discussions on the contribution of infrastructure to trade take into account the state of the infrastructure and a brief description of the quality of the infrastructure. Similarly, most of the studies that have been carried out only take account of transport infrastructure and forget about telephone, electricity, etc. infrastructure. This study therefore attempts to contribute to the empirical analysis by taking all these factors into account.

### **2.3. West African Countries' Participation in Global Value Chains: Stylized Facts**

In West Africa, most exported products remain at the initial stage of the transformation process and contain little foreign added value. In other words, inputs from foreign countries have a limited weight in the exports of countries in the sub-region. Downstream participation, on the other hand, appears to be quite strong, even if it involves far fewer benefits than strong upstream participation. This is because most of the goods exported are used as intermediate goods by the importing countries. Between 2015 and 2019, the annual participation of West African countries in downstream MVCs averaged 39.2% of exported value added. While their annual participation in upstream MVCs averaged 14.5% of exported value added (AUC/OECD, 2022).

West African countries are therefore clearly located further downstream in the production process than the rest of the world. As such, the dividends associated with international trade are lower for them, as they do not reap as much as others of the benefits associated with strong upstream participation, including improved quality and lower prices for final goods produced through the use of better quality and lower cost imported inputs (Fally and Hillberry, 2018).

Certain key sectors represent the main contributors to the participation of the region's countries in MVCs. These include mining and quarrying, which generate the bulk of upstream and downstream participation flows. The agricultural and food sectors also feature prominently. This is also reflected in

the weight of food and drink goods in the region's exports, accounting for an average of 10% of total flows over the period 2015-19 according to CEPII data, compared with 5% for the African continent as a whole, 7% for Latin America and the Caribbean and 2% for low-income

Asian countries. At the same time, 6% of imports were devoted to food and beverages in West Africa, compared with 5% for the African continent as a whole and 3% for low-income Latin American and Asian countries (AUC/OECD, 2022).

The poor development of logistics and transport infrastructures reduces integration opportunities and affects trade costs. Most rural production areas remain landlocked due to a lack of information or adequate transport infrastructure. The lack of transport infrastructure (roads, railways, rail network services), combined with a lack of public service infrastructure and certain specific services (market places, storage facilities, logistics services and communication networks, etc.), affects the efficiency of food systems (OECD/SWAC, 2021). While 12 out of 15 countries (with the exception of Mali, Burkina Faso and Niger) have a relatively large coastline, the average maritime connectivity rate was 13.6% for a port services efficiency of 40.8% in 2019 (WEF, 2019).

### 3. METHODOLOGY

To illustrate the method used to estimate the components of CVR participation, this essay draws on a Leontief Input-Output Table (IOT). From this TES, we can establish the following equality:

$$X = CI + Y \quad (1)$$

Where  $X$  is the gross production matrix (it can be used either in the form of intermediate goods or final goods). The  $CI$  matrix represents intermediate consumption and  $Y$  represents final demand.

The matrix of technical coefficients  $A$  is used to determine the number of units of intermediate goods required to produce one unit of gross output.  $AX$  therefore represents the matrix of intermediate goods. This relationship can be formulated as follows:

$$X = AX + Y \quad (2)$$

A great deal of work has been done to study trade in intermediate goods and vertical specialisation based on IOTs. The work of Daudin *et al* (2006)

is among the first to refer explicitly to value added in trade. These authors assert that the use of IOTs, and more specifically matrices of intermediate consumption, is indispensable for calculating international trade in value added.

Koopman *et al* (2010) provide the first comprehensive conceptual framework integrating the old literature on vertical specialisation and the new literature on trade in value added. This framework allows gross exports to be decomposed by distinguishing domestic value added from foreign value added in order to link each part of this value to its source or country of origin. The authors use IOTs to decompose gross exports into domestic and foreign value added.

The decomposition made by Koopman *et al* (2008) is the starting point for estimating country participation in CVRs and for constructing new databases.

A perusal of the economic literature shows that trade facilitation plays a crucial role in participation in global value chains, given that intermediate goods cross borders several times.

There are several techniques and methods for assessing trade facilitation on MVC participation. Among these, the gravity model is a simple and very efficient tool for predicting bilateral trade volumes. The application of the gravitational principle to trade volumes is undoubtedly one of the most stable and robust empirical relationships in economics (Mucchielli and Mayer 2005).

Many recent empirical studies use the gravity model and value-added trade flows are used as the dependent variable instead of gross trade flows (Choi, 2013; Nakazawa *et al.*, 2014; Moïsé and Sorescu, 2015; Kowalski *et al.*, 2015; Slany, 2019). The gravity approach focuses on why countries trade with each other rather than why countries engage in production networks at the aggregate level. It ignores some key features of value chain trade. To assess country participation in GVCs, we use an econometric specification that pays particular attention to country-specific factors, including those related to governance and transport infrastructure on GVC participation.

Since backward integration indicates that a country is positioned at a higher stage of the production process, which is also linked to better economic performance, it is retained in this study with reference to the work of Slany (2019). Thus, the model to be estimated is inspired by those of Takpara *et al.*, 2023; Kowalski *et al.*, 2015; Moïsé and Sorescu, 2015; Slany, 2019).

$$FVAit = \beta_0 + \beta_1 Xit + \beta_2 FEit + \eta t + \mu i + \varepsilon_t \quad (1)$$

Where  $FVAit$  represents the foreign value added in country  $i$  in period  $t$ . It measures the share of foreign value added (backward integration) in exports of African countries;  $Xit$  represents the vector of control variables;  $FEit$  represents the vector of trade facilitation indicators;  $\eta t$  are time fixed effects;  $\mu i$  is a vector representing country fixed effects;  $\varepsilon_{it}$  is the error term.

Governance indicators explain the economic environment for participation in agricultural value chains. They measure the level of development of regulation and transparency. An extensive literature supports the idea that institutional quality can be an important determinant of trade in value chains because it can determine the ability of firms to enforce contracts. Levchenko (2007) argues that institutional aspects can significantly influence trade flows, particularly for products characterised by high complexity, including those characterised by the level of dispersion of intermediate inputs. Similarly, Costinot (2009) found that in complex industries characterised by high levels of complex tasks, good institutions can be an important determinant of firm performance. Institutional quality assesses the effect of the social and political environment on countries' participation in global value chains. The data are scores centred around 0 and vary between -2.5 and 2.5. A low score indicates a poor level of the indicator, while a high score indicates a good level, and therefore a better situation. These variables were chosen because they influence the uncertainty associated with economic activity if they are not controlled. Consequently, they lead to an increase in transaction costs.

We consider backward integration as a measure of participation in global value chains with reference to the assumption that backward integration is primarily associated with greater benefits to the economy (IMF, 2016). It is a measure of backward integration that corresponds to the imported intermediate input content of exports for each product.

The control variables include the following:

- Market size: This determines demand for primary, intermediate and final goods. Consequently, exports increase with market size. The gravitational theory of trade postulates that trade volume is positively associated with the economic mass of trading partners and negatively associated with the distance between partners (Anderson, 1979; Anderson and van Wincoop, 2004). Thus, according to Kowalski *et al* (2015), as in the case of gross

trade, market size should be an important determinant of value-added trade flows. We measure market size by GDP per capita and population. Both variables should have a positive effect on participation in global value chains, regardless of country position.

- **Human capital:** The literature suggests that adequate human capital promotes the transfer of technology and knowledge and the ability to transform intermediate products (Okah Efogo *et al.*, 2021). In addition, a high human capital index is an attractive factor for FDI, which encourages multinationals to include local companies in their production chain, leading to greater participation in MVCs. The human capital index is measured in our study by the school enrolment rate.
- **Market access:** Market access is also an important factor in stimulating participation in global value chains. Market access is measured by trade openness. The more a country facilitates access to its market, the more foreign value added it imports and the more it attracts the multinational companies that are the main players in global value chains. In this study, market access is measured by trade openness.
- **Foreign Direct Investment:** The global value chain revolution has been driven to a large extent by large multinational enterprises through FDI (OECD, 2013) and FDI is expected to be strongly associated with the type of global value chains and participation in them. In this work, FDI is measured by the ratio of net inward FDI flows to GDP.

**Access to finance:** This has been shown to be an important determinant of trade and specialisation (Choi, 2013) and is likely to play an important role in participation in global value chains. It is important not only to facilitate transactions, but also to enable local firms to meet the standards and technological requirements necessary for effective participation in the international production chain (Efogo, 2020). Access to finance is measured by the credit granted to the economy by financial institutions as a percentage of GDP.

**Gross fixed capital formation (GFCF):** This includes land improvements (fences, ditches, drains, etc.), purchases of plant, machinery and equipment, and the construction of roads, railways and other infrastructure, including schools, offices, hospitals, private residential accommodation and commercial

and industrial buildings. The GFCF/GDP ratio is used in this study and measures physical capital (domestic investment).

**Average applied tariff:** This is the average of the rates actually applied, weighted by the import shares of the products corresponding to each partner country. It is an indicator of trade costs, and the higher it is, the less countries participate in global value chains. A negative effect on global value chains is expected regardless of a country's position.

The following table summarises the variables, sources and expected signs of the model.

**Table 2: Summary of variables used**

<i>Variables</i>	<i>Measure</i>	<i>Sources</i>	<i>Expected signs</i>
FVA	Backward integration measured by foreign value added, i.e. the share of foreign value added in total exports	UNCTAD EORA	N/A
GDP per capita	Gross domestic product per capita (current \$)	WDI	+
Population	Population in millions	WDI	+
Human capital	It is measured by the school enrolment rate.	PWT	+
Commercial opening	Ratio of imports to exports as a percentage of GDP	WDI	+
Foreign direct investment (FDI)	Net FDI investment ratio as % of GDP	WDI	+/-
Financial development	Credit to the private sector provided by finance companies	WDI	+/-
Capital formation	It measures physical capital (GFCF)	WDI	+
Rate	Weighted average rate applied to all products	WDI	-
Physical infrastructure (IP)	Level and quality of road, port, airport and rail infrastructure (from 1 = extremely underdeveloped to 7 = well developed)	WDI	+
Information and Communication Technology (ICT)	Use of ICT to improve efficiency and productivity and reduce transaction costs (1 to 7 = best)	WDI	+
Business and regulation Environment (RE)	Level of development of regulation and transparency (1=low to 7=high).	WDI	+
Efficiency at borders and in transport (BE)	The efficiency of customs and inland transport is reflected in the time and number of documents.	WDI	+

Source: Author

The empirical strategy adopted in this study is to estimate the equation using the Pooled Ordinary Squares (Pooled OLS) estimator. Then, we use the instrumental variable two-stage least squares estimator (IV-2SLS) to take into account the potential endogeneity related to MVCs and variables of interest on the one hand and other control variables such as FDI, etc. on the other hand. According to Giroud and Mirza (2015), there is a bidirectional relationship between participation in GVCs and governance indicators. This hypothetical simultaneity bias leads to endogeneity. The same applies to human capital or transport infrastructure variables, which can be both a cause and a consequence of participation in GVCs. If, for example, human capital or infrastructure logistics can condition participation in GVCs, at the same time, greater participation in GVCs can induce a specific demand for infrastructure development (Efogo, 2020). In the case of the IV-2SLS estimator, the Hansen p-value test, the Kleibergen and Paap (2006) test for under-identification and the Cragg-Donald Wald F-test for weak identification are used to ensure the validity of the selected instruments.

## **4. RESULTS AND INTERPRETATION**

### **4.1. Descriptive Statistics**

Table 3 shows the trade performance of West African countries for the indicators considered between 2000 and 2018. The data show a relatively low average GDP growth rate (1.7%) between 2000 and 2018. This could be explained by recent financial crises, particularly those of 2008. Our data also shows that the openness rate of West African countries is 58.5%, which could be explained by the existence of regional and preferential trade agreements in force in the region. The data also show high levels of trade facilitation, as evidenced by the region's border efficiency index (99.66%). By contrast, the level of regulation remains very low in the region (-0.65). This gap, if bridged, could increase ECOWAS's participation in international trade at all levels (production, processing, marketing, etc.). The development of regional value chains requires quality infrastructure. In ECOWAS, and considering the study period, the regional average is 2.21, which is relatively low on a scale of 5. Emphasis should be placed on transport infrastructure for the effective development of global value chains.

**Table 3: Descriptive statistics of the variables used**

<i>Variables</i>	<i>Comments</i>	<i>Average</i>	<i>Standard deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Logistics performance index	81	2,21	0,29	1,40	2,89
GDP growth rate	284	1,70	4,32	-30,70	19,56
Open rate	266	58,50	18,51	20,72	117,82
Financial development	283	13,96	11,59	0,00	59,51
Efficiency at the border	75	99,66	53,40	48,00	238,71
rates	205	10,58	2,54	6,11	21,47
Internet penetration rate	283	7,66	10,78	0,02	59,50
regulations	270	-0,65	0,38	-1,86	0,10
CVR participation index	266	211643,80	453446,20	0,00	2571493,00

Source: Author

## 4.2. Econometric Results

The results of the econometric estimates show the expected signs. Overall, the results show that trade facilitation boosts the participation of West African countries in regional value chains. Indeed, trade facilitation regulations have a positive impact on trade facilitation in the region. Specifically, the econometric results show that a 1% increase in the level of regulations in West African countries improves participation in TRCs by 3.74%. The results also show that participation in regional value chains is associated with an efficient border policy. Thus, the implementation of effective border measures aimed at the fluidity of trade flows improves the participation of West African countries in RVCs. A 1% increase in the level of border efficiency in the region increases TRC participation by 0.02%. This result confirms the economic theory and empirical work of Kowalski *et al.*, 2015; Shepherd, 2017, Takpara *et al.*, 2023.

The coefficients associated with the variables “Internet penetration rate”, “openness rate” and “GDP growth rate” show positive and significant signs. This highlights the need for structural transformation in West Africa by implementing policies to transform raw materials into finished or semi-finished products, and by placing particular emphasis on information and communication technologies, the engine of growth in these economies. Implementing these policies will make West Africa less dependent on the rest of the world, especially in recent years marked by crises (financial in 2008,

health in 2020 and the Russia-Ukraine conflict in 2022). These events have had a negative impact on households, as the general level of prices has risen.

These estimates show that the quality of infrastructure has an impact on the development of regional value chains in West Africa; these results show that the poor quality of transport infrastructure is an obstacle to the development of value chains in the region. These results show the need to strengthen policies and measures aimed at improving the quality of infrastructure in West Africa. Finally, the econometric results show the role played by commercial costs in participation in regional value chains. Indeed, a 1% increase in average applied tariffs reduces participation in RVCs by 4%. This result confirms the economic theory and empirical work of Slany, 2019; Del Prete *et al.*, 2018; Okah Efogo *et al.*, 2021, Takpara *et al.*, 2023.

A second econometric regression is performed with the countries<sup>1</sup> having notification levels for the different categories of the Trade Facilitation Agreement (A, B and C) below the average<sup>2</sup>. The econometric results show a positive and significant contribution of regulations and border efficiency on the participation of West African countries in regional value chains. In contrast, the results show a negative but significant effect of ICT on participation in regional value chains in ECOWAS. This counter-intuitive result could be explained by the low internet penetration rate recorded by most of these countries.

Internet penetration has a significant influence on countries' commitments under the agreement. Nations with a high level of Internet penetration tend to be more inclined to commit to measures aimed at facilitating trade, particularly in the area of e-commerce. This propensity stems from several interconnected factors. Firstly, widespread access to the internet fosters a better informed and technologically connected population, which in turn stimulates demand for digitally-based trade facilitation solutions. In addition, countries with a robust e-commerce infrastructure are more likely to seek to fully exploit the e-commerce provisions of the AFE. In addition, widespread internet access enhances economic competitiveness by making it easier for businesses to reach global markets via online platforms. However, while internet penetration is an important factor, other variables such as the size of the economy and

1. All West African countries except Benin, Gambia, Mali and Togo.
2. <https://www.tfadatabase.org/fr/implementation/comparisons>, visited on 05 April 2024

institutional capacity must also be taken into account when assessing countries' trade facilitation commitments.

In the light of these results, West Africa should play an important role in the recovery of African economies. It should put trade facilitation at the centre of development policies, especially in the RVCs, given their effects on the development of RVCs in the region. In addition, West African countries could implement concrete reforms to facilitate trade. These could include simplifying customs procedures, harmonising standards and regulations, providing access to ICTs and improving transport infrastructure.

