

Africa's Regional and Global Integration

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January 7, 2025

Abstract

This paper examines Africa's regional and global integration through trade, global and regional value chains (GVCs and RVCs) at the aggregate and sector levels using detailed trade data and the EMERGING MRIO tables. It finds that the share of Africa's trade with itself is increasing and that precious stones and metals, petrochemicals, mining, and processed foods are driving RVCs, with high potential for further integration. Most RVC trade is within regional economic communities (RECs), particularly inside SADC, implying opportunities to expand RVCs in other RECs and establish cross-REC RVCs. The continent's upstreamness in GVCs has decreased in many sectors, suggesting a trend towards greater local value-addition.

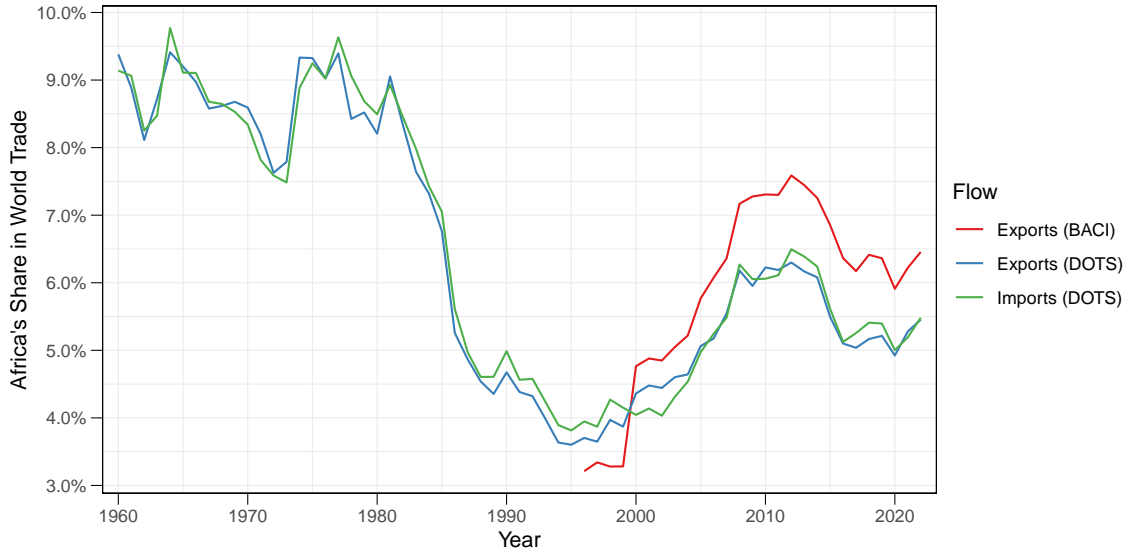
Keywords: Africa, GVCs, RVCs, trade, regional integration, economic development

JEL Classification: F14; F15; O11

1 Gross Trade Flows

Africa's share of world trade is widely acknowledged to be low. According to a recent report by the UN Economic Commission for Africa (UNECA),¹ it is less than 3% of global trade, and mainly driven by merchandise trade. A careful inspection of two widely used databases on merchandise trade, CEPII's BACI (Gaulier & Zignago, 2010) (HS 1996 version) and the IMF's Direction of Trade Statistics (DOTS) (IMF General Statistics Division, 1993) database, visualized in Figure 1, suggests a higher African share of 5.5-6.5% in global merchandise trade. Interestingly, the share was high at 9% until 1980, then saw a rapid decline to less than 4% in 1995 and a subsequent rise to above 6% in 2012. The trade slowdown in the 80s and 90s is congruent to the extended period

Figure 1: Africa's Share of Global Merchandise Trade



Notes: Figure shows Africa's share in global merchandise trade from different databases. The DOTS is an aggregate database derived from official sources, whereas BACI is a product-level database derived from COMTRADE.

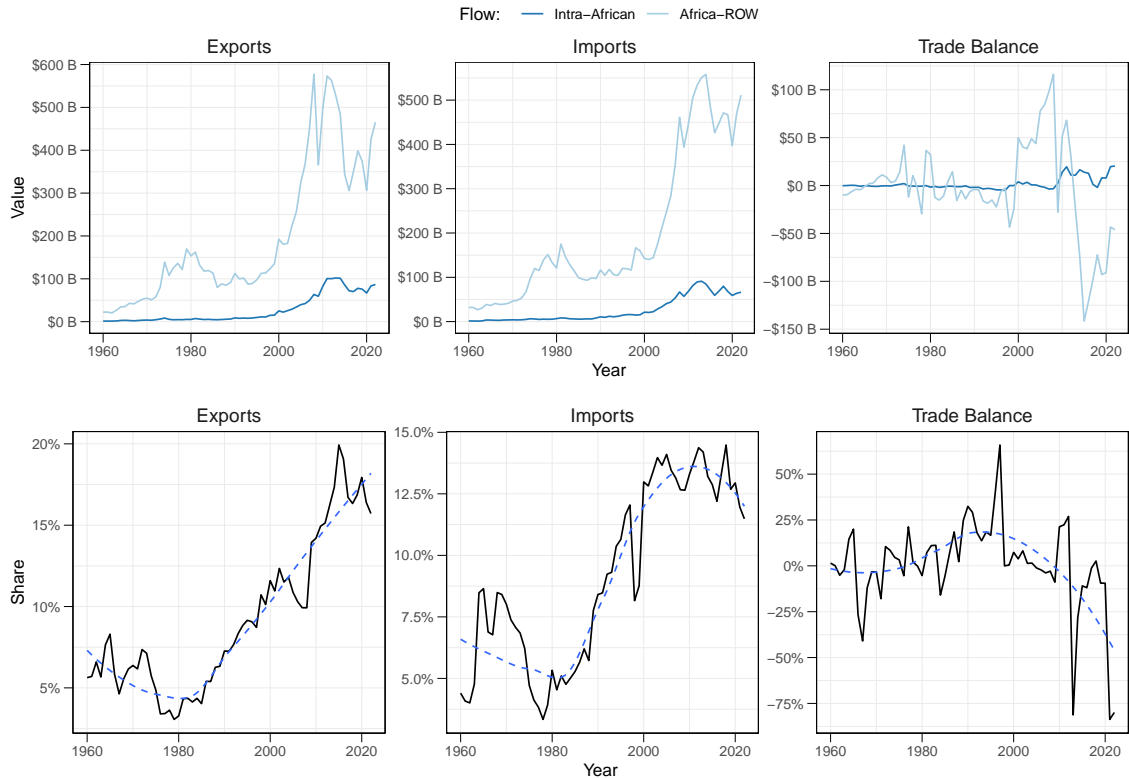
of high inflation, low commodity prices, debt distress, structural adjustment, and political instability commonly referred to as the "lost decade(s)" for Africa. The trade spurt in the 2000s, on the

¹<https://www.unece.org/stories/african-countries-trading-more-outside-the-continent-than-amongst-themselves%2C-eca-report>

other hand, is aligned with a growth spurt supported by higher commodity prices and economic reforms, commonly referred to as "Africa Rising" and analyzed in [Calderón & Boreux \(2016\)](#), [Rodrik \(2018\)](#), and [Krantz \(2023\)](#) among others. Thus, Africa's share of world trade co-varies to a large extent with its aggregate macroeconomic performance.

There is also notable variation in the extent of African trade with itself versus with the rest of the World (ROW). Figure 2 shows the intra-African and Africa-ROW trade levels in constant 2015 USD according to DOTS, and below it the share of intra-African trade together with a lowess trend. Evidently, the share of intra-African trade has risen considerably since 1980, from 5% in 1980 to 17% for Exports and 13% for imports in 2020. The trade balance of Africa with itself has been positive since 2010 and negative with ROW.

Figure 2: African Trade with Itself and ROW



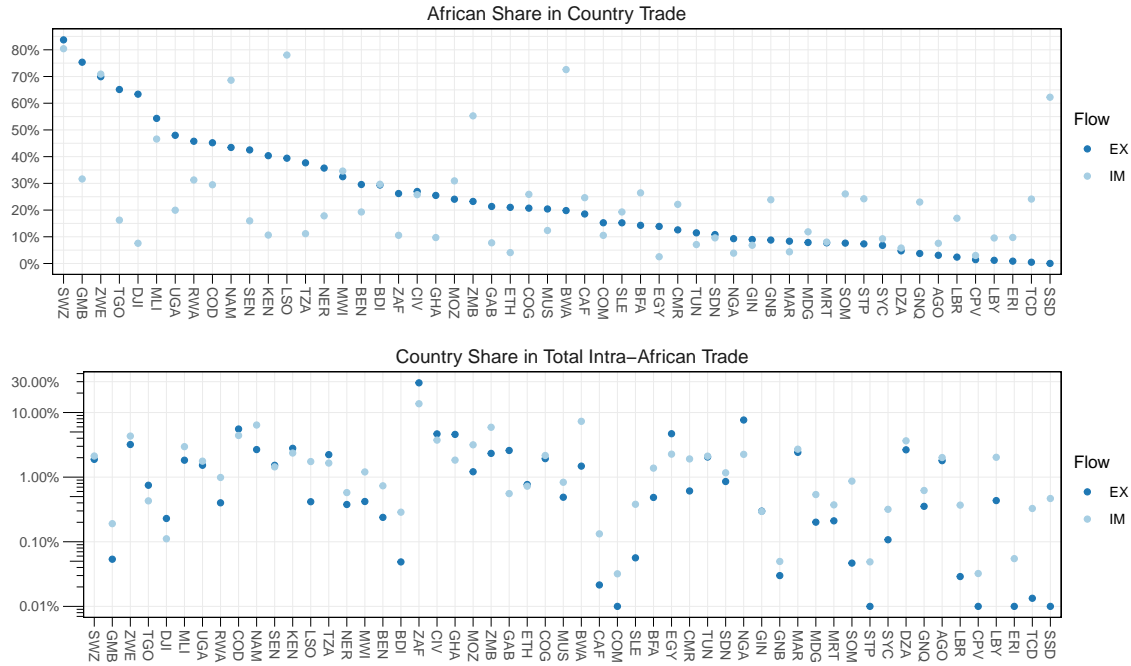
Notes: Figure shows intra-African and Africa-ROW trade flows according to DOTS data (top panel), and the share of intra-African trade including a smooth lowess trend (bottom panel).

Figure 3 further disaggregates intra-African trade shares by country and. It uncovers considerable heterogeneity in countries' share of trade with African partners (top panel) and countries' share in total intra-African trade (bottom panel). With shares of 30% on both metrics, South Africa is the most significant regional trader, followed by Nigeria and Congo. Many North-African countries, island states, conflict, and Saharan states have low trade shares with Africa.

A further level of heterogeneity in African trading is the share of intra-African trade within or between regional economic communities (REC), which have played a significant role in the continent's economic development and regional integration agenda up to this point. To facilitate regional trade analysis, Table 1 provides a mutually exclusive classification of countries into either their most important economic union or the union of closest geographic proximity.

Figure 4 decomposes intra-African exports between and within RECs. The ratio of within- to between-REC exports shown on the RHS indicates that the period from 1960-1990 was characterized by increasing trade within regional blocks - from 1.2 times greater in 1960 to 2.75 times greater than between-REC trade in 1990. After 1990, trade between RECs picked up again and

Figure 3: Intra-African Trade Share in Total African Trade by Country: 2010-2022 Averages



Notes: Using DOTS data, Figure shows the African share in countries' trade, and countries' share in intra-African trade.

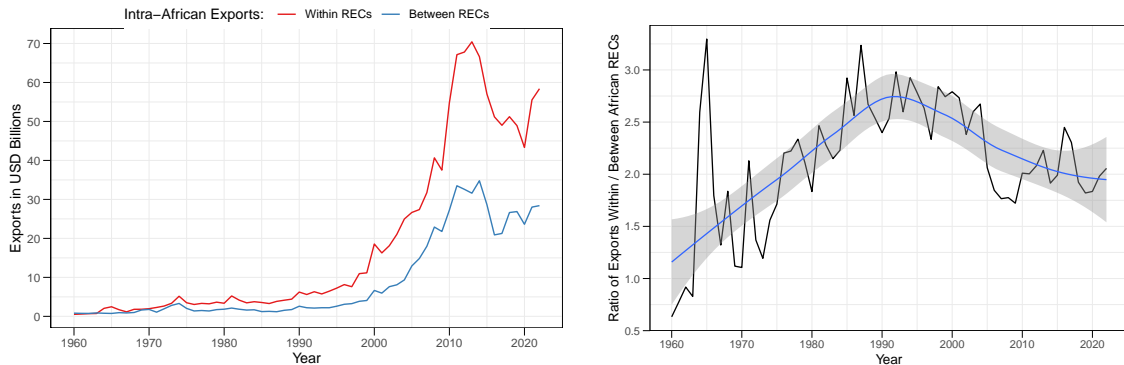
Table 1: Classification of African Countries into RECs

REC	Description	Countries
AMU+EGY	Arab Maghreb Union + Egypt	DZA, EGY, LBY, MRT, MAR, TUN, ESH
CEMAC+STP	Economic Community of Central African States + São Tomé and Príncipe	CMR, CAF, TCD, COG, GNQ, GAB, STP
EAC	East African Community	BDI, COD, KEN, RWA, SSD, TZA, UGA
ECOWAS	Economic Community of West African States	BEN, BFA, CPV, CIV, GMB, GHA, GIN, GNB, LBR, MLI, NER, NGA, SEN, SLE, TGO
IGAD-EAC	Intergovernmental Authority on Development, excluding EAC Mmembers	DJI, ERI, ETH, SOM, SDN
SADC-COD	Southern African Development Community, excluding the DRC (now EAC)	AGO, BWA, COM, SWZ, LSO, MDG, MWI, MUS, MOZ, NAM, SYC, ZAF, ZMB, ZWE

Notes: Table provides mutually exclusive classification of countries into RECs. The REC name reflects deviations from official membership.

appeared to stabilize at a ratio of 2 in 2020. Thus, trade within African RECs is currently 2 times greater than trade between RECs.

Figure 4: Intra-African Trade Between and Within RECs



Notes: Figure plots intra-African trade within and between RECs according to DOTS data (LHS) and their ratio (RHS).

At the REC level, it is feasible to visualize the trade flows. Figure 5 shows heatmaps giving the average 2010-2022 exports. The LHS indicates that the AMU+EGY, SADC-COD, and ECOWAS have the largest exports to ROW. SADC-COD also has the largest intra-REC exports, at a volume of 32 billion USD'15, followed, with some distance, by ECOWAS with intra-REC exports above 10.6 billion. The AMU+EGY and EAC have intra-REC exports of 6.5 and 5.2 billion, respectively. However, these RECs have different economic sizes, so their total trade volumes may not be indicative of their extent of regional integration. Averaging the GDP in constant 2015 USD of the RECs over the same period (2010-22) yields a GDP of 736 billion for AMU+EGY, 673 billion for ECOWAS, 545 billion for SADC-COD, 225 billion for the EAC, 168 billion for IGAD-EAC, and 82 billion for CEMAC+STP. The RHS shows exports in percent of origin REC GDP.

Figure 5: (Intra-)African Exports by RECs: 2010-2022 Averages

In 2015 USD Billions							
6.502	0.341	0.49	1.705	0.991	0.563	139.11	AMU+EGY
0.14	2.221	0.078	0.982	0.004	1.269	28.186	CEMAC+STP
0.261	0.07	5.198	0.066	0.507	4.571	15.517	EAC
0.413	1.046	0.073	10.557	0.026	7.084	96.833	ECOWAS
0.62	0.001	0.057	0.033	0.879	0.03	9.477	IGAD-EAC
0.518	0.272	3.903	1.706	0.187	31.676	142.655	SADC-COD
AMU+EGY	CEMAC+STP	EAC	ECOWAS	IGAD-EAC	SADC-COD	ROW	
In Percent of Origin REC GDP							
0.883	0.046	0.067	0.232	0.135	0.077	18.897	AMU+EGY
0.171	2.708	0.095	1.198	0.004	1.548	34.37	CEMAC+STP
0.116	0.031	2.308	0.029	0.225	2.029	6.889	EAC
0.061	0.155	0.011	1.569	0.004	1.053	14.39	ECOWAS
0.37	0.001	0.034	0.02	0.525	0.018	5.66	IGAD-EAC
0.095	0.05	0.716	0.313	0.034	5.809	26.163	SADC-COD
AMU+EGY	CEMAC+STP	EAC	ECOWAS	IGAD-EAC	SADC-COD	ROW	

Notes: Figure shows heatmaps visualizing REC-level exports from rows to columns. Exports data is taken from DOTS, and GDP from the World Development Indicators. Both are averaged between 2010 and 2022.

Surprisingly, CEMAC+STP has the greatest export penetration at 41% of GDP, of which 34% is destined for ROW, 2.7% is internal trade, 1.5% for SADC-COD, and 1.2% for ECOWAS. It is followed by SADC-COD, with a total export penetration of 33.2%, of which 26.2% for ROW. SADC-COD maintains the largest intra-REC exports at 5.8% of GDP, and also exports 0.7% and 0.3% of GDP to the EAC and ECOWAS, respectively. The EAC remains the greatest inter-REC trader, at 6.9% of its GDP exported to ROW, 2.3% regional trade, and a large share of 2% of GDP is exported to SADC-COD, followed, with some distance, by 0.23% of GDP exports to IGAD-EAC. ECOWAS has an export penetration of 17.2%, of which 14% is for ROW, 1.6% regional, 1.1% for SADC-COD and 0.16% for CEMAC+STP. The AMU+EGY trades 20.3% of GDP, but 18.9% with ROW at only 0.9% regional trade, 0.23% for ECOWAS, and 0.13% for IGAD-EAC. IGAD-EAC has the lowest export penetration at 6.6% of GDP, of which 5.7% is for ROW, 0.5% regional, and 0.4% for the AMU+EGY. Overall, the absence of direct east-west trade is striking in this picture. The EAC does not trade meaningful quantities with ECOWAS or CEMAC+STP, indicating the existence of large trade barriers in central Africa. North-South trade is also scarce, likely reflecting physical and cultural barriers and the proximity of the AMU+EGY to Europe and the Middle East. The exports between AMU+EGY and SADC+COD, valued at 500-600 million and below 0.1% of GDP from both sides, are also insignificant in relative magnitude.

1.1 Trade Flows by Sector

To analyze trade flows by sector, we employ a 18-sector classification adapted from Huo et al. (2022), comprising 11 goods producing and 7 services sectors. The classification, summarized in Table 2, maps to the 2-digit HS2002 codes (see Appendix Table 6). Whereas Huo et al. (2022) distinguish 10 goods producing sectors, we add an 11th sector called PSM - "Precious stones & base metals incl. compounds" to distinguish minimally processed mining outputs that play an important role in intra-African trade from raw mining, petrochemical, and metal products. In the original classification of Huo et al. (2022), most of these products are subsumed into petrochemicals (PCM). Appendix Table 6 provides a mapping. We loosely refer to 2-digit HS codes as industries.

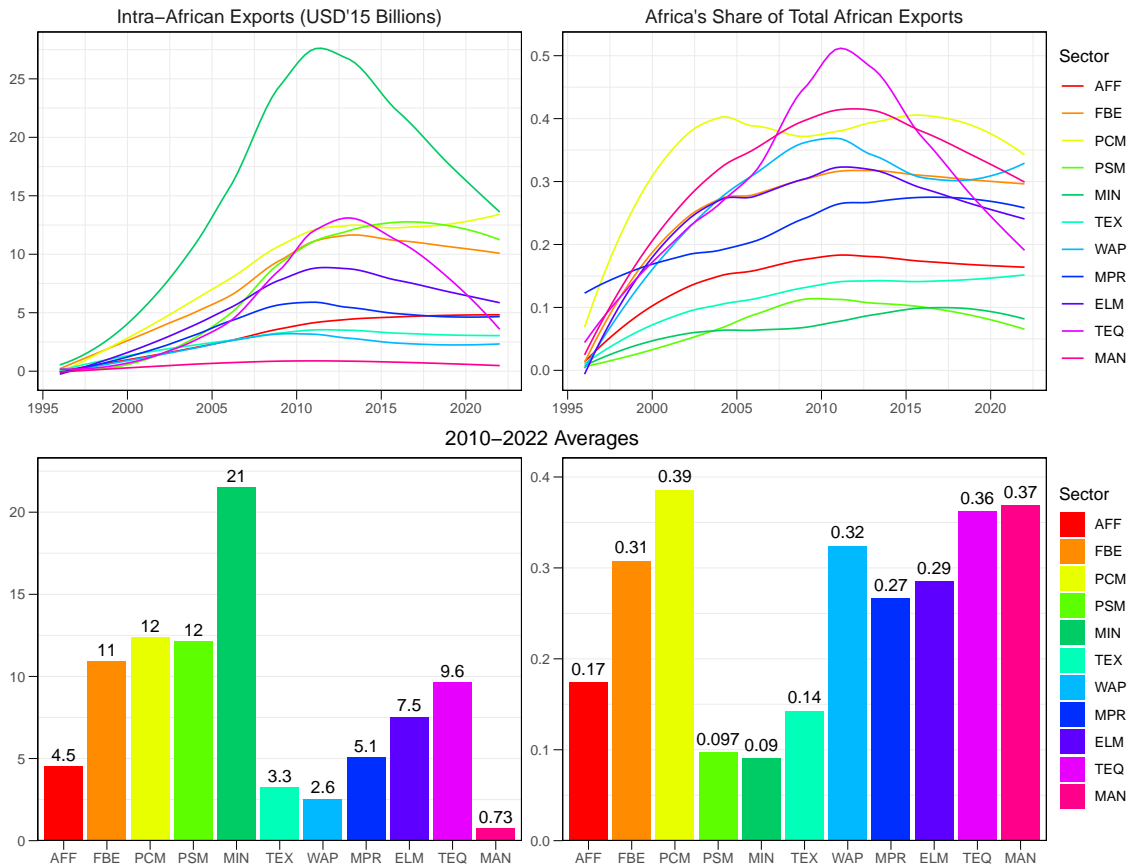
Table 2: Sector Classification

Code	Sector Definition of Huo et al. (2022) + Created PSM Sector
<i>Goods Producing Sectors (EMERGING and BACI)</i>	
AFF	Agriculture, hunting, forestry & fishing
FBE	Food production, beverages & tobacco
PCM	Petroleum, chemicals & non-metallic mineral products
PSM	Precious stones & base metals incl. compounds
MIN	Mining & quarrying
TEX	Textiles, leather & wearing apparel
WAP	Wood, paper & publishing
MPR	Metal & metal products
ELM	Electrical & machinery
TEQ	Transport equipment
MAN	Manufacturing & recycling
<i>Service Sectors (Only EMERGING)</i>	
EGW	Electricity, gas & water
SMH	Sale, maintenance & repair of vehicles; fuel; trade; hotels & restaurants
TRA	Transport
PTE	Post & telecommunications
CON	Construction
FIB	Financial intermediation & business activity
PAO	Public administration; education; health; recreation; other services

Notes: Table shows 18 sector classification applied to EMERGING and BACI. See Appendix Table 6 for details.

Employing this classification, Figure 6 plots intra-African goods trade (BACI) by sector, using a lowess-smoother to curb some high-frequency volatility in trade flows. The bottom half shows

Figure 6: Intra-African Exports by Sector: Billions of Constant 2015 USD



Notes: Figure shows intra-African exports by sector (LHS) and as a share of total African exports (RHS) using BACI.

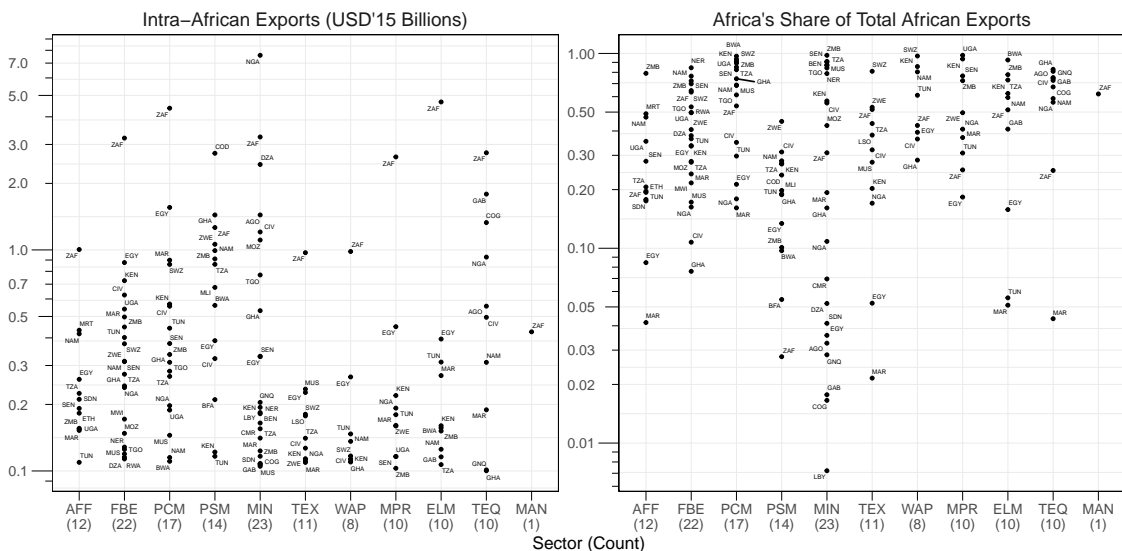
2010-2022 averages, indicating that petrochemicals (PCM), precious stones and base metals (PSM), and mining (MIN) together make up almost 50% of intra-African trade - amounting to 90.2 billion USD'15. Mining exports, driven by petroleum, peaked in 2011 and declined to less than 15 billion in recent years, whereas PCM exports increased slightly to almost 14 billion. The RHS shows that only 9%-10% of African mining and PSM exports were intra-African, compared to 39% of PCM exports. This suggests that PCM has a leading role in intra-African trade expansion.

Following these three, processed foods and beverages (FBE) accounts for 12% of intra-African trade, amounting to 11 billion USD'15. Also here, intra-African exports peaked in 2013 but remain above 10 billion. The African share in exports of 31% for FBE is also very high. Thus, FBE has a similarly important role in intra-African trading to PCM. Of the other sectors, transport equipment (TEQ), metal products (MPR), electrical machinery (ELM), and agriculture (AFF) have intra-African exports between 4.5 and 9.6 billion, at African shares between 17 and 36%. TEQ exports also peaked in 2013 and have declined below 5 billion since then.

To validate the importance of different sectors for intra-African trade, we also consider the extensive margin of regional trading in these sectors. Figure 7 shows all African countries that exported more than 100 million USD'15 per year to Africa during the 2010-22 period by sector. The counts indicate the number of countries. Notably, in the FBE sector, 22 countries had intra-African exports above 100M, comparable to mining (23), followed by PCM (17) and PSM (14).

In all sectors apart from mining (mainly petroleum) and PSM, South Africa (ZAF) is the largest intra-African exporter. In FBE and PCM, >50% of ZAF exports are to African countries, versus <3% in PSM. Nigeria has the largest overall sectoral export flow at above 7 billion USD'15 annual mining (petroleum) exports to Africa. This only comprises 11% of total Nigerian mining exports. Exempting ZAF and Nigerian mining, other flows above 1 billion USD'15 are PCM exports by Egypt, PSM exports by the DRC, Ghana, Zimbabwe, and Namibia, mining exports of Algeria, Angola, Cote d'Ivoire, and Mozambique, and TEQ exports by Gabon, the Republic of Congo, and Nigeria. In the FBE sector, Egypt, Kenya, Cote d'Ivoire, Uganda, and Morocco have exports between 500M and 1B USD'15. In PCM, this category includes Morocco, Swaziland, Kenya, and Cote d'Ivoire; in PSM, Zambia, Tanzania, Mali, and Botswana; and in mining, Togo and Ghana.

Figure 7: Intra-African Exports > 100M USD'15 by Sector and Country: 2010-22 Averages



Notes: Figure shows sectoral intra-African exports > 100M USD'15 (LHS) and their share in country exports (RHS).

It remains to analyze sectoral exports by RECs. Table 3 does so in a very compact way by reporting the average 2010-22 African exports of each REC in billions of USD'15, and, in parentheses, the share of Africa in overall sectoral exports by the REC, followed by the own-REC share in the REC's African exports. The final row additionally reports these metrics for total exports across sectors. Drawing from this last row, according to the BACI database SADC-COD

exports 40.9 billion USD'15 to Africa, which comprises 20% of the total exports of this REC, and 79% of these African exports are within the REC. The EAC, in contrast, only exports 9.15 billion USD'15 to Africa, constituting 30% of total EAC exports, and 51% of these exports are regional. Of the sectors with sizeable regional trade volumes, AFF, FBE, PCM, MPR, ELM, and TEQ generally have African export shares above 10%. In FBE and PCM, all RECs except for CEMAC+STP and IGAD-EAC have African export volumes above 1 billion USD'15, indicating a high potential for driving regional trade integration. In most RECs, 50% or more of these exports are regional.

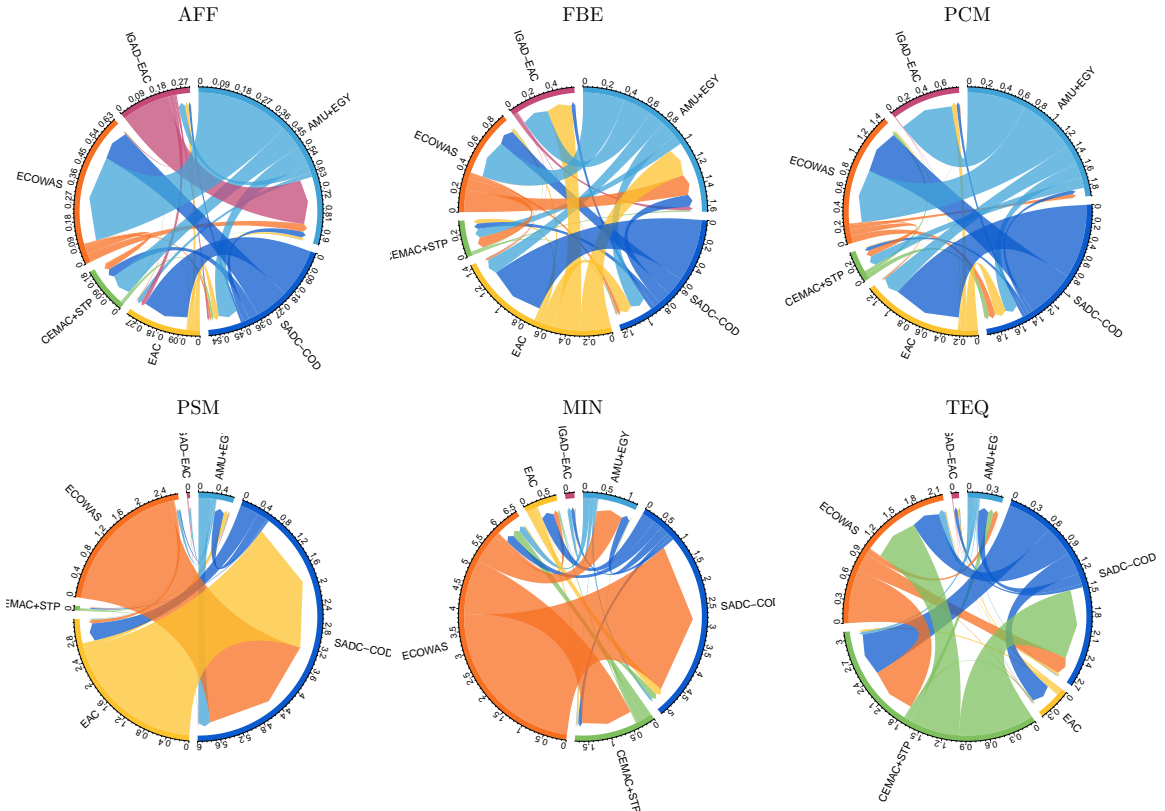
Table 3: Intra-African Exports by Sector and REC: 2010-22 Averages

Sector	AMU+EGY	CEMAC+STP	EAC	ECOWAS	IGAD-EAC	SADC-COD
AFF	0.99 (12% 34%)	0.03 (12% 47%)	0.5 (18% 88%)	0.65 (14% 87%)	0.41 (16% 40%)	1.96 (26% 78%)
FBE	1.9 (30% 47%)	0.12 (13% 70%)	1.67 (37% 58%)	1.82 (16% 80%)	0.13 (10% 63%)	5.26 (50% 82%)
PCM	3.03 (20% 40%)	0.18 (28% 45%)	1.07 (88% 79%)	1.88 (42% 88%)	0.02 (35% 51%)	6.19 (59% 75%)
PSM	0.61 (6.1% 46%)	0.05 (1.6% 10%)	3.74 (22% 27%)	2.83 (11% 8.1%)	0.02 (0.62% 1.7%)	4.89 (6.9% 88%)
MIN	3.13 (3.7% 89%)	0.58 (2.4% 32%)	0.5 (19% 46%)	10.89 (14% 46%)	0.11 (4.2% 99%)	6.29 (11% 86%)
TEX	0.4 (2.9% 58%)	0.02 (10% 29%)	0.31 (30% 60%)	0.54 (20% 67%)	0.05 (10% 16%)	1.95 (42% 94%)
WAP	0.52 (45% 49%)	0.1 (5.2% 20%)	0.24 (59% 79%)	0.27 (22% 86%)	0.01 (18% 29%)	1.41 (46% 86%)
MPR	0.88 (22% 62%)	0.1 (31% 51%)	0.44 (87% 84%)	0.55 (48% 87%)	0 (20% 42%)	3.09 (23% 69%)
ELM	1.02 (7.6% 54%)	0.25 (45% 39%)	0.36 (64% 61%)	0.4 (44% 74%)	0.05 (21% 24%)	5.46 (52% 74%)
TEQ	0.38 (7% 57%)	3.3 (72% 47%)	0.24 (77% 61%)	1.77 (55% 42%)	0.02 (30% 51%)	3.91 (30% 62%)
MAN	0.1 (12% 44%)	0.01 (29% 50%)	0.08 (63% 62%)	0.05 (46% 69%)	0 (33% 28%)	0.49 (61% 85%)
SUM	12.97 (8% 57%)	4.75 (13% 44%)	9.15 (30% 51%)	21.65 (16% 51%)	0.82 (7.8% 48%)	40.9 (20% 79%)

Notes: Table shows the REC exports to Africa, and, in parentheses, Africa's share in total REC exports and the own-REC share in exports to Africa.

To examine the between-REC trade, Figure 8 visualizes the between-REC exports in AFF and the 5 largest sectors. The largest between-REC flows are in mining and PSM, valued at 7.8 and 8.3 billion USD'15, respectively. These are dominated by Nigeria and the DRC. Next up, TEQ, valued at 4.5 billion, shows meaningful trade between CEMAC+STP, SADC-COD, and ECOWAS. This is followed by PCM at 3.9 billion, FBE at 3.1 billion, and AFF at 1.5 billion. In these sectors, SADC-COD and the AMU+EGY are the largest inter-regional exporters, but in FBE, the EAC and ECOWAS are also important, and in AFF, IGAD-EAC exports much to AMU+EGY. The ELM and MPR sectors, omitted here, are dominated by SADC-COD (South African) exports.

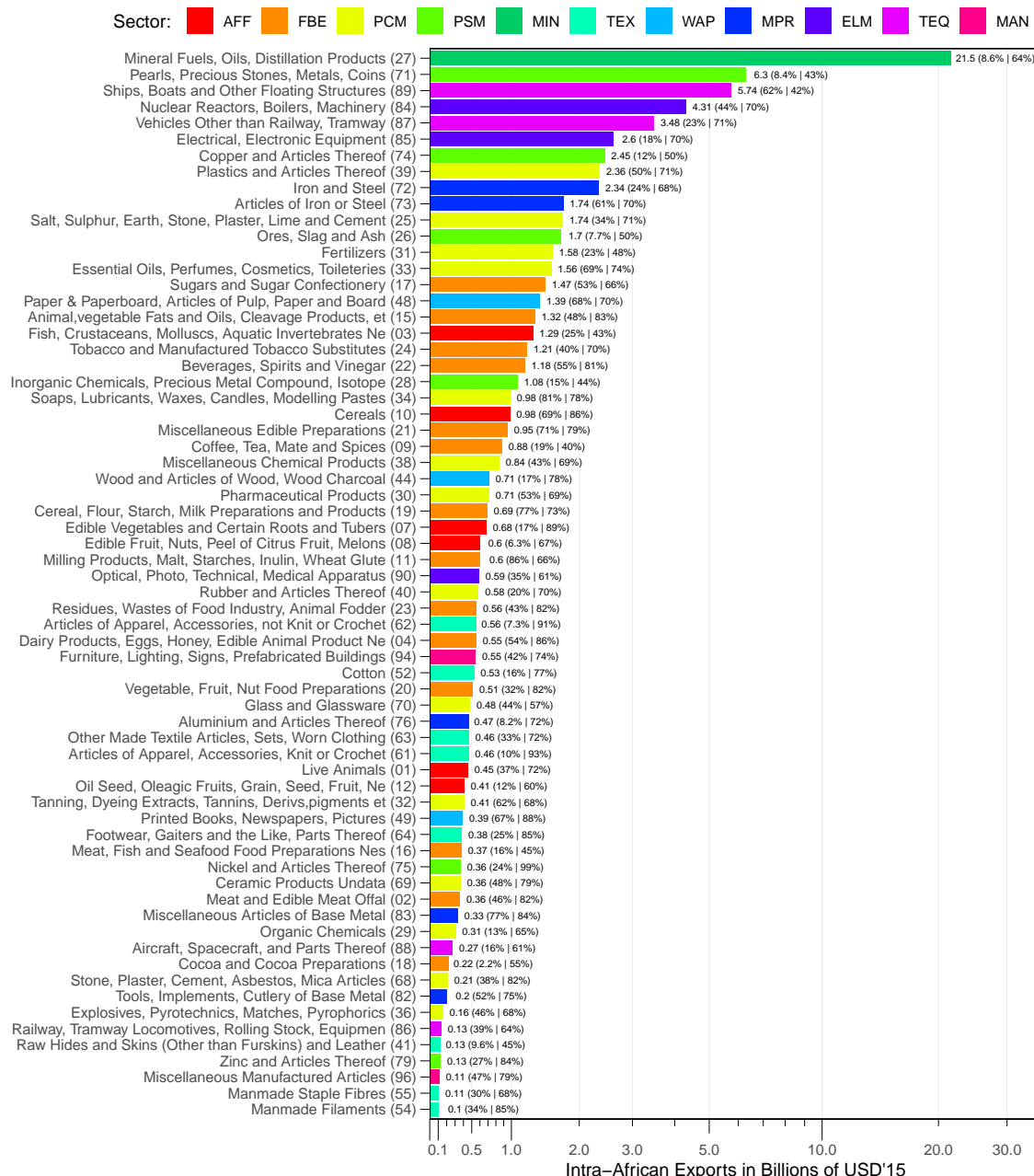
Figure 8: Between-REC Trade (Exports): 2010-2022 Averages in 2015 USD Billions



1.2 Trade Flows by Industry

Concluding gross trade analysis, we also examine intra-African trade at the industry level to better understand what is being traded in different sectors. Figure 9 provides an overview at the 2-digit HS02 level, showing intra-African exports for all significant industries, including, in parentheses, the percentage in total African exports and the percentage traded inside RECs, as in Table 3.

Figure 9: Intra-African Exports > 100M USD'15 by Industry (HS02 2-Digit): 2010-22 Averages



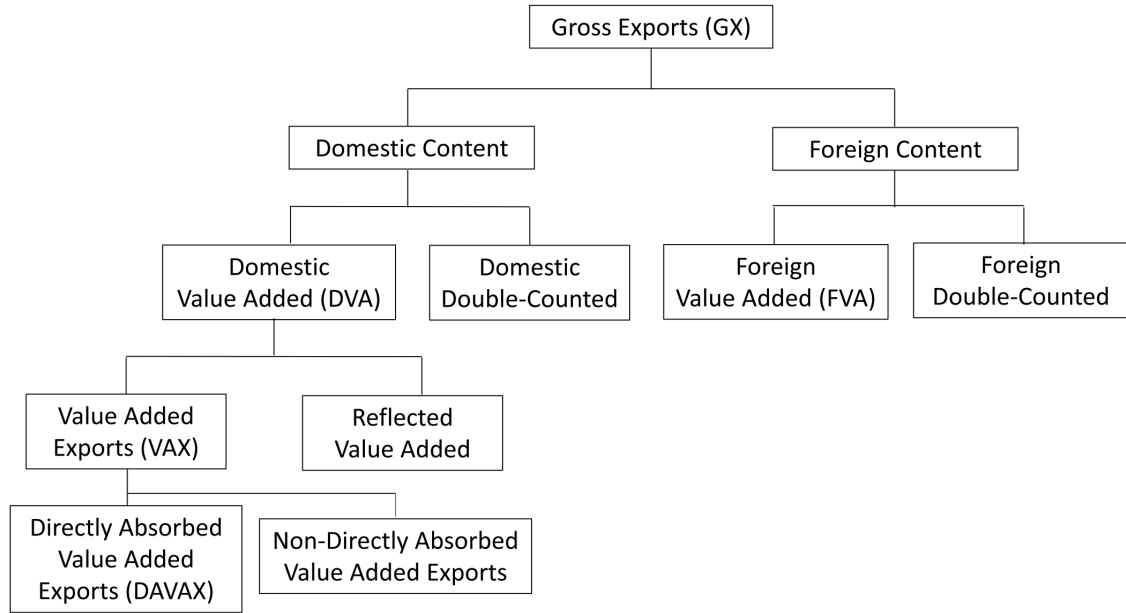
Notes: Figure shows total intra-African exports by 2-digit HS2002 industries valued above > 100M USD'15 (BACI 2010-2022 Average), and, in parentheses, its percentage in total African exports and the percentage of it traded inside RECs.

Figure 9 indicates that the mining sector only includes petroleum. With 21.5 billion USD'15 annually over the last decade, the petrol industry is by far the largest in intra-African trade but only accounts for 8.6% of total African petroleum exports. It is followed by precious stones and metals at 6.3 billion. Other large industries in intra-African trade are boats, machinery, vehicles, electrical equipment, copper, plastics, and iron/steel at annual volumes above 2 billion USD'15. Following these, many industries with volumes between 0.5 and 2 million are in the PCM, FBE, and AFF sectors. Exempting AFF, these industries all involve low to moderate levels of processing and have African shares in total exports above 20%. Typically, >60% of this trade is within RECs.

2 Value Chains

While gross trade flows provide useful information about direct economic relationships, their value-added (VA) content partly stems from previous production stages performed in other countries. [Koopman et al. \(2014\)](#) first proposed a complete decomposition of a country's gross exports into different VA components. [Borin & Mancini \(2019\)](#) showed that their decomposition is inexact for certain components and proposed a refined version, visualized schematically in Figure 10.

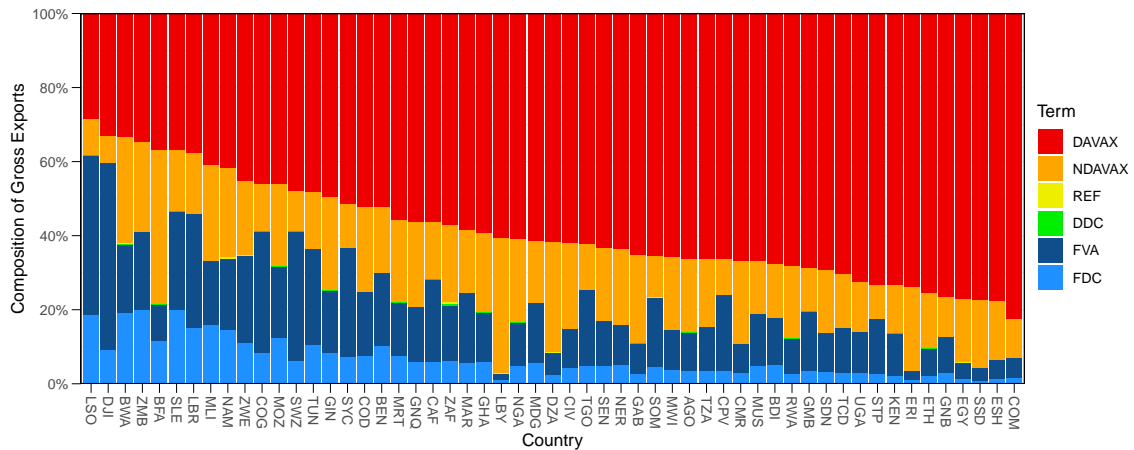
Figure 10: REFINED KOOPMAN WANG WEI DECOMPOSITION OF GROSS EXPORTS



Notes: Graphic of [Borin & Mancini \(2019\)](#)'s exports decomposition into VA components. Source: [Antràs & Chor \(2022\)](#).

[Borin & Mancini \(2019\)](#) propose $GX - DAVAX$ as a measure of total GVC-related trade. This can be further broken down into *backward* GVC participation ($GX - DVA$) comprising non-domestic content in exports, and *forward* GVC participation ($DVA - DAVAX$) capturing re-exported domestic content in exports. Figure 11 shows the decomposition for all African countries based on EMERGING 2015-2019 tables aggregated to the sector level. Since the Domestic Double Counted (DDC) and Reflected Value Added (REF) terms are very small, backward GVC participation is approximately equal to $FVA + FDC$, and forward participation is approximately $NDVAX$. For the lion's share of countries, $DAVAX$ still makes up more than 50% of exports, but many countries such as Lesotho, Djibouti, Botswana, Zambia, and Burkina Faso are highly engaged in GVCs. The mode of engagement also differs, with some countries such as Libya, Eritrea, and Burkina Faso mostly participating in forward GVCs, whereas Others like Djibouti, Lesotho, or Swaziland mostly engaged in backward GVCs, partly also due to their small economic size.

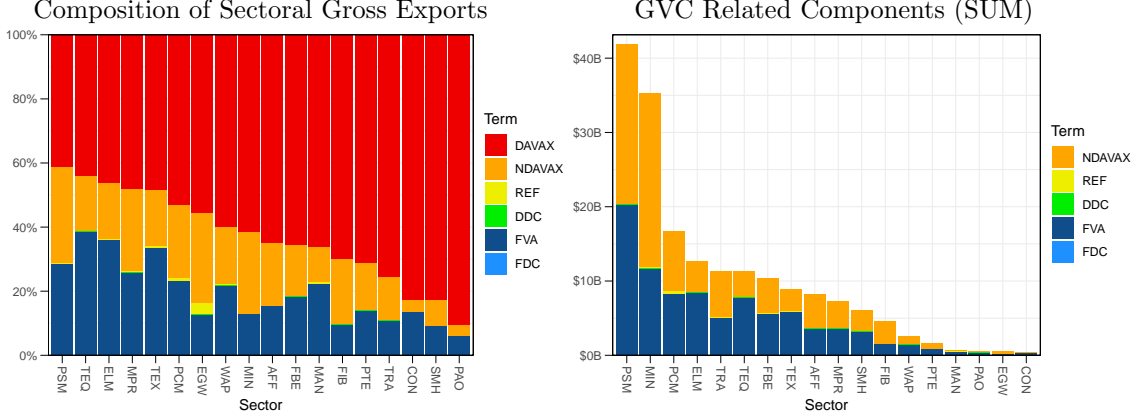
Figure 11: Decomposition of Total Gross Exports by Country: 2015-19 Average



Notes: Figure plots decomposition of countries' exports into VA components following [Borin & Mancini \(2019\)](#) (Fig. 10).

The decomposition can also be computed at the sector level, using a source-based exporter perspective following [Borin & Mancini \(2019\)](#), which allows summing items across countries. Figure 12 provides both the decomposition of sector-level gross exports and the total size of GVC-related components. The PSM sector has the greatest GVC export share at nearly 60%, followed closely by core manufacturing sectors (TEQ, ELM, MPR, TEX). The latter are, however, less important in overall size. The RHS of Figure 12 shows that PSM and mining at >\$30B USD of GVC-related exports each, together make up 42.7% of total African GVC-related exports. They are followed, with some distance, by PCM at \$16.7B USD or 9.2% of total African GVC-related exports.

Figure 12: Decomposition of African Countries' Gross Exports by Sector: 2015-19 Average



Notes: Figure shows sectoral exports decomposition into VA terms (Fig. 10) using a source-based exporter perspective.

2.1 Regional Value Chains

To study which sectors are important for African RVCs, it is necessary to extract the parts of GVC components accounted for by African partners. Towards this end, the [Leontief \(1936\)](#) inverse is useful. Let \mathbf{A} be a normalized ICIO table where each element $a_{oi,uj}$ gives the units of origin country o and sector i 's (row) output required for the production of one unit of using country u and sector j 's (column) output, \mathbf{x} the vector of outputs of each country-sector, and \mathbf{d} a vector of final demand (FD) such that the following productive relationship holds

$$\mathbf{x} = \mathbf{A}\mathbf{x} + \mathbf{d}. \quad (1)$$

Then, following [Leontief \(1936\)](#)

$$\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{d} = \mathbf{B}\mathbf{d}, \quad (2)$$

where the Leontief Inverse is denoted $\mathbf{B} = (\mathbf{I} - \mathbf{A})^{-1}$. This matrix is also often called the total requirements matrix since it gives the total productive input requirements from each sector to produce one unit of final output². The direct VA share of each country-sector is given by

$$\mathbf{v} = \mathbf{1} - \mathbf{A}'\mathbf{1}, \quad (3)$$

where $\mathbf{1} = (1, 1, 1, \dots, 1)'$ is a column-vector of 1's³. Let \mathbf{V} be the matrix with \mathbf{v} along the diagonal and 0's in the off-diagonal elements. Multiplying Eq. 2 with \mathbf{V} then gives VA in each country-sector

$$\mathbf{V}\mathbf{x} = \mathbf{V}(\mathbf{I} - \mathbf{A})^{-1}\mathbf{d} = \mathbf{V}\mathbf{B}\mathbf{d}. \quad (4)$$

The matrix $\mathbf{V}\mathbf{B} = \mathbf{V}(\mathbf{I} - \mathbf{A})^{-1}$ is known as the matrix of VA multipliers or VA shares, which can be used to obtain the amount of VA generated in each country-sector ($\mathbf{V}\mathbf{x}$) when producing to satisfy FD (\mathbf{d}). More specifically, it contains the amount of VA by each country-sector (row) to the production of one unit of each country-sector's (column's) output.

²Specifically, each element in $b_{oi,uj}$ in \mathbf{B} gives the output required from country-sector oi for the production of one unit of the final good in uj . Thus, the first column of \mathbf{B} gives all the productive input required from all sectors for the production of one unit of the final good in sector 1, and the first row of \mathbf{B} gives all the input required from sector 1 to produce one unit of the final good in each sector.

³Thus, the expression amounts to summing up the entries in each column of \mathbf{A} (representing the intermediate input shares for 1 unit of output) and subtracting them from 1.

Let \mathbf{E} be a vector of sector-level gross exports, then \mathbf{VBE} is the matrix of sector-level exports (columns) decomposed by origin of VA country-sector (rows) with elements $vbe_{oi,uj}$. From it, following [Hummels et al. \(2001\)](#) and [Baldwin & Lopez-Gonzalez \(2015\)](#), we can derive simple indicators for the imported exports (I2E) and re-exported exports (E2R) shares.

$$I2E_{uj} = \frac{1}{E_{uj}} \sum_{oi, oi \neq u} vbe_{oi,uj} \quad \forall uj \quad (5)$$

$$E2R_{oi} = \frac{1}{E_{oi}} \sum_{uj, uj \neq o} vbe_{oi,uj} \quad \forall oi, \quad (6)$$

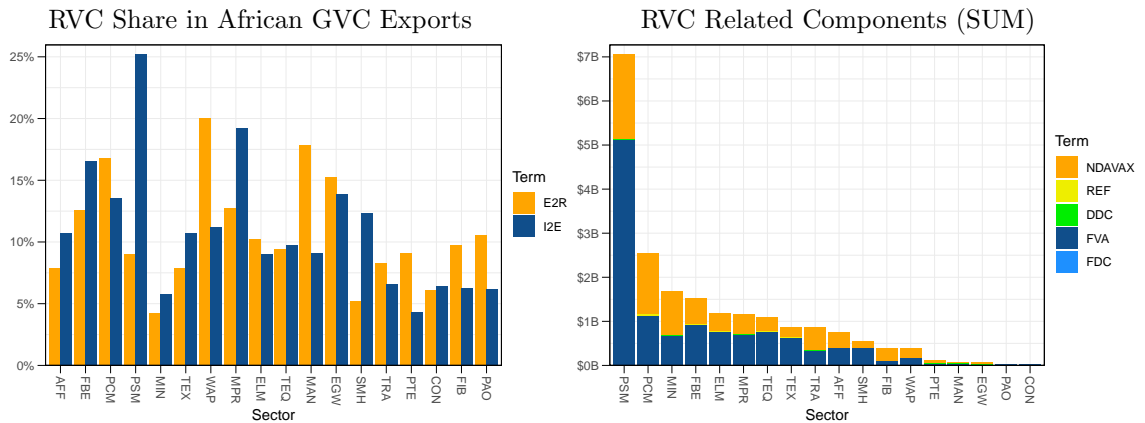
The import measure is equal to the share of backward GVC participation [$I2E = (GX - DVA)/GX$]. The export measure is approximately equal to the forward GVC participation share, but imprecise because it includes double-counted components. These are, however, relatively small in Africa. Using these measures, we obtain the shares of African partners in countries' backward and forward GVC participation. Let AFR denote the set of all African countries, then

$$I2E_{uj}^{AFR} = \sum_{oi \in AFR, oi \neq u} vbe_{oi,uj} / \sum_{oi, oi \neq u} vbe_{oi,uj} \quad \forall uj \in AFR, \quad (7)$$

$$E2R_{oi}^{AFR} = \sum_{uj \in AFR, uj \neq o} vbe_{oi,uj} / \sum_{uj, uj \neq o} vbe_{oi,uj} \quad \forall oi \in AFR. \quad (8)$$

are relative shares tracking the African share in countries' forward and backward GVC participation. The LHS of Figure 13 shows $I2E^{AFR}$ and $E2R^{AFR}$ at the sector level. The RHS applies these shares to the exact measures following [Borin & Mancini \(2019\)](#), multiplying FVA, FDC, and DDC with $I2E^{AFR}$ and NDAVAX and REF with $E2R^{AFR}$. In most sectors, the RVC share is between 5% and 20%. Sectors WAP, MAN, PCM, and EGW have high forward participation shares (E2R), whereas PSM, MPR, FBE, and PCM have high backward participation shares (I2E). In absolute values, PSM alone accounts for 35% of African RVCs, around \$7 billion, followed by PCM (12.4%), MIN (8.3%), and FBE (7.5%). It is unlikely that PSM and MIN RVCs are sophisticated, but they highlight great potential to process raw materials such as gold, diamonds, ores, and precious stones in African countries with more advanced industrial facilities rather than exporting them directly or via neighbours. PCM, comprising mainly plastics, salt, cement, fertilizers, oils, and cosmetics, soaps, and lubricants (see Figure 9), and FBE also show high potential for RVC deepening.

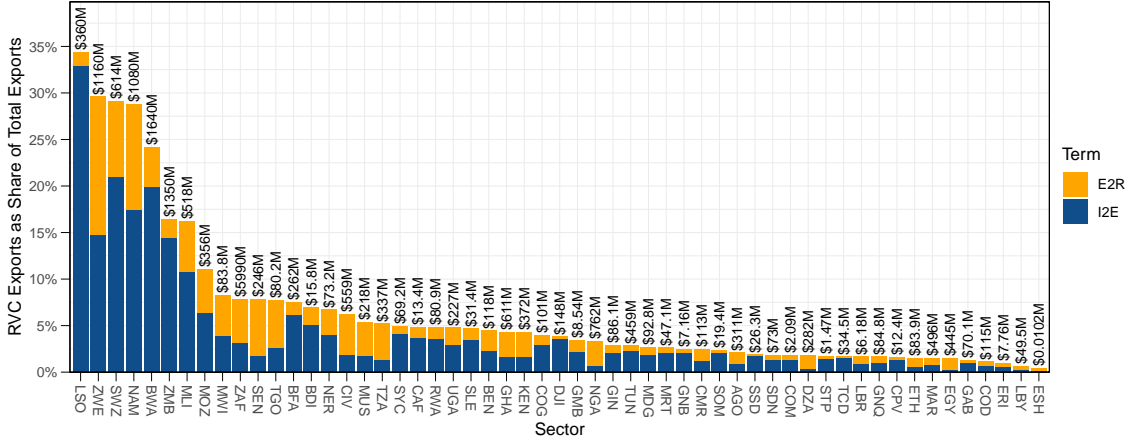
Figure 13: African RVCs by Sector: 2015-19 Average



Notes: Figure shows African RVCs by sector, computed via regional backward (I2E) and forward (E2R) GVC shares.

To investigate how countries engage differently in RVCs, we plot their overall and sector-level engagement below. Figure 14 provides the share of RVC exports (both forward/E2R and backward/I2E RVC integration) in country total gross exports. Ostensibly, for most countries, the RVC share is below 5%, but a handful of countries, particularly in SADC, are highly engaged at export shares close to 30%. The overall volume of RVC-related flows is also concentrated in SADC, with South Africa leading at \$6 billion USD RVC-related exports, followed by Botswana, Zambia, Zimbabwe, and Namibia at between \$1 and \$2 billion. Nigeria follows at \$762 million.

Figure 14: African RVCs by Country: 2015-19 Average



Notes: Figure shows total RVC share (backward (I2E) and forward (E2R)) in country gross exports, including its value.

Table 4 provides a summary of bilateral RVCs by RECs. Evidently, the largest share of RVC-related exports is by SADC-COD countries, followed by ECOWAS, AMU+EGY, and the EAC. In total, 72% of RVC exports are within RECs. Of the remaining 28% between-REC RVC exports, the largest flows are between ECOWAS and SADC-COD, valued at around \$1-1.4 billion, and between the EAC and SADC-COD, valued around \$450-520 million.

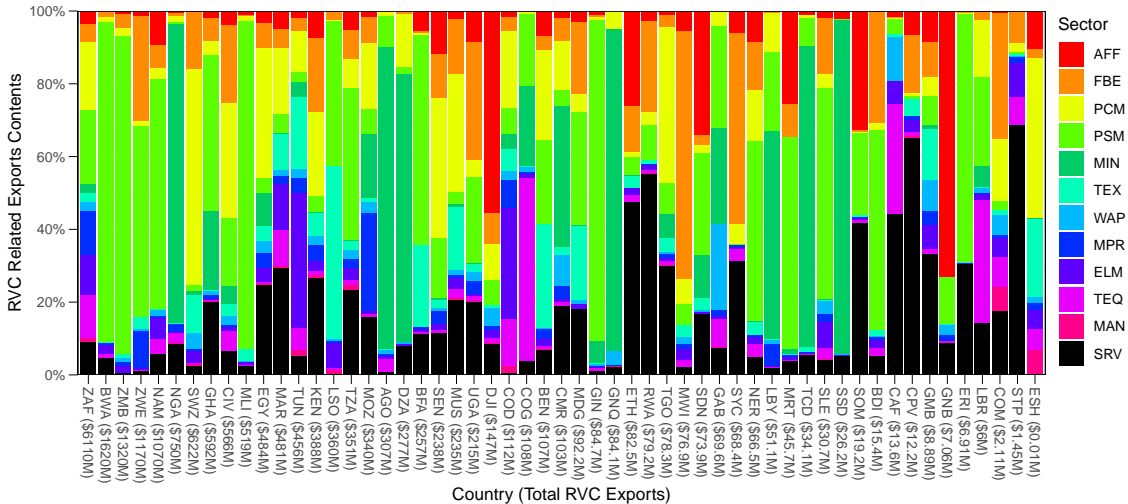
Table 4: African RVCs by REC: 2015-19 Average (USD millions)

Exporter	Total	AMU+EGY	CEMAC+STP	EAC	ECOWAS	IGAD-EAC	SADC-COD
AMU+EGY	1777.9	1038.4	64.7	84.7	238.2	103.8	248.1
CEMAC+STP	418.3	79.1	99.1	17.8	123.7	6.6	91.9
EAC	1173.7	95.9	16.0	527.4	49.1	31.6	453.5
ECOWAS	3380.3	278.2	101.1	51.4	1880.9	22.8	1045.9
IGAD-EAC	331.8	137.5	5.7	38.6	20.6	67.7	61.7
SADC-COD	13321.5	289.5	90.9	516.0	1376.0	57.1	10992.0

Notes: Table provides total RVC-related exports from row-REC to column-REC (EMERGING 2016-2019 average).

We also examine RVCs at the country-sector and REC-sector levels. Figure 15 shows sectoral shares in country-level RVC exports, with the largest RVC exporter to the left of the chart. There is significant heterogeneity in countries' RVC export content. In many countries, PSM and MIN (green bars) dominate RVC engagement. In some smaller countries like Rwanda, Cape Verde, and Sao Tome, services (SRV) exports dominate. Apart from these, many countries export AFF, FBE, and PCM as part of RVCs. South Africa has the largest and most diversified RVC exports.

Figure 15: African RVCs by Country: 2015-19 Average Sectoral Shares



Notes: Figure shows sectoral breakdown of total RVC-related exports by country (largest RVC exporter to the left).

To also provide sectoral details at the REC-level, Table 5 gives a breakdown of RVC exports by REC and sector. SADC-COD has the largest RVC exports in all sectors, and in all RECs apart from AMU+EGY and IGAD-EAC, either PSM or MIN is the largest regionally traded sector. However, there are significant differences between RECs. FBE RVCs play a significant role in the EAC, where they make up 17% of all RVC exports. They play a lesser role in IGAD-EAC, ECOWAS, and SADC-COD at shares around 7-8%. PCM, on the other hand, is important in the AMU+EGY (20%) and also in the EAC, SADC, and ECOWAS (12-13%), but small (5%) in IGAD-EAC where agriculture, forestry and fishing (AFF) comprises 41% of RVC-related exports.

Table 5: African RVCs by REC and Sector: 2015-19 Average (USD millions)

Sector	Total	AMU+EGY	CEMAC+STP	EAC	ECOWAS	IGAD-EAC	SADC-COD
AFF	749.8 (3.7%)	62.35 (3.5%)	2.65 (0.64%)	70.94 (6%)	108.6 (3.3%)	134.9 (41%)	370.4 (2.8%)
FBE	1596 (7.8%)	79.51 (4.4%)	7.5 (1.8%)	205.9 (17%)	221.7 (6.7%)	25.05 (7.6%)	1056 (7.9%)
PCM	2700 (13%)	357.7 (20%)	21.6 (5.2%)	153.8 (13%)	386.8 (12%)	17.27 (5.2%)	1763 (13%)
PSM	6986 (34%)	101.8 (5.7%)	48.81 (12%)	239 (20%)	1177 (35%)	43.96 (13%)	5375 (40%)
MIN	1774 (8.7%)	296 (16%)	184.6 (45%)	29.98 (2.5%)	787.9 (24%)	9 (2.7%)	466.4 (3.5%)
TEX	884.2 (4.3%)	160.6 (8.9%)	2.85 (0.69%)	47.19 (4%)	138.4 (4.2%)	6.42 (1.9%)	528.8 (3.9%)
WAP	364.2 (1.8%)	36.58 (2%)	32.11 (7.8%)	26.26 (2.2%)	28.5 (0.86%)	7.89 (2.4%)	232.9 (1.7%)
MPR	1133 (5.5%)	51.53 (2.9%)	5.39 (1.3%)	42.66 (3.6%)	41.96 (1.3%)	1.57 (0.48%)	989.7 (7.4%)
ELM	1202 (5.9%)	251.3 (14%)	3.78 (0.91%)	57.93 (4.9%)	25.44 (0.77%)	5.23 (1.6%)	858.5 (6.4%)
TEQ	1071 (5.2%)	77.07 (4.3%)	65.4 (16%)	29.23 (2.5%)	70.99 (2.1%)	4.01 (1.2%)	824.1 (6.2%)
MAN	97.22 (0.48%)	14.51 (0.81%)	0.25 (0.06%)	10.13 (0.85%)	1.62 (0.049%)	0.24 (0.074%)	70.47 (0.53%)
SRV	1889 (9.2%)	306 (17%)	39.12 (9.4%)	273.9 (23%)	333.9 (10%)	73.9 (22%)	862.2 (6.4%)
SUM	20446 (100%)	1795 (100%)	414.1 (100%)	1186.9 (100%)	3322.4 (100%)	329.5 (100%)	13398 (100%)

Notes: Table shows RVC content by REC and sector, including sectoral shares in total REC RVC exports. Computed using **VBE** shares.

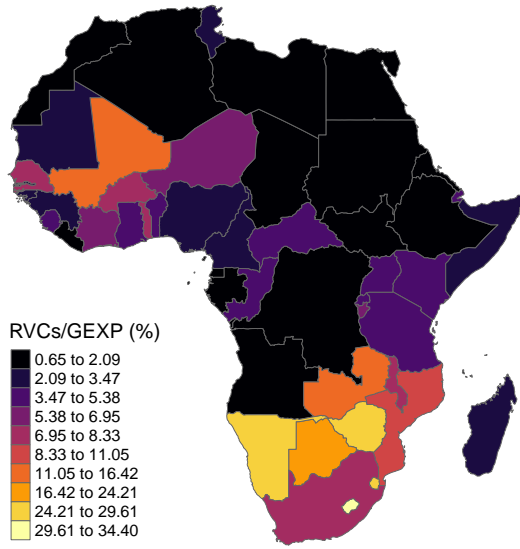
Another so far neglected but critical consideration for RVC deepening is geography, as deepening RVCs is facilitated by countries being geographically close. Towards this end, Figure 16 first summarizes countries' aggregate engagement. Panel (A) clearly shows that most RVC engagement is in SADC, followed by ECOWAS and the EAC. North Africa is not very engaged in African RVCs. Panel (B) shows the largest RVC sector, which is MIN or PSM for most countries. If these two are excluded in Panel (C), North African countries mostly engage in PCM RVCs, and many countries in eastern, western and central Africa mainly engage in services RVCs. If services are also excluded in Panel (D), IGAD-EAC focuses on agricultural RVCs, the EAC is split between FBE and PCM, and SADC and ECOWAs are more diverse, exempting two geographic clusters: in SADC, FBE is the leading sector in Zimbabwe, Zambia, and Malawi, and in ECOWAS textiles is leading in Benin, Burkina Faso, and Mali.

To provide a detailed spatial analysis of important RVC sectors, Figure 17 shows the total values (in million USD) of RVCs in 6 important sectors. Agricultural RVCs in Panel (A) are quite dispersed, with South Africa and Namibia the most significant participants, but also sizeable participation in the EAC, Ethiopia, and Sudan, as well as Ghana, Morocco, and Senegal. In FBE, shown in Panel (B), Zimbabwe is the leading RVC exporter, with sizeable contributions in all of SADC, but also in the EAC, especially between Uganda and Kenya, