A Macro and Micro Analysis of Value Chain Trade in Africa[1]

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Motivation and Contribution

- International trade has expanded rapidly since the 90s through GVCs that account for a rising share of trade, global GDP, and employment (Johnson, 2018).
- Africa's GVCs intensity is considered low and underdeveloped and African governments want to increase their participation in GVCs by emulating successes of other regions of the world.
- Yet, the majority of studies on GVCs focus on developed countries (Van Biesebroeck and Mensah, 2019) and data on African GVC is relatively scanty.

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- What we do:
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  - Discuss determinants of GVC using different sources of data for the same countries.

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  - Systematic comparison of Africa's GVC participation using micro and macro data: WBES, EORA and customs data.
  - Discuss determinants of GVC using different sources of data for the same countries.
- Contribution: (i) systematically comparing Africa's GVC engagement; (ii) constructing two firm-level backward GVC measures for Africa (iii) discuss the different empirical results based on the three sets of data

Main Findings

- Aggregate GVC data masks disparities, as Africa's proportion of GVC firms is comparable to other regions though the level of Africa's GVC trade is indeed much lower
- Higher share of foreign owned firms are not backward GVC firms, likely due to high-resource nature of economies
- Multi-country empirical results reveal that political stability influences GVC participation of African countries. For single country analyses, results show that FDI is positively associated with backward GVC participation both at the firm-level and country-level of analysis. However, other variables were less consistent both for multi-country and single country analyses.
- African countries, preferably the AfCFTA secretariat, may consider establishing a protocols and database that help understand Africa's GVC participation more coherently to enable policymakers to make informed decisions. The protocols should standardized the way trade activities are registered and also assumption used in preparation of national input-output tables.

Data and Sources

- Macro (country) level : UNCTAD-Eora
  - **Strength**: Wide Coverage; both backward and forward GVCs
  - **Weakness**: Compiled from sometimes inconsistent databases plus sectoral information is inferred and estimated.
- Micro (firm) level (also used for country level): WBES
  - **Strength**: Coverage; consistency across countries; firm dynamics
  - **Weakness**: Not designed for GVC study; no the level of GVC trade; only backward GVC participation; no time consistency
- Micro level (Also used for country-level): Custom data:
  - **Strength**: GVC values and participation; product-country info, High frequency, high quality trade data; in-depth country-level analysis
  - **Weakness**; Difficult to access; only trading activity is recorded (no domestic activities, no other characteristics (e.g firm ownership)

Data and Sources

Table: Quick overview of the databases

Name	Source	Frequency	African Countries	Start	End
UNCTAD-Eora	UNCTAD	Annual	46	1990	2019
WBES	WB	Annual	47	2008	2020
Custom data	EDD-WB	Annual	1	2008	2020

Country-Level GVC Definition

- **Eora-UNCTAD**: The GVC participation of countries is captured using three measures.

$$Backward\ GVC = \frac{Foreign\ Value\ Added(FVA)}{Export} \tag{1}$$

$$Forward\ GVC = \frac{Indirect\ Value\ Added(DVX)}{Export} \tag{2}$$

$$GVC = \frac{FVA + DVX}{Export} \tag{3}$$

- The backward GVC measure is computed as the share of foreign value-added in export, while the forward GVC measure is computed as the share of indirect value-added in exports. The overall GVC measure is the sum of the two

Firm-Level GVC Measure Computation

- **WBES**: we follow Van Biesebroeck and Mensah (2019). A GVC firm is defined based on two conditions.

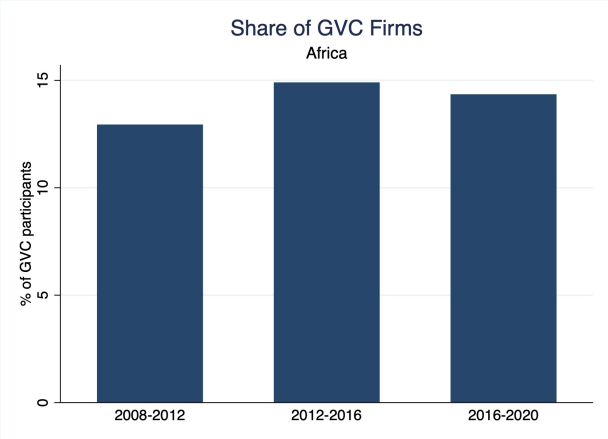
$$GVC\ firm = \begin{cases} 1, & \text{if the firm exports directly or indirectly} \\ & \textit{and} \text{ imports inputs and supplies} \\ 0, & \text{otherwise} \end{cases} \tag{4}$$

  For cross-country analysis we use the share of GVC firms among those surveyed.