**Table 4: Results of econometric estimations**

IPL	-1.485 (2.359)	-3.953 (2.826)
ICT	0.121*** (0.037)	-0.152** (0.062)
Regulations	3.740* (2.044)	30.197*** (4.837)
Border efficiency	0.018** (0.007)	0.025*** (0.007)
Education	-0.076*** (0.015)	0.058 (0.058)
GDP growth	0.394 (0.930)	1.791*** (0.657)
Opening	1.850 (1.796)	-9.030*** (2.354)
Financial Development	-5.546*** (1.344)	-7.548*** (1.797)
GFCF	2.610 (1.628)	16.505*** (2.417)
Rates	-4.040 (2.491)	-6.674*** (1.886)
Population	-8.487*** (1.517)	-1.193 (3.286)
Constant	170.938*** (29.712)	65.384 (62.839)
R-squared	0.890	0.972
Underidentification test	3.878	2.725
Prob>LM	0.275	0.0988
Hansen_stat	3.929	
Hansen P_value	0.140	

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1 Source: authors

### (a) Robust Results

The regression results, presented in Tables 5 and 6, confirm the significant influence of the explanatory variables on the participation of West African countries in regional value chains. The fixed-effects model used in Table 5 has a high coefficient of determination ( $R^2 = 0.89$ ), indicating that the variables in the model explain 89% of the variation in participation. Furthermore, the robustness tests carried out in Table 5 confirm these results using different participation indicators.

The validity of the instruments used in the IV-2SLS estimation is also confirmed by several tests. The Kleibergen-Paap test rejects the null hypothesis of under-identification, indicating correct identification of the model. The Cragg-Donald Wald and Stock-Yogo F-statistics indicate that the instruments are not weak and do not suffer from size bias. The Hansen statistic and p-value also confirm the suitability of the instruments. These statistics therefore indicate that the instruments are relevant, allowing us to conclude that they are sufficiently robust.

**Table 5: Estimation results using the fixed-effects model**

<i>Variables</i>	<i>FVA</i>
IPL	0.353 (0.251)
ICT	-0.0131* (0.00575)
Regulations	0.272 (0.595)
Border efficiency	0.00130 (0.0116)
GDP growth	0.245** (0.0764)
Financial Development	-0.342 (0.407)
Rates	0.839** (0.251)
Population	-0.860 (0.767)
Constant	24.04 (12.60)
Comments	22
R-squared	0.892

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  Source: authors

**Table 6: Results of econometric estimations with GVC and DVA**

IPL	81.756*** (28.233)	2.872*** (0.916)
ICT		-0.021*** (0.007)
Regulations	-61.057** (24.964)	0.391 (0.552)
Border efficiency	-0.284*** (0.108)	-0.004 (0.003)
Education	0.519*** (0.188)	0.037*** (0.003)
GDP growth	39.488*** (13.437)	1.912*** (0.346)
Opening	-23.618** (9.837)	-0.315 (0.217)
Financial Development	35.906*** (13.688)	1.562*** (0.232)
GFCF	30.595*** (9.767)	1.042*** (0.319)
Rates	16.065** (7.008)	0.721*** (0.218)
Population	44.694*** (16.954)	2.769*** (0.374)
Constant	-1,157.421*** (424.441)	-51.670*** (7.053)
Comments	13	13
R-squared	0.918	1.000
Underidentification test	6	3.750
Prob>LM	0.0498	0.0528
Hansen_stat	2.036	0
Hansen P_value	0.154	

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

Source: authors

## 5. CONCLUSION AND ECONOMIC POLICY IMPLICATIONS

Trade facilitation remains a key determinant of participation in regional value chains in ECOWAS. The objective of this trial is to assess the effect of trade facilitation on participation in regional value chains in ECOWAS. Panel data with ECOWAS countries covering the period from 2000 to 2018 are constructed

for the study. The 2 SLS method with instrumental variables is used to estimate the econometric model. The results showed a positive and significant effect of the variables of interest and control, indicating the important role that trade facilitation can play in participation in regional value chains in ECOWAS. Taking this information into account could serve as a basis for decision-makers to improve the quality of institutional governance in regional value chains. These results also highlight the preponderant role of transport infrastructure in regional value chains; the authorities must promote the development of transport infrastructure for a strong participation of ECOWAS in regional value chains. These results answer the research question and show that trade facilitation boosts ECOWAS's participation in value chains. These results confirm the work of Takpara (2023) and Efogo (2020) on the importance of trade facilitation in value chains. ECOWAS countries need to make their economies much more competitive in order to reduce trade costs and customs red tape. In addition, ECOWAS countries need to strengthen trade facilitation measures to take full advantage of the AfCFTA.

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