The impact of trade openness on export diversification in low-income countries: the role of institutional quality

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Abstract

In this study, we investigate the effect of trade openness on export diversification through the moderating influence of institutional quality for a panel dataset of 66 low-income countries covering the period 2000–2019. Using a Poisson pseudo-maximum likelihood estimator, the study considers various regional groups: East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, South Asia and Sub-Saharan Africa. Our findings indicate that the weakness of institutions in low-income Sub-Saharan African countries significantly exacerbates the negative effect of trade openness on export diversification. These findings align with sub-samples of regional groups, except for Europe and Central Asia countries, where good institutional quality promotes diversification due to trade openness. Then, low-income countries need to significantly improve their institutional quality, such as voice and accountability and rule of law, as a fundamental step to harness the positive benefits of trade openness and achieve industry diversification.

Keywords: International trade, export diversification, institutional quality, low-income countries

L'impact de l'ouverture commerciale sur la diversification des exportations dans les pays à faible revenu : le rôle de la qualité institutionnelle

Résumé

Dans cette étude, nous examinons l'effet de l'ouverture commerciale sur la diversification des exportations à travers l'influence modératrice de la qualité institutionnelle pour un ensemble de données de panel de 66 pays à faible revenu sur la période 2000-2019. En utilisant un estimateur de pseudo-maximum de vraisemblance de Poisson, l'étude prend en compte différents groupes régionaux : Asie de l'Est et Pacifique, Europe et Asie centrale, Amérique latine et Caraïbes, Moyen-Orient et Afrique du Nord, Asie du Sud et Afrique subsaharienne. Nos

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résultats indiquent que la faiblesse des institutions dans les pays d'Afrique subsaharienne à faible revenu exacerbe de manière significative l'effet négatif de l'ouverture commerciale sur la diversification des exportations. Ces résultats s'alignent sur les sous-échantillons de groupes régionaux, à l'exception des pays d'Europe et d'Asie centrale, où une bonne qualité institutionnelle favorise la diversification grâce à l'ouverture commerciale. Par conséquent, les pays à faible revenu doivent améliorer de manière significative leur qualité institutionnelle, comme la voix et la responsabilité et l'État de droit, en tant qu'étape fondamentale pour exploiter les avantages positifs de l'ouverture commerciale et parvenir à une diversification industrielle.

Mots-clés : Commerce international, diversification des exportations, qualité institutionnelle, pays à faible revenu

Introduction

The literature on international trade highlights the relevance of export diversification during the early stages of a nation's economic development. Imbs & Wacziarg (2003) demonstrate a positive correlation between diversification and economic growth in low-income countries, while concentration becomes crucial in high-income countries. Other researchers, such as Dogruel & Tekce (2011), Rondeau & Roudaut (2014), Gözgör & Can (2017), Hounsou & Ayivodji (2020), and Gnangnon (2021) also support the driving role of export products diversification in sustainable economic growth. Indeed, the transition from commodities to highly skilled and high-tech products stimulates investment in emerging sectors, promoting economic growth (Hausmann & Rodrik, 2003). Export diversification facilitates the expansion of goods exported and enables the exploration of higher-quality products and new markets (Tran et al., 2017).

However, empirical research on the advantages of trade openness yields inconsistent findings. Some authors suggest a positive correlation between trade openness policies and diversification (Dennis & Shepherd, 2011; Stojčić et al., 2018; Hounsou & Ayivodji, 2020; Afaf et al., 2021).

For example, Stojčić et al. (2018) examine the effects of trade liberalization with the European Union on changes in the structure and quality of exports of New Member States (NMS) during the period 1990-2015. Results obtained using the synthetic control method (SCM)

indicate that trade liberalization has improved the quality of exports and the share of technology-intensive industries. For Afaf et al. (2021), trade openness is a crucial factor in the diversification of non-oil exports, particularly for economies dependent on commodities. They indicate that the trade openness policy has a positive long-term effect on the diversification of Algerian exports away from the hydrocarbon sector. Economic globalization permits the transfer of technologies and their diffusion to other sectors, resulting in new production facilities. Therefore, trade openness can lead to the emergence of new products by positively contributing to a country's current level of knowledge (Chellaraj et al., 2013).

Conversely, others argue that trade liberalization leads to export product concentration or specialization, resulting in a negative relationship between trade openness and diversification (Imbs, 2004; Osakwe et al., 2018).

Osakwe et al. (2018) investigated the role of trade and trade policy in the diversification of exports of developing countries, using both parametric and non-parametric techniques. The non-parametric analyses indicate that developing countries that are more open to trade, as measured by trade intensity, tend to have more diversified export structures than those that are less open to trade. However, for sub-Saharan African countries, the non-parametric test shows the opposite, indicating that countries that are more open to trade have less diversified export structures. The results of the parametric analysis provide further evidence that trade liberalization, in the form of lower tariffs, contributes to export diversification in developing countries, and the long-run results are even stronger for sub-Saharan African countries. Regarding trade intensity, the parametric estimates also confirm the results that trade is associated with diversification in developing countries and sub-Saharan African countries in the short run; however, for sub-Saharan African countries, it leads to concentration in the long run, consistent with the non-parametric results.

Finally, Jacks et al. (2011) and Makhlouf et al. (2015) demonstrate that openness can be positively associated with both specialization and diversification, contingent on the period and methodology employed. Trade openness can simultaneously foster diversification by expanding accessible markets or reinforce concentration if the gains are limited to already competitive sectors. Agosin et al. (2012) used GMM panel data

estimation in 79 countries from 1962 to 2000 to investigate the determinants of export diversification and used trade openness as an explanatory variable in the regressions. Their results indicate that trade openness has no significant effect on export diversification by product.

There is considerable heterogeneity among developing countries in terms of trade and export specialization patterns. Despite extensive efforts towards trade openness and liberalization, several developing countries, particularly African countries, and LDCs, have failed to diversify their production and exports, and transform their economies. This is in contrast to emerging economies in Asia and Latin America, where increased trade has been associated with greater export diversification. For most developing countries outside the emerging economies, their export structures have remained largely unchanged and heavily concentrated on commodities.

Moreover, North (1990), Acemoglu (2005), Gnangnon (2021), and Tondé et al. (2024) recognize institutions' substantial impact on the effectiveness of economic policies.

Baliamoune-Lutz and Ndikumana (2007) explore the argument that weak institutions may be one of the causes of the limited effects of trade openness on growth in Africa. They control for several major factors, particularly export diversification, using a new dataset on Africa. The results of Arellano-Bond's GMM estimates on panel data for African countries show that institutions play an important role in improving the growth effects of trade. Furthermore, they find that the joint effect of institutions and trade is U-shaped, suggesting that institutions play a key role in harnessing the trade-driven growth engine, especially when openness to trade reaches high levels.

The influence of this institutional aspect is highlighted by Fu (2021), who demonstrates that the positive relationship between openness and firm exports is mediated by the protection of property rights and firm autonomy, by Makhlouf et al. (2015), who notes that the impact of openness on firm diversification depends strongly on the type of political regime (democracies and autocracies), and by Gnangnon (2021), who emphasizes the importance of tax reform.

Contractual institutions and property rights institutions are vital for expanding production and trade. Palangkaraya et al. (2017), d'Araujo et al. (2016), and Gani and Scrimgeour (2016) emphasize that upholding the rule of law, effective enforcement of trade agreements,

absence of bureaucracy, improvements in the regulatory environment, and the freedom of citizens to exercise their political and civil rights are essential for promoting trade. Another critical factor directly affecting bilateral trade flows is corruption. Anderson and Marcouiller (2002) argue that corruption and weak legal enforcement of contracts increase the risks associated with trading with countries with such weaknesses, thereby harming trade flows.

Nonetheless, limited empirical studies analyze the moderating effect of institutional quality on the relationship between trade openness and diversification. Three studies have attempted to account for the indirect influence of institutions on diversification through trade openness (Makhlouf et al., 2015; Fu, 2021; Gnangnon, 2021), but they have not explicitly considered all the factors that measure formal institutional quality.

This study contributes to the existing literature in two main ways. Firstly, we investigate the moderating effect of institutions using Kaufmann et al., (2010) institutional variables in the relationship between trade openness and export diversification in low-income countries. Secondly, we conduct a comparative analysis across regions to better appreciate the significant disparities in institutional quality. Indeed, few analytical frameworks have simultaneously considered regions separately and the moderating role of institutional quality. Most studies that have explored the link between openness and diversification focus mainly on selected regions or do not take into account the moderating role of institutional quality. Our study enhances research by filling this gap.

This analysis is performed over a panel dataset of 66 countries [4] covering the period 2000–2019 using a Poisson pseudo-maximum likelihood estimator. Empirical results suggest that over the full sample, higher levels of trade openness have a detrimental impact on product diversification when the effect of institutional variables is not

[4] More specifically, for reasons of homogeneity, the current sample consider the low-income and lower-middle income countries of the World Bank categorization by income level. There is a strong proximity, in terms of income level, between the countries in the upper bound of the low-income group and the lower-middle income group. Additionally, some countries moved from the low-income group to the low-middle income group over the period. We also consider the following regional sub-samples: East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, South Asia, and Sub-Saharan Africa. The list of countries in the sample is presented in Appendix 8.

considered. Ultimately, in the presence of weak institutions in low-income countries, an improvement of governance indicators significantly impacts the negative effect of trade openness on diversification. These findings align with sub-sample regional groups, except for Europe and Central Asian countries, in which good institutional quality promotes diversification due to trade openness.

The remainder of this paper is organized as follows. Section 1 presents the data, section 2 discusses the empirical methodology. Section 3 interprets the empirical findings, and the last section concludes the paper.

I. Data

The dependent variable (**y**) represents the export diversification indicator. In the current data, we consider the United Nations Conference on Trade and Development (UNCTAD) number of products at the SITC (Standard International Trade Classification) group level (revision 3 at 3-digits) exported by each country. Despite alternative indexes[5], we approximate diversification by the number of exported goods, as in recent studies (Dennis & Shepherd, 2011; Yenilmez, 2024; Zhang et al., 2024) to better shape intensive margin to export. An increasing number of products could suggest an improvement in competitiveness for a given economy in the dynamics of trade openness. Indeed, export quality upgrading is often associated with export diversification in the earlier stages of development (Henn et al., 2020). So, as in most of the empirical studies, export diversification in lower-income countries is associated with changes in the distribution of export earnings for a set of products, known as intensive margin (Can & Gozgor, 2018). The variable **trade** measures openness (in percentage) as the sum of imports and exports, and share of gross domestic product (GDP). To address the institutional quality in a country, we use six institutional variables (control of corruption, government effectiveness, political stability and absence of violence/terrorism, rule of law, voice and accountability, and regulatory quality), produced by Kaufmann et al., (2010), as the moderating

[5] Indeed, the Theil diversification index proposed by the International Monetary Fund is limited to the period from 1964 to 2014. Furthermore, the Herfindahl-Hirschmann concentration index does not allow to highlight the intensive and extensive dimensions of diversification like the Herfindahl-Hirschmann index.

variables. The indicators are normalized, and vary from approximately -2.5 to 2.5, with higher values corresponding to better governance.

In addition, we use control variables: human capital per capita index (**hc**), financial development (**credit**), exchange rate (**xr**), and terms of trade (**terms**). Additional details on variable descriptions and sources and the list of countries are summarized in Table I and Table II.

Table I : Data description and sources

Variable	Description	Source
number	Number of products	United Nations Conference on Trade and Development (UNCTAD)
xr	Exchange rate in national currency USD	Penn World Table
hc	Human capital index	
credit	Domestic credit to private sector by banks in percentage of GDP	World Development Indicators (World Bank)
trade	Trade (sum of imports and exports) in percentage of GDP	
terms	Net barter terms of trade index (2000 = 100)	
instmean	Mean value of institutional quality calculated using Kaufmann et al. (2010) data	Worldwide Governance Indicators (World Bank)
corruption	Control of Corruption	
effective	Government Effectiveness	
stability	Political Stability and Absence of Violence/Terrorism	
regulatory	Regulatory Quality	
ruleofLaw	Rule of Law	
voice	Voice and Accountability	

Table II: List of countries in the sample

Angola	Eswatini	Lesotho	Uzbekistan	Ukraine
Armenia	Gambia	Madagascar	Pakistan	Vietnam
Bangladesh	Ghana	Malawi	Philippines	Zambia
Bhutan	Guatemala	Mali	Rwanda	Zimbabwe
Bolivia	Guinea	Morocco	Lao	Egypt
Burkina Faso	Guinea-Bissau	Mauritania	Syrian Arab Republic	Ethiopia
Burundi	Georgia	Moldova	Central African Republic	
Benign	Haiti	Mongolia	Sierra Leone	
Cape Verde	Honduras	Mozambique	Sri Lanka	
Cambodia	India	Myanmar	Senegal	
Cameroon	Indonesia	Nicaragua	Tajikistan	
Comoros	Solomon Islands	Niger	Tanzania	
Congo	Jordan	Nigeria	Chad	
Ivory Coast	Kenya	Nepal	Togo	
El Salvador	Kyrgyzstan	Uganda	Tunisia	

Accumulation of human capital allows countries to shift from raw commodity production to manufactured goods or knowledge-intensive services, promoting research and development efforts and enhancing productivity and export diversification (Agosin et al., 2012). Financial development can stimulate export diversification by alleviating liquidity constraints to exporters and expanding their number. However, the development of capital markets may lead to export concentration if investors avoid taking risks on untested projects and focus on financing already competitive activities (Manova, 2013; Chaney, 2016). The terms of trade variable has both negative and positive effects on diversification. In a simple factor endowment model, an improvement in the terms of trade often leads to concentration as factors are reallocated to the primary exported product. However, according to Melitz (2003), improvements in terms of trade can also increase export profitability and foster greater diversification.

Table III summarizes the data for all variables covering the period 2000–2019 and Table IV presents the Pearson correlation matrix. To

approximate a normal distribution of **trade**, **xr**, and **credit** we use their logarithmic transformations.

Table III: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
number (Y)	1317	136.97	68.42	5	256
trade	1262	4.17	0.45	2.47	5.17
xr	1300	4.69	2.52	-0.61	10.05
credit	1265	2.87	0.83	-0.91	4.74
hc	1140	1.98	0.57	1.07	3.58
terms	1320	116.68	39.46	21.4	321.69
instmean[6]	1250	-3.91	2.69	-11.96	3.65
corruption	1254	-0.68	0.52	-1.69	1.64
effective	1250	-0.69	0.49	-2.14	0.81
stability	1254	-0.61	0.76	-2.97	1.28
regulatory	1251	-0.62	0.49	-2.35	1.04
ruleofLaw	1254	-0.69	0.51	-2.09	0.66
voice	1254	-0.6	0.63	-2.23	0.97

[6] « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicators.

Table IV : Cross-correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) number	1.00												
(2) log_trade	0.11	1.00											
(3) log_xr	-0.25	-0.24	1.00										
(4) log_credit	0.56	0.27	-0.28	1.00									
(5) hc	0.43	0.43	-0.33	0.38	1.00								
(6) terms	-0.08	0.02	-0.00	-0.09	-0.05	1.00							
(7) instmean	0.33	0.25	-0.19	0.40	0.23	-0.06	1.00						
(8) corruption	0.21	0.15	-0.22	0.31	0.04	-0.08	0.82	1.00					
(9) effective	0.54	0.18	-0.23	0.54	0.36	-0.16	0.82	0.69	1.00				
(10) stability	-0.04	0.42	-0.05	0.09	0.11	0.09	0.66	0.42	0.32	1.00			
(11) regulatory	0.41	0.20	-0.17	0.44	0.27	-0.07	0.83	0.65	0.78	0.35	1.00		
(12) ruleofLaw	0.35	0.12	-0.14	0.38	0.21	-0.09	0.88	0.79	0.79	0.44	0.73	1.00	
(13) voice	0.24	-0.01	-0.11	0.21	0.09	-0.04	0.66	0.39	0.40	0.25	0.51	0.48	1.00

II. Empirical methodology

We employ the Poisson pseudo-maximum likelihood (PPML) estimator due to its efficacy in addressing several challenges, including heteroskedasticity, endogeneity, and the incorporation of heterogeneity controls (Motta, 2019). Silva and Tenreyro (2006) advocate for the use of the PPML estimator in trade models over ordinary least squares (OLS) because the former provides more accurate coefficient estimates by addressing heteroskedasticity. Additionally, the PPML estimator effectively handles potential endogeneity issues and econometric drawbacks such as heteroskedasticity bias, serially correlated errors, and multicollinearity (Álvarez et al. 2018).

Finally, the number of products that represent diversification is an integer variable. We can then assume that the process follows a discrete distribution according to the Poisson distribution (Cameron & Trivedi, 2013; Gourieroux et al., 1984).

The Poisson regression model is defined by:

$$\boldsymbol{Pr(Y_{it} = k/X_{it}) = \frac{e^{\lambda}\lambda^{k}}{k!}\ , k = 0, 1, 2, \ldots} \quad \boldsymbol{(1)}$$

Where X is a vector of explanatory variables and $\boldsymbol{\lambda = e^{X'_{it}\beta} = e^{\beta_0+\beta_1 X_{1it}+\beta_2 X_{2it}+\cdots}}$

The panel Poisson pseudo-maximum likelihood regression can be estimated by maximizing the Poisson likelihood function for the model parameters, transforming equation (1) as follows:

$$\boldsymbol{Y_{it} = \exp(\beta_1 trade_{it} + \beta_2 (trade * inst)_{it} + \beta_3 inst_{it} + \beta_4 hc_{it} + \beta_5 credit_{it} + \beta_6 xr_{it} + \beta_7 terms_{it} + \gamma t_{it}) + \in_{it}} \quad \boldsymbol{(2)}$$

In equation (2), ***inst*** represents each institutional variable, and the other variables are defined as previously stated. The variable $\boldsymbol{trade * inst}$ captures the combined effect of trade openness with each institutional variable on diversification. This approach implies taking into account two hypotheses: a direct effect of trade openness, and an indirect moderating effect linked to institutional quality. Thus, improving institutional quality is likely to amplify or attenuate the estimated direct effect. More precisely, the relationships involved in formalization can be schematized in Figure 1 below from Andersson et al., (2014).

$\in_{it}$ defines the error term and t_{it} represents exporter-time fixed effect estimates[7]. In the analysis, we estimate the effects of the indicators separately to identify the significant dimensions of institutional governance. However, we are careful not to estimate the six indicators simultaneously to limit the risk of multicollinearity.

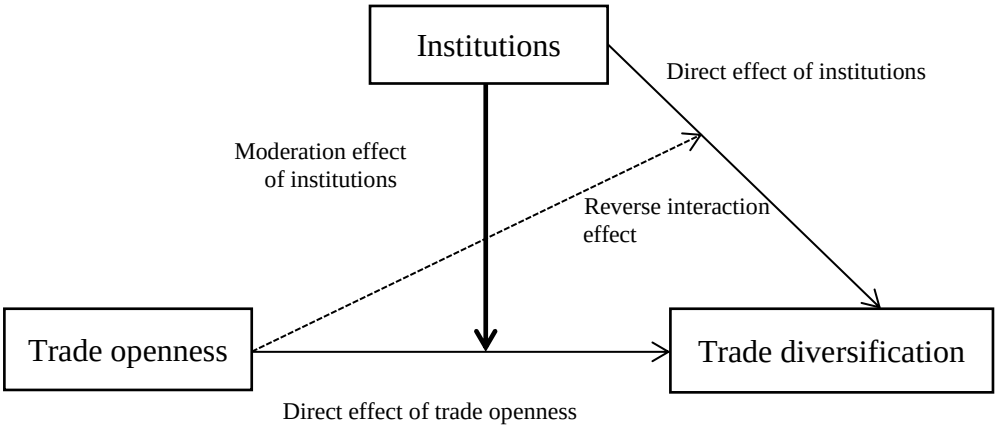

Figure 1: Representation of the moderation effect of institutions

III. Empirical findings

In the comprehensive analysis of the full sample[8] (Table V), the coefficient of trade openness (-0.517) exhibits a negative and statistically significant effect, indicating that higher levels of trade openness have a detrimental impact on product diversification. These findings align with previous studies, such as Osakwe et al. (2018) and Agosin et al. (2012), which suggest that the Heckscher-Ohlin factor endowment model may be more suitable for explaining the potential effect of trade liberalization on diversification for countries heavily reliant on primary products, increased openness tends to enhance the profitability of traditional sectors (Melitz, 2003).

[7] For this purpose, we perform the estimations using the Poisson regression models with multiple high-dimensional fixed effects by Correia et al., (2019)

[8] We consider the following region: East Asia and Pacific countries, Europe and Central Asia countries, Latin America and Caribbean countries, Middle East and North African countries, South Asia, and Sub-Saharan African countries. Tables of the remaining results a presented in Appendix 3, Appendix 4, Appendix 5, and Appendix 6.

Table V: The effect of trade liberalization on export diversification; full sample

Dependent variable: number of products exported							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
xr	-0.0110***	-0.00979**	-0.00938**	-0.00586	-0.0124***	-0.0114***	-0.0180***
	(0.00409)	(0.00438)	(0.00412)	(0.00407)	(0.00421)	(0.00429)	(0.00372)
hc	0.214***	0.221***	0.172***	0.210***	0.201***	0.208***	0.237***
	(0.0202)	(0.0210)	(0.0200)	(0.0204)	(0.0205)	(0.0199)	(0.0203)
credit	0.268***	0.266***	0.216***	0.286***	0.250***	0.259***	0.237***
	(0.0160)	(0.0160)	(0.0169)	(0.0164)	(0.0162)	(0.0159)	(0.0148)
log_terms	-0.0105	-0.000575	0.0139	0.0183	-0.0116	0.00107	0.00889
	(0.0337)	(0.0332)	(0.0324)	(0.0338)	(0.0316)	(0.0329)	(0.0321)
instmean	0.340***						
	(0.0493)						
trade	-0.517***	-0.306***	-0.418***	-0.211***	-0.420***	-0.464***	-0.501***
	(0.0513)	(0.0546)	(0.0399)	(0.0419)	(0.0429)	(0.0383)	(0.0355)
instmean#trade	-0.0766***						
	(0.0117)						
corruption		0.740***					
		(0.256)					
corruption#trade		-0.161***					
		(0.0593)					
effective			1.840***				
			(0.229)				
effective#trade			-0.381***				
			(0.0535)				
stability				0.346*			
				(0.183)			
stability#trade				-0.0951**			
				(0.0436)			
regulatory					1.788***		
					(0.283)		
regulatory#trade					-0.386***		
					(0.0668)		
ruleofLaw						1.832***	
						(0.210)	
ruleofLaw#trade						-0.407***	
						(0.0486)	
voice							2.049***
							(0.193)
voice#trade							-0.469***
							(0.0452)

Constant	6.114***	5.133***	5.904***	4.521***	5.819***	5.885***	5.986***
	(0.282)	(0.297)	(0.236)	(0.238)	(0.254)	(0.249)	(0.223)
Observations	995	995	995	995	995	995	995
Chi2	773.3	733.1	981.0	724.2	794.3	865.3	822.0
Pseudo R^2	0.324	0.295	0.347	0.294	0.328	0.331	0.347
ID*TIME_FE	YES	YES	YES	YES	YES	YES	YES

Pseudo Poisson Maximum Likelihood estimation for the full sample of 66 countries from 2000 to 2019. « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicators by Kaufmann et al. (2011). The variables in interactions contain the special character « # ». The regression includes a country-time fixed effect over the period. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Furthermore, low-income countries have embraced more liberal trade policies continue to represent a negligible percentage of global trade, and have highly concentrated export structures. This suggests that these reforms stimulate specialization in traditional sectors and have not been associated with a significant influx of new products and exporters. The additional impact of institutional variables on trade remains negative and significant: for example, the absence of application of law explains the negative effect of trade on export diversification (-0.407, column 6). In addition, the low quality of voice and accountability (freedom of expression, free media) is another reason that explains this negative effect (-0.469, column 7).

To conduct a more in-depth analysis, we consider sub-samples based on regional groups (The regional distribution of the sample is given in Table VI).

Table VI : Distribution of sub-samples

Label	**Number of countries**	**Frequencies**
East Asia & Pacific	8	160
Europe & Central Asia	7	140
Latin America & Caribbean	6	120
Middle East & North Africa	5	100
South Asia	6	120
Sub-Saharan Africa	34	680
Total	66	1320

Table VII presents the regression outcomes that examine the effects of trade openness and their interaction with institutional quality on the number of products in Sub-Saharan Africa (SSA) low-income countries. Looking at the results, we find that trade has a negative and significant effect, and the institutional variables (Inst) have a positive impact on export diversification. In other words, in the SSA sub-sample, higher volumes of trade as a share of GDP hurt the number of

Table VII: The effect of trade liberalization on export diversification, Sub-Saharan Africa

Dependent variable: number of products exported							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
xr	0.0315***	0.0478***	0.0338***	0.0360***	0.0328***	0.0269***	0.0229***
	(0.00895)	(0.00911)	(0.0100)	(0.00830)	(0.0106)	(0.00931)	(0.00786)
hc	0.695***	0.746***	0.653***	0.712***	0.694***	0.672***	0.685***
	(0.0485)	(0.0556)	(0.0499)	(0.0493)	(0.0501)	(0.0499)	(0.0461)
credit	0.281***	0.291***	0.247***	0.304***	0.240***	0.283***	0.268***
	(0.0281)	(0.0299)	(0.0302)	(0.0308)	(0.0313)	(0.0289)	(0.0259)
log_terms	0.0597	0.127**	0.0373	0.0962*	0.0799	0.0475	0.0410
	(0.0573)	(0.0583)	(0.0600)	(0.0568)	(0.0589)	(0.0581)	(0.0532)
instmean	0.282***						
	(0.0921)						
trade	-0.354***	0.0252	-0.258*	-0.194**	-0.0549	-0.351***	-0.562***
	(0.112)	(0.107)	(0.141)	(0.0785)	(0.110)	(0.0980)	(0.0675)
instmean#trade	-0.0600***						
	(0.0219)						
corruption		-0.324					
		(0.475)					
corruption#trade		0.103					
		(0.115)					
effective			1.317**				
			(0.611)				
effective#trade			-0.260*				
			(0.146)				
stability				0.757**			
				(0.348)			
stability#trade				-0.183**			
				(0.0865)			
regulatory					0.449		
					(0.560)		
regulatory#trade					-0.0423		
					(0.134)		
ruleofLaw						1.608***	
						(0.481)	
ruleofLaw#trade						-0.352***	
						(0.114)	

voice							3.079***
							(0.340)
voice#trade							-0.692***
							(0.0797)
Constant	4.072***	1.917***	3.986***	3.002***	2.880***	4.147***	5.083***
	(0.656)	(0.636)	(0.781)	(0.495)	(0.700)	(0.619)	(0.461)
Observations	498	498	498	498	498	498	498
Chi2	530.6	447.3	521.2	430.0	529.5	506.9	560.8
Pseudo R^2	0.282	0.255	0.279	0.256	0.287	0.276	0.354
ID*TIME_FE	YES	YES	YES	YES	YES	YES	YES

Pseudo Poisson Maximum Likelihood estimation for the sub-sample of low-income countries in Sub-Saharan Africa from 2000 to 2019. « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicator by Kaufmann et al. (2011). The variables in interactions contain the special character « # ». The regression includes a country-time fixed effect over the period. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

products exported. Moreover, institutional quality has a positive effect on the endogenous variable (export diversification). Finally, the interaction of trade with institutional quality presents a negative effect: this outcome indicates that the low institutional quality reinforces the negative impact of trade openness on export diversification. Such a result is not surprising since economic development induces trade specialization, followed by export concentration. The other covariates like exchange rate, human capital, financial development, and terms of trade present a positive and significant effect as expected. Regarding the effects of exchange rates, a depreciation of the exchange rate (an increase in uncertainty) should stimulate the entry of new exporters and favor diversification (Melitz, 2003; Agosin et al., 2012).

Findings presented in Table VIII reveal variations in the coefficients of trade openness and institutions across Europe & Central Asia countries. Specifically, the coefficient of trade openness is positive and statistically significant for this sample. Consequently, high levels of trade openness can have a positive influence on product diversification in low-income countries. The process of economic globalization facilitates the transfer and diffusion of technologies to various sectors, thereby fostering the emergence of new production facilities. Consequently, trade openness can contribute positively to a country's existing knowledge base, leading to the development of new products. This outcome aligns with the findings of Stojčić et al. (2018), which

confirm the positive effect of trade openness on diversification in European countries.

Table VIII: The effect of trade liberalization on export diversification, in Europe and Central Asia

Dependent variable: number of products exported							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
xr	0.0256	0.0825**	-0.0485	0.0396	-0.0597	0.101***	-0.0722***
	(0.0437)	(0.0381)	(0.0298)	(0.0260)	(0.0370)	(0.0367)	(0.0204)
hc	1.256***	0.885***	1.124***	1.148***	1.111***	1.027***	0.250
	(0.241)	(0.227)	(0.146)	(0.213)	(0.153)	(0.232)	(0.281)
credit	0.242***	0.411***	0.174***	0.320***	0.223***	0.412***	-0.0323
	(0.0771)	(0.0498)	(0.0386)	(0.0415)	(0.0420)	(0.0643)	(0.0692)
log_terms	0.0341	-0.421**	0.214**	-0.0861	0.242	-0.568**	0.669***
	(0.252)	(0.186)	(0.107)	(0.119)	(0.168)	(0.237)	(0.165)
instmean	-1.095***						
	(0.353)						
trade	1.263***	0.738	1.922***	0.536***	0.635***	0.763*	0.307
	(0.345)	(0.682)	(0.250)	(0.179)	(0.119)	(0.438)	(0.195)
instmean#trade	0.246***						
	(0.0777)						
corruption		-3.280					
		(3.256)					
corruption#trade		0.612					
		(0.717)					
effective			-9.740***				
			(1.543)				
effective#trade			2.317***				
			(0.340)				
stability				-4.137**			
				(1.636)			
stability#trade				0.875**			
				(0.353)			
regulatory					-5.015***		
					(1.045)		
regulatory#trade					1.199***		
					(0.229)		

ruleofLaw						-3.836	
						(2.359)	
ruleofLaw#trade						0.753	
						(0.524)	
voice							-1.652*
							(0.993)
voice#trade							0.494**
							(0.215)
Constant	-5.479**	-1.099	-7.989***	-1.737	-2.712***	-0.891	0.483
	(2.212)	(3.820)	(1.340)	(1.298)	(0.900)	(2.828)	(1.503)
Observations	93	93	93	93	93	93	93
Chi2	128.3	127.1	294.1	119.2	227.2	107.6	251.8
Pseudo R^2	0.400	0.364	0.524	0.387	0.477	0.369	0.487
ID*TIME_FE	YES	YES	YES	YES	YES	YES	YES

Pseudo Poisson Maximum Likelihood estimation for the sub-sample of low-income countries in Europe & Central Asia from 2000 to 2019. « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicators by Kaufmann et al. (2010). The variables in interactions contain the special character « # ». The regression includes a country-time fixed effect over the period. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

As observed in Table VIII, the interaction term between trade and institutions (0,246, column 1) exhibits a significant positive coefficient at the 1% level, indicating that the relationship between openness and the number of products is stronger when institutional quality is considered for Europe & Central Asia countries. Indeed, government effectiveness and political stability foster the positive impact of trade on export diversification. Improving institutional quality is therefore an important factor in diversifying exports (Akram, 2018; Giri et al., 2019). It is widely acknowledged that higher institutional quality and a better governance atmosphere reduce business costs and foster an efficient business environment (Wu et al., 2012; Chowdhury & Audretsch, 2014; Yu et al., 2015; Abreo et al., 2021).

However, the interaction term (**trade#inst)** displays a negative and significant coefficient for the full sample and the SSA region (Tables V and VII). We conclude that the negative effect of openness becomes more pronounced for countries with low institutional quality. Ultimately, the weakness of institutions in low-income countries, except for Europe & Central Asia, significantly exacerbates the negative effect of trade openness on diversification. These results are

consistent with Baliamoune-Lutz & Ndikumana (2007), who argue that weak institutions may be one of the causes of the limited effects of trade openness in Africa (Ndjokou & Tsopmo, 2017).

The results for the other regions are presented in Tables IX to XII and are in line with the full sample and sub-Saharan Africa results. Results show that for these regions (East Asia and Pacific countries, Latin America and Caribbean countries, Middle East and North African countries, and South Asia), the additional effect of institutions on trade openness hurts export diversification.

Table IX : Results of estimations for Middle East & North Africa

Dependent variable : number of products exported							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
xr	0.00756	0.0190**	-0.00682	0.0103	0.0186***	0.0124**	0.0178***
	(0.00751)	(0.00892)	(0.00545)	(0.00674)	(0.00634)	(0.00522)	(0.00600)
hc	0.0479**	0.0747***	0.0226*	0.0378**	0.0631***	0.0444***	0.0555***
	(0.0206)	(0.0280)	(0.0133)	(0.0168)	(0.0175)	(0.0142)	(0.0196)
credit	0.123***	0.133***	0.107***	0.115***	0.120***	0.117***	0.121***
	(0.0129)	(0.0168)	(0.0130)	(0.0188)	(0.0127)	(0.0152)	(0.0154)
terms	0.142***	0.137***	0.157***	0.140***	0.132***	0.128***	0.135***
	(0.0276)	(0.0283)	(0.0286)	(0.0274)	(0.0262)	(0.0266)	(0.0272)
instmean	0.0827***						
	(0.0280)						
trade	-0.224***	-0.232***	-0.197***	-0.205***	-0.209***	-0.187***	-0.246***
	(0.0282)	(0.0302)	(0.0201)	(0.0223)	(0.0171)	(0.0145)	(0.0381)
instmean#trade	-0.0202***						
	(0.00602)						
corruption		0.664**					
		(0.269)					
corruption#trade		-0.150***					
		(0.0575)					
effective			0.499***				
			(0.162)				
effective#trade			-0.126***				
			(0.0369)				
stability				0.151*			
				(0.0781)			

stability#trade				-0.0339*			
				(0.0185)			
regulatory					0.424***		
					(0.121)		
regulatory#trade					-0.0932***		
					(0.0264)		
ruleofLaw						0.301**	
						(0.132)	
ruleofLaw#trade						-0.0687**	
						(0.0310)	
Voice							0.348**
							(0.174)
voice#trade							-0.0771**
							(0.0391)
Constant	5.094***	5.055***	5.053***	5.078***	5.049***	5.033***	5.217***
	(0.205)	(0.190)	(0.206)	(0.227)	(0.198)	(0.203)	(0.209)
Observations	87	87	87	87	87	87	87
Chi2	832.0	754.7	694.5	634.9	759.0	588.4	595.1
Pseudo R^2	0.146	0.146	0.147	0.145	0.146	0.145	0.145
ID*TIME_FE	YES	YES	YES	YES	YES	YES	YES

Pseudo Poisson Maximum Likelihood estimation for Middle East & North Africa low-income countries. « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicators by Kaufmann et al. (2010). The variables in interactions contain the special character « # ». The regression includes a country-time fixed effect over the period. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Table X : Results of estimations for East Asia & Pacific

Dependent variable : number of products exported							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
xr	0.0401***	0.0610***	0.0165	0.0869***	0.0373**	0.0556***	-0.0575***
	(0.0132)	(0.0165)	(0.0180)	(0.0104)	(0.0176)	(0.0175)	(0.0150)
hc	0.806***	0.383***	-0.316	0.418***	0.265*	0.365**	0.162*
	(0.120)	(0.121)	(0.194)	(0.0692)	(0.148)	(0.160)	(0.0873)
credit	0.506***	0.508***	0.468***	0.505***	0.536***	0.520***	0.386***
	(0.0495)	(0.0638)	(0.0608)	(0.0486)	(0.0572)	(0.0591)	(0.0394)
terms	-0.308**	-0.697***	-0.0651	-0.313***	-0.467***	-0.598***	0.151
	(0.123)	(0.152)	(0.187)	(0.112)	(0.154)	(0.154)	(0.121)
instmean	0.509***						
	(0.0486)						
trade	-1.143***	-0.846***	-0.510***	-0.500***	-0.852***	-0.863***	-1.151***
	(0.0629)	(0.136)	(0.0907)	(0.0499)	(0.0845)	(0.107)	(0.0604)
instmean#trade	-0.145***						
	(0.0141)						
corruption		1.535***					
		(0.489)					
corruption#trade		-0.305**					
		(0.126)					
effective			0.648*				
			(0.336)				
effective#trade			-0.0151				
			(0.0863)				
stability				1.426***			
				(0.233)			
stability#trade				-0.394***			
				(0.0514)			
regulatory					1.515***		
					(0.275)		
regulatory#trade					-0.352***		
					(0.0803)		
ruleofLaw						1.553***	
						(0.428)	
ruleofLaw#trade						-0.332***	
						(0.108)	

Voice							3.115***
							(0.232)
voice#trade							-0.748***
							(0.0565)
Constant	7.297***	9.142***	6.905***	5.366***	8.306***	8.722***	8.065***
	(0.396)	(0.480)	(0.450)	(0.500)	(0.426)	(0.569)	(0.317)
Observations	113	113	113	113	113	113	113
Chi2	753.3	342.8	375.5	873.9	789.0	351.9	888.8
Pseudo R^2	0.658	0.581	0.613	0.687	0.605	0.584	0.703
ID*TIME_FE	YES	YES	YES	YES	YES	YES	YES

Pseudo Poisson Maximum Likelihood estimation for East Asia & Pacific low-income countries. « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicators by Kaufmann et al. (2010). The variables in interactions contain the special character « # ». The regression includes a country-time fixed effect over the period. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Table XI : Results of estimations for Latin America & Caribbean

Dependent variable : number of products exported							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
xr	-0.0713***	0.000356	-0.0310**	-0.0992***	-0.0311*	-0.0995***	-0.00487
	(0.0242)	(0.0210)	(0.0148)	(0.0219)	(0.0168)	(0.0221)	(0.0221)
hc	-0.497***	-0.460***	-0.489***	-0.442***	-0.565***	-0.426***	-0.568***
	(0.0353)	(0.0412)	(0.0451)	(0.0408)	(0.0557)	(0.0406)	(0.0525)
credit	0.306***	0.389***	0.299***	0.476***	0.451***	0.419***	0.453***
	(0.0489)	(0.0486)	(0.0550)	(0.0560)	(0.0489)	(0.0609)	(0.0555)
terms	-0.0696	0.119***	0.112**	0.185***	-0.0164	0.238***	0.162**
	(0.0490)	(0.0439)	(0.0524)	(0.0656)	(0.0551)	(0.0697)	(0.0706)
instmean	1.528***						
	(0.171)						
trade	-1.305***	-1.163***	-0.646***	-0.109	-0.564***	-0.852***	-0.131
	(0.163)	(0.159)	(0.112)	(0.102)	(0.0740)	(0.193)	(0.106)
instmean#trade	-0.372***						
	(0.0428)						
corruption		6.626***					
		(0.651)					
corruption#trade		-1.467***					
		(0.151)					
effective			4.568***				
			(0.514)				

effective#trade			-1.043***				
			(0.128)				
stability				2.873***			
				(0.552)			
stability#trade				-0.732***			
				(0.132)			
regulatory					5.946***		
					(0.524)		
regulatory#trade					-1.422***		
					(0.125)		
ruleofLaw						4.648***	
						(0.784)	
ruleofLaw#trade						-1.148***	
						(0.188)	
Voice							3.780***
							(0.734)
voice#trade							-0.803***
							(0.178)
Constant	11.01***	9.397***	7.499***	4.060***	7.272***	7.009***	4.596***
	(0.953)	(0.834)	(0.680)	(0.666)	(0.595)	(1.120)	(0.760)
Observations	114	114	114	114	114	114	114
Chi2	885.7	1064	675.8	574.9	848.4	532.3	573.2
Pseudo R^2	0.668	0.665	0.657	0.623	0.657	0.620	0.627
ID*TIME_FE	YES	YES	YES	YES	YES	YES	YES

Pseudo Poisson Maximum Likelihood estimation for Latin America & Caribbean low-income countries. « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicator by Kaufmann et al. (2010). The variables in interactions contain the special character « # ». The regression includes a country-time fixed effect over the period. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Table XII : Results of estimations for South Asia

Dependent variable : number of products exported							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
xr	-0.827***	-1.042***	-0.786***	-1.101***	-1.020***	-0.921***	-0.717***
	(0.0833)	(0.0703)	(0.110)	(0.0547)	(0.0662)	(0.0857)	(0.0852)
hc	0.617***	0.812***	0.647***	0.814***	0.777***	0.687***	0.698***
	(0.0641)	(0.0616)	(0.0827)	(0.0648)	(0.0571)	(0.0758)	(0.0528)
credit	-0.360***	-0.386***	-0.264***	-0.160	-0.312***	-0.322***	-0.307***
	(0.0618)	(0.0708)	(0.0805)	(0.105)	(0.0665)	(0.0752)	(0.0569)
terms	-0.478***	-0.230**	-0.421***	-0.0523	-0.320***	-0.347***	-0.389***
	(0.0984)	(0.0985)	(0.124)	(0.0941)	(0.0870)	(0.102)	(0.0967)
instmean	0.132						
	(0.103)						
trade	-0.435***	-0.728***	-0.556***	0.281*	-0.614***	-0.452***	-0.349***
	(0.106)	(0.127)	(0.136)	(0.170)	(0.0744)	(0.0728)	(0.0903)
instmean#trade	-0.0149						
	(0.0291)						
corruption		2.391***					
		(0.651)					
corruption#trade		-0.613***					
		(0.188)					
effective			2.360***				
			(0.761)				
effective#trade			-0.544**				
			(0.215)				
stability				-1.946***			
				(0.439)			
stability#trade				0.507***			
				(0.113)			
regulatory					2.273***		
					(0.501)		
regulatory#trade					-0.550***		
					(0.144)		
ruleofLaw						0.981*	
						(0.530)	

ruleofLaw#trade						-0.202	
						(0.153)	
Voice							-0.655
							(0.450)
voice#trade							0.253**
							(0.125)
Constant	12.85***	13.31***	12.36***	7.995***	13.03***	12.30***	11.09***
	(0.551)	(0.412)	(0.563)	(0.945)	(0.429)	(0.426)	(0.439)
Observations	90	90	90	90	90	90	90
Chi2	1240	811.4	927.2	698.3	940.5	1338	883.1
Pseudo R^2	0.635	0.626	0.634	0.622	0.633	0.631	0.633
ID*TIME_FE	YES	YES	YES	YES	YES	YES	YES

Pseudo Poisson Maximum Likelihood estimation for South Asia low-income countries. « instmean » is a mean value of institutional quality obtained using an arithmetic calculation of the six governance indicators by Kaufmann et al. (2010). The variables in interactions contain the special character « # ». The regression includes a country-time fixed effect over the period. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Conclusion

This research delves into the role of institutional quality as a moderating factor in the relationship between trade openness and export diversification in low-income countries. Using a Poisson pseudo-maximum likelihood estimator, the study categorizes these countries into various regional groups. The outcomes derived from our analysis suggest that in the presence of weak institutions in low-income countries, the combined effect of trade openness and quality of institutions intensifies the adverse impact of trade openness on export diversification, except for Europe & Central Asia. Conversely, for the latter, strong institutional quality allows trade openness to foster export diversification.

These findings hold significant implications for public policy-making. They highlight that, in most low-income countries, trade openness policies alone do not ensure diversification and emphasize the crucial role of institutions in determining the magnitude of the impact of openness on diversification. Specifically, trade openness impedes diversification in countries with low institutional quality, while in countries with sound institutional frameworks, trade openness facilitates diversification. Moreover, low-income countries with robust institutions can harness the benefits of openness to diversify their production. To conclude, the findings underscore the imperative for

low-income countries to make substantial improvements in institutional quality, like voice and accountability and rule of law as a crucial step towards harnessing the positive effects of trade openness and achieving production diversification.

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