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The effect of trade and customs digitalization on agri-food trade: A gravity approach

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The effect of trade and customs digitalization on agri-food trade: A gravity approach

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Introduction

Agrifood trade in Sub-Saharan Africa: Stronger integration of food systems into global value chains; low-income countries slowly diversifying into higher value markets (need to improve food processing); opportunities to increase value addition via international trade.

Transaction costs act as barriers to trade: "sensitive items" tariffs for many food products; poor infrastructure leads to high transport costs; many and complex food standards.

Digital trade facilitation: non-tariff measures are becoming more relevant than tariffs; digitalization of trade bureaucracy, i.e., paperwork and procedures -> slow and ineffective implementation in SSA.

Research questions & Objectives

Research questions:

- **1:** Digitalized trade facilitation measures increase bilateral agrifood trade/export capacity (costs of not implementing).
- **2:** Digitalized processes and paperwork related to cross-border NTMs increase agrifood trade.
- **3:** SSA countries, which face higher transaction costs, benefit more from digitalized trade facilitation.

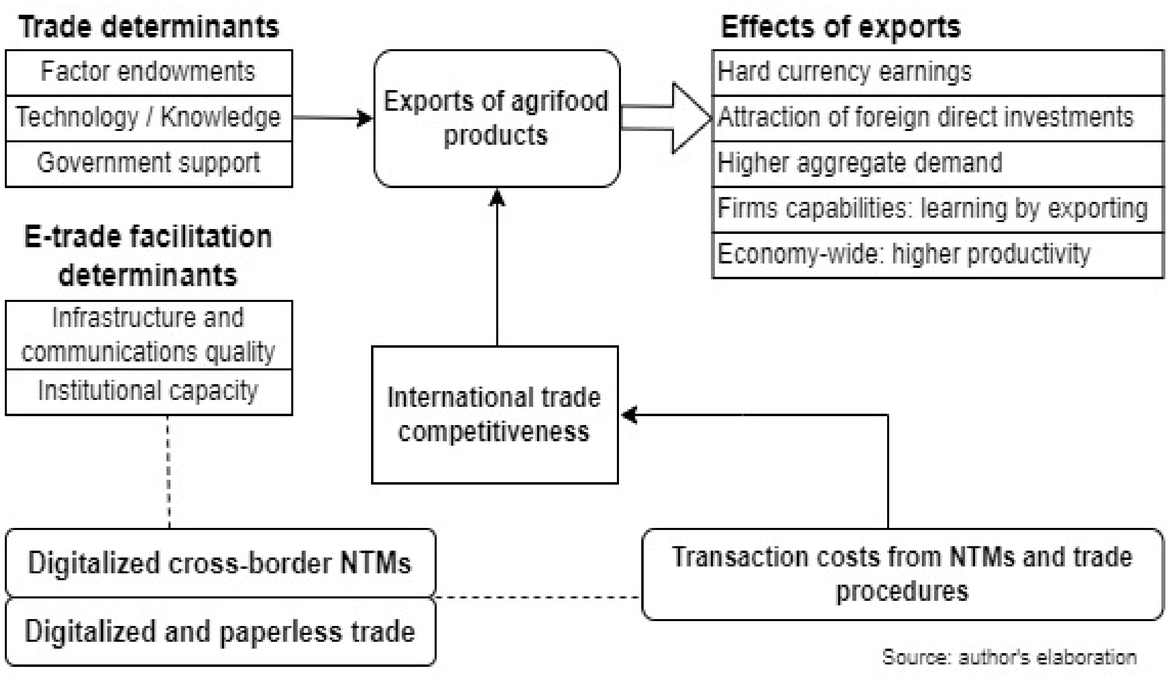
Materials & Methods

Variable of interest – Trade digitalization -> two main variables from UN Trade Facilitation Survey that capture: **(PT)** digitalization of standard trade and customs processes and documents; **(CB)** digitalization of processes and compliance with non-tariff measures + Trade formalities and trade transparency. All captured at the importer and exporter level.

Dataset: panel with 3 periods, time span of 4 years, cross country (128) -> BACI-CEPII + product disaggregated at the HS-6-digit code.

Estimation: gravity model with fixed effects -> workhorse to analyze the effect of changes in bilateral trade-related variables on trade volume.

Conceptual Framework



Source: author's elaboration

Table 1 Summary of effects of e-paperless trade digitalization on agrifood trade

Log of Agrifood Trade	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PT, importers	0.276***		0.226***		0.121***		0.240***		0.132***	
	(0.023)		(0.022)		(0.027)		(0.019)		(0.023)	
PT, exporters		0.437***		0.356***		0.226***		0.371***		0.245***
		(0.025)		(0.024)		(0.028)		(0.022)		(0.026)
Other digitalization	NO	NO	NO	NO	YES	YES	NO	NO	YES	YES
Time trend	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Gravity variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Socioeconomic Controls	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
Observations	2,899,748	2,899,748	2,681,156	2,681,156	2,672,922	2,672,922	2,562,154	2,562,154	2,554,242	2,554,242
No. of countries	125	125	125	125	125	125	125	125	125	125
R^2	0.242	0.237	0.297	0.289	0.299	0.290	0.414	0.379	0.414	0.379

Standard errors in parentheses and significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Fixed-effects models: R^2 captures the Pseudo-R^2. Policy variables: measured in log.

Results

25% variation in index (1 sd as a % of maximum value)

- Coefficient of PT exporters (9.3%) > PT importers (6%): for SSA countries PT exporters is even larger.
- Coefficient of CB importers (3.9%) ~ CB exporters (4.3%): for SSA countries CB importers is larger.

Both coefficients are larger for processed agrifood products.

Other trade digitalization variables also have positive and significant effects on agrifood trade: transparency & formalities.

High correlation between the trade digitalization variables -> preferred specification includes single variables.

Non-trivial impacts: implementing trade digitalization is a low-hanging fruit compared to an overhaul in the barriers to trade or a shift in comparative advantages; therefore, we consider that our results have immediate importance to policymakers

Table 2 Effect of cross-border NTMs digitalization on bilateral agrifood trade: All food groups

Log of Agrifood Trade	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CB, importers	0.198***		0.150***		0.084**		0.156***		0.089***	
	(0.017)		(0.014)		(0.016)		(0.012)		(0.014)	
CB, exporters		0.245***		0.168***		0.054***		0.174***		0.062***
		(0.017)		(0.015)		(0.017)		(0.014)		(0.015)
Other digitalization	NO	NO	NO	NO	YES	YES	NO	NO	YES	YES
Time trend	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Gravity variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Socioeconomic Controls	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
Observations	2,480,228	2,480,228	2,338,594	2,338,594	2,330,360	2,330,360	2,234,450	2,234,450	2,226,538	2,226,538
No. of countries	125	125	125	125	125	125	125	125	125	125
R^2	0.245	0.231	0.299	0.280	0.301	0.284	0.409	0.358	0.410	0.359

Standard errors in parentheses and significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Fixed-effects models: R^2 captures the Pseudo-R^2. Policy variables: measured in log.

Conclusions & Policy Implications

Large and **significant positive impact of digitalization** of trade bureaucracy, processes, and NTMs compliance **on bilateral agri-food trade** – but with heterogeneities. PT: larger effect for exporters -> digitalization has even **larger impact for SSA** countries = low-hanging fruit. Digitalization of NTM procedures -> lower impact on agri-food trade than PT; SSA -> higher CB impact than in full sample = opportunities of **gains from trade with NTM facilitation** but this depends on importers. **Processed** agri-food products are even **more positively affected by digitalization** of trade bureaucracy.

Impact of digitalization of trade processes is even larger in SSA countries -> policymakers need to deepen trade integration and e-trade facilitation. Industrial policy -> it pays off to shift focus of exports to processed products compared with unprocessed raw materials. Digitalization efforts need to go beyond simply passing legislation, and should focus on effectiveness/implementation. Problem: despite high pay-off, costs and technical requirements for implementing trade digitalization measures need to be considered.

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