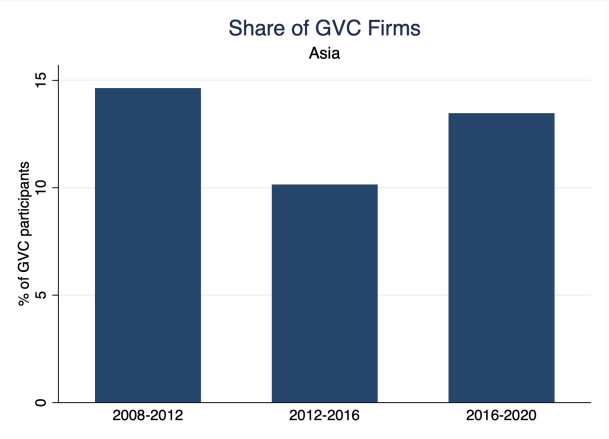
- **Customs data**: A GVC firm is one that exports and imports intermediate products simultaneously (Antràs, 2020). Non-GVCs exclusively import or export.

Africa: not necessarily have the lowest share of GVC firms

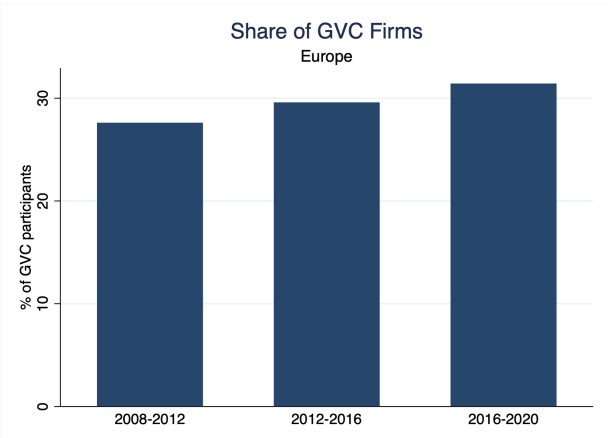
Backward GVC participation-WBES



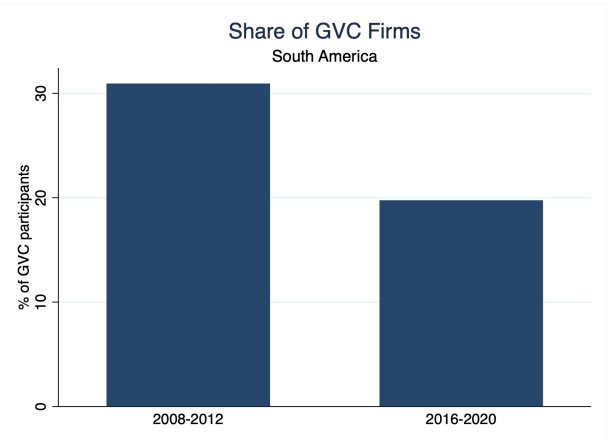
e. Africa



f. Asia



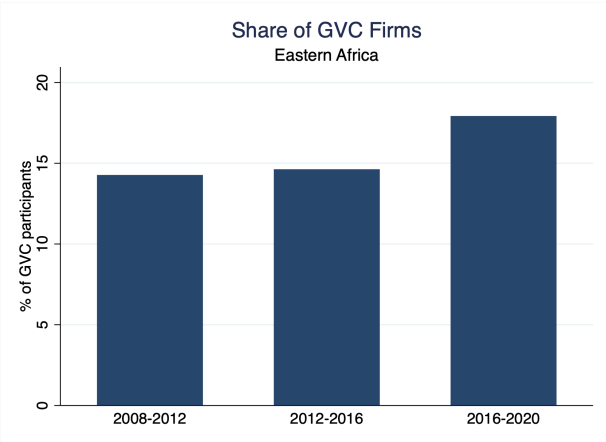
g. Europe



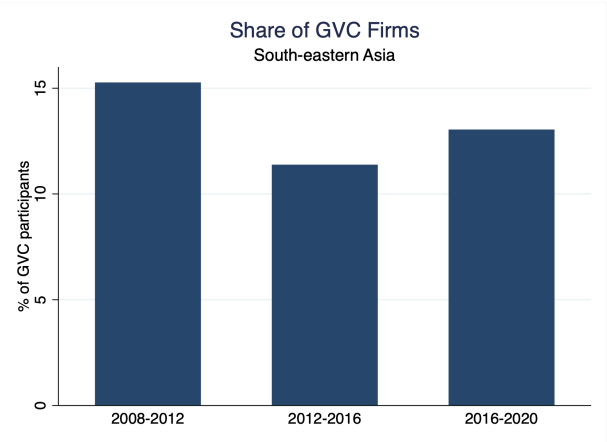
h. South America

Source: Author calculations from WBES.

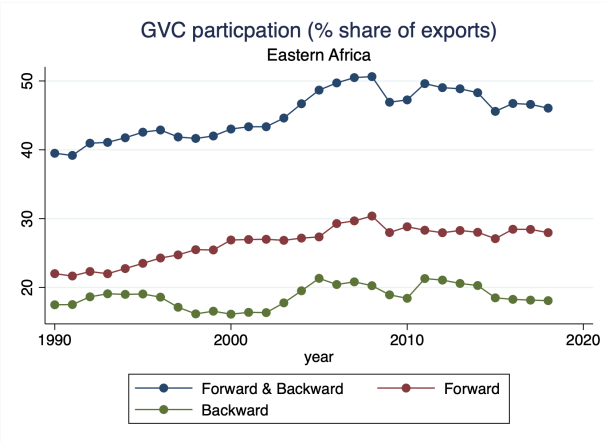
East Asia has lower share of GVC firms contrary to higher backward GVC levels in eora data



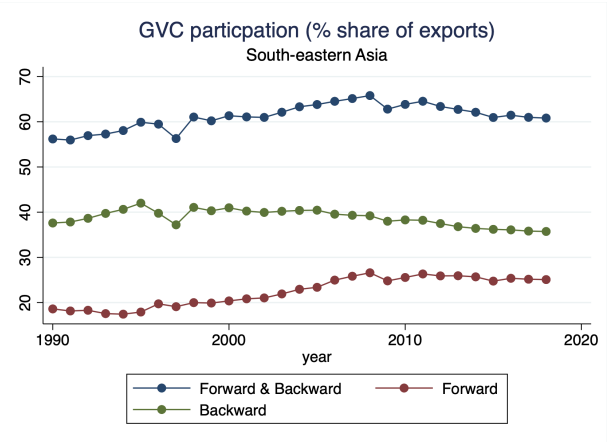
a. Eastern Africa



b.South-eastern Asia



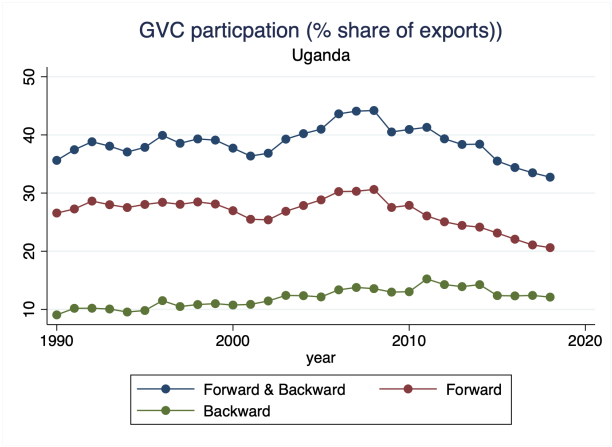
c. Eastern Africa



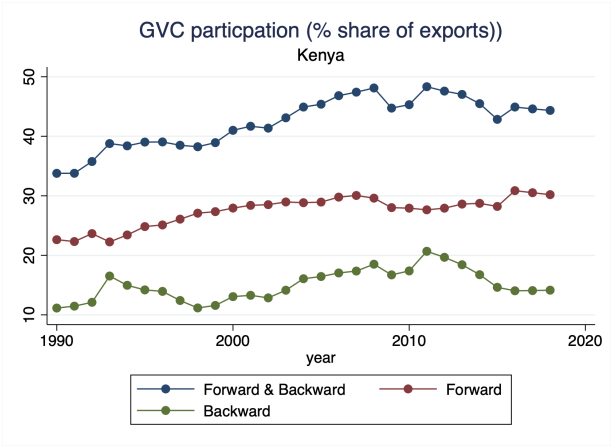
d.South-eastern Asia

Source: Author Computations from EORA GVC Database. The results are weighted by the trade value of the respective countries.

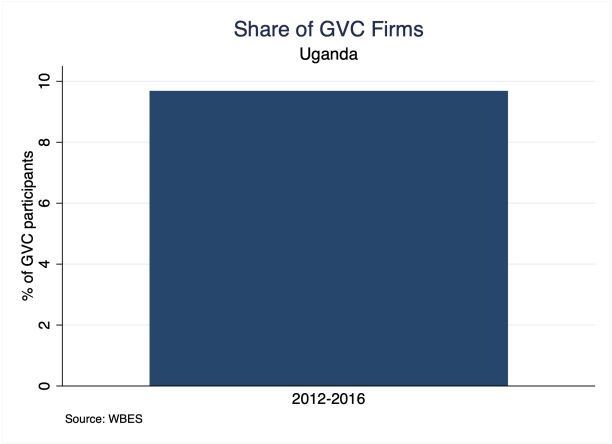
Kenya has over half the share of GVC firms to Uganda but not much difference in backward GVCs



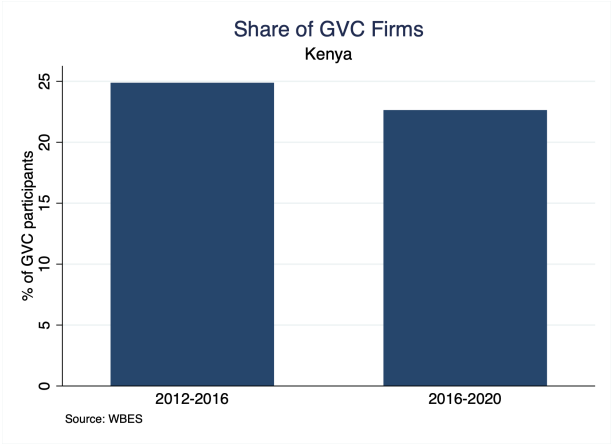
a. Uganda



b. Kenya



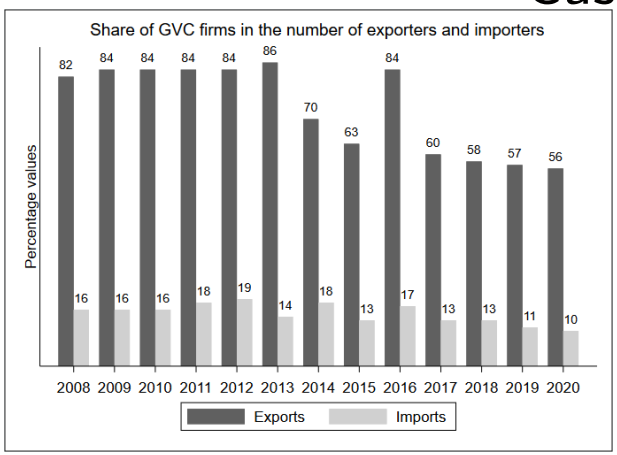
a. Uganda



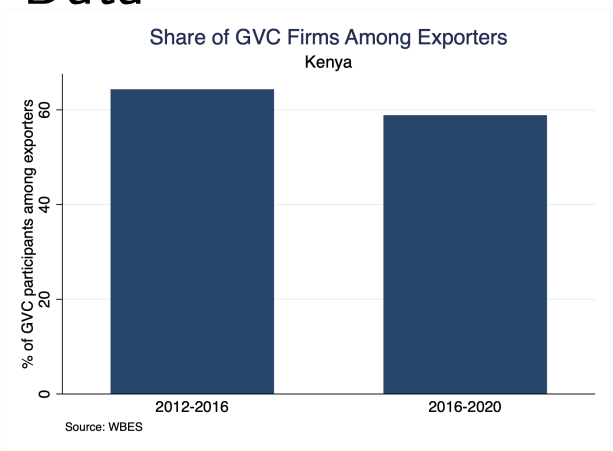
b. Kenya

The Customs and WBES Data however are highly consistent

Share of GVC firms as a % of Exporters the same for WBES and Customs Data



a. Customs



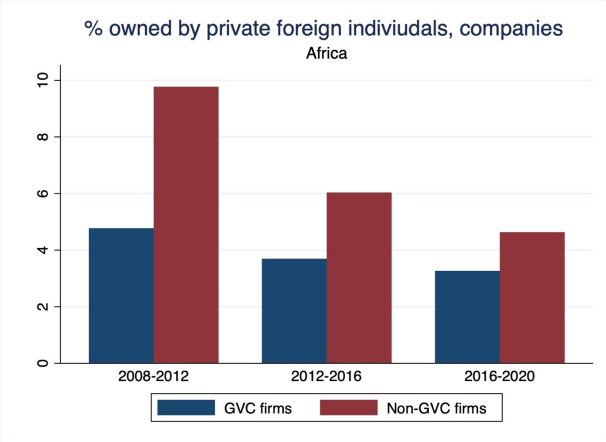
b. WBES

Note: Author Calculations from Customs data and from WBES data

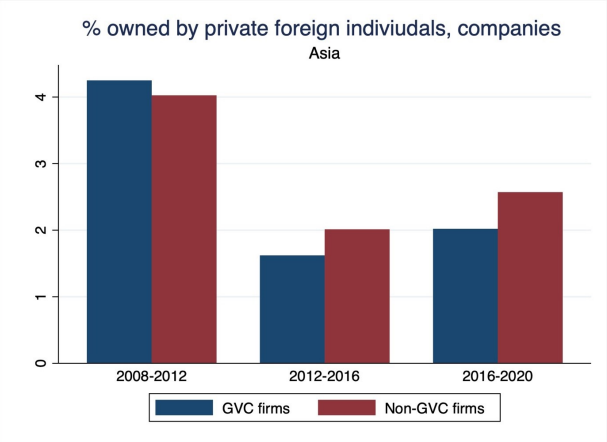
About 60 percent of exporting firms are GVC firms in Kenya

Unlike other continents, foreign owned firms are more likely to be non-GVC firms in Africa

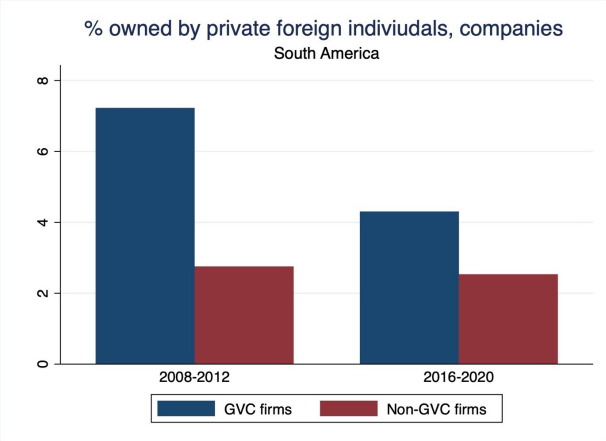
Foreign Ownership and GVC



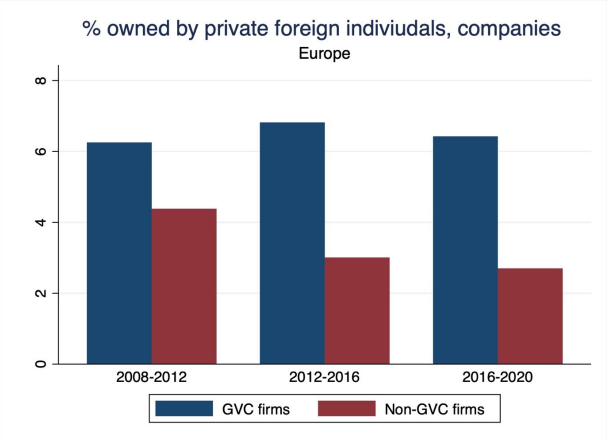
a. Africa



b. Asia



c. South America



d. Europe

Empirical specification

The study adopts the 2020 WDR report theoretical framework:

Country level cross sectional analysis

$$GVC_{c(t+1)} = \beta_1 + \beta_2 Endowment_{ct} + \beta_3 Market\_Size_{ct} + \beta_4 Geography_{ct} + \beta_5 Institution_{ct} + FE_d + \varepsilon_{ct} (5)$$

Firm level cross sectional analysis

$$GVC_{icgpt} = \beta_1 + \beta_2 Endowment_{ct} + \beta_3 Market\_Size_{ct} + \beta_4 Geography_{ct} + \beta_5 Institution_{ct} + \delta_p + \gamma_g + \theta_t + \varepsilon_{icgpt} (6)$$

Table: Determinants of GVC in Africa

	(Eora)			(WBES)
	(1)	(2)	(3)	(4)
	Backward-GVC	Forward-GVC	GVC	GVC
FDI	-0.0401	0.00580	0.191***	-1.010
	(0.0247)	(0.0137)	(0.0458)	(1.045)
Rent	0.0184	0.0110	0.151*	1.174
	(0.0457)	(0.0217)	(0.0785)	(1.261)
Land	-0.118***	0.0281	-0.111*	-1.217
	(0.0353)	(0.0189)	(0.0599)	(1.311)
Capital	-0.0540	0.0604*	0.536***	1.945
	(0.0585)	(0.0314)	(0.123)	(2.857)
Skill	-0.120*	-0.0243	-0.636***	2.723
	(0.0717)	(0.0346)	(0.0984)	(2.522)
Market Size	-0.0949***	0.0427***	0.606***	-0.0307
	(0.0246)	(0.0141)	(0.0498)	(1.383)
Distance	0.158	-0.341***	-0.0803	-4.525
	(0.215)	(0.120)	(0.327)	(6.810)
Political Stability	0.221***	-0.153***	-0.118	4.621*
	(0.0514)	(0.0270)	(0.101)	(2.348)
Constant	-2.439	4.010**	-5.625	133.0
	(2.707)	(1.614)	(4.398)	(120.0)
Decade FE	YES	YES	YES	NO
N	91	91	91	31
No. of Countries	34	34	34	31
Adj. R^2	0.519	0.559	0.901	0.001

Table: Determinants of GVC in Africa vs. other regions

	(UNCTAD-Eora)			(WBES)
	(1)	(2)	(3)	(4)
	Backward GVC	Forward GVC	Total GVC	Backward GVC
Africa	-10.85***	0.467	-6.349	48.59
	(3.004)	(1.733)	(4.679)	(115.3)
FDI	0.0855***	-0.00105	0.247***	-1.422
	(0.0227)	(0.0123)	(0.0371)	(1.292)
FDI x Africa	-0.0135	-0.00641	0.162***	-1.381*
	(0.0246)	(0.0128)	(0.0440)	(0.756)
Rent	-0.0942***	0.0623***	0.0927***	0.843
	(0.0183)	(0.00966)	(0.0282)	(0.724)
Rent x Africa	0.0288	0.00873	0.128*	0.768
	(0.0449)	(0.0204)	(0.0770)	(1.164)
Market Size	-0.0666***	0.0371***	0.687***	1.450
	(0.0232)	(0.0112)	(0.0329)	(0.986)
Market Size x Africa	-0.115***	0.0476***	0.635***	0.115
	(0.0219)	(0.0133)	(0.0466)	(1.201)
Land	-0.0318	0.0104	-0.174***	-2.032*
	(0.0237)	(0.0155)	(0.0420)	(1.034)
Land x Africa	-0.136***	0.0237	-0.0666	-1.205
	(0.0351)	(0.0181)	(0.0565)	(1.151)
Capital	0.340***	-0.0355	-0.0284	2.115
	(0.115)	(0.0352)	(0.0785)	(1.599)
Capital x Africa	-0.0952	0.0414	0.654***	2.115
	(0.0661)	(0.0298)	(0.107)	(2.638)
Skill	0.0755	-0.0451	0.170**	-3.072*
	(0.0708)	(0.0299)	(0.0800)	(1.800)
Skill x Africa	-0.149**	-0.0222	-0.585***	2.551
	(0.0704)	(0.0317)	(0.0957)	(2.196)
Distance	-0.205*	-0.504***	-0.426***	-13.73***
	(0.107)	(0.0547)	(0.159)	(4.322)
Distance x Africa	0.134	-0.388***	0.0386	-5.026
	(0.215)	(0.119)	(0.328)	(5.579)
Political Stability	0.279***	-0.0148	0.334***	4.486***
	(0.0459)	(0.0231)	(0.0577)	(1.332)
Political Stability x Africa	0.223***	-0.161***	-0.117	4.565**
	(0.0459)	(0.0257)	(0.0964)	(2.110)
Constant	7.532***	3.851***	2.118	88.21**
	(1.045)	(0.637)	(1.584)	(42.11)
Decade FE	YES	YES	YES	NO
N	372	372	372	110
No. of Countries	134	134	134	110
Adj. R^2	0.434	0.445	0.930	0.439

Determinants of GVC participation in Africa

- It is not possible to draw a consistent story for many of the explanatory variables, except for two.
- Political stability has a positive effect on backward GVC participation of African countries according to multi-country empirical results (using WBES and Eora) is the positive.
- The effect of other factors at the multi-country analysis is irregular across databases.

Table: Determinants of Backward GVC participation in Kenya and Uganda using UNCTAD-Eora, WBES and Custom Level Data

	Kenya				Uganda		
	WBES	Cust. (Firm)	EORA	Cust. Country	WBES	EoRA	Custom
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FDI	0.531***	0.027***	0.878	0.087***	0.539***	1.598***	3.217***
	(0.093)	(0.010)	(1.18)	(0.014)	(0.130)	(6.40)	(0.412)
Skill	0.204**	-0.032	1.207	0.629***	-0.161	-0.566**	3.458***
	(0.080)	(0.103)	(1.92)	(0.090)	(-0.140)	(-3.08)	(0.527)
Capital	0.011**	-0.220**	-0.590	0.092	0.353***	0.00419	-7.709***
	(0.040)	(0.090)	(-0.59)	(0.105)	(0.045)	(0.01)	(0.594)
Market	-0.002	-0.086	-1.158	-1.043***		-0.338	0.927**
	(0.002)	(0.137)	(-1.00)	(0.144)		(-0.91)	(0.364)
Political stability	0.052	-0.072	-3.363	0.288***	-0.347***	-1.092	-0.050
	(0.081)	(0.062)	(-1.35)	(0.085)	(0.162)	(-1.98)	(0.614)
Constant	0.580***	3.516	11.39***	25.339***	-1.89***	10.78***	-5.091
	(0.122)	(2.296)	(4.31)	(2.276)	(0.270)	(17.76)	(14.486)
Year FE	YES		YES	YES		YES	YES
Partner country FE		YES		YES			YES
Product FE		YES		YES			YES
N	314	1,688,102	29	370,781	149	27	117,350

Robust standard errors in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Determinants of Backward GVC participation: Within-Country ANalysis

- Foreign direct investment is positively correlated with both Kenya's and Uganda's Backward GVC participation in all the three databases.
- This is in contrast to the continental level results where FDI was negatively correlated with backward GVC participation.
- For the rest establishing a consistent story using the three databases is challenging.

Conclusion

- Aggregate data masks disparities: The percentage of African firms that participate in backward GVC is comparable with other regions, but the value of Africa's backward GVC trade is comparably low
- Higher share of foreign owned firms are not backward GVC firms, so Africa may need to attract more export oriented FDI
- Multi-country empirical results (from WBES and Eora) reveal that a common theme in the two data sets is the critical role of political stability in explaining backward GVC participation in Africa. This highlights how much institutions are relevant in promoting Africa's future engagements in global values chain activities.
- The firm and single-country analysis on the other hand showed that FDI inflow is positively associated with backward GVC activity. This consistency remains when FDI was measured in values and when proxied by foreign-ownership of firms in WBES data.

Conclusion

- Using within country-comparisons is the optimal way to assess GVCs and using macro and micro data helps highlight these.
- African countries, preferably the AfCFTA secretariat, may consider establishing a protocols and database that helps understand Africa's GVC participation more coherently to enable policymakers to make informed decisions.
- The protocols should standardized the way trade activities are registered and also assumption used in preparation of national input-output tables.

Thank you

Antràs, P. (2020). *Conceptual aspects of global value chains*. The World Bank.

Johnson, R. C. (2018). Measuring global value chains. *Annual Review of Economics 10*, 207–236.

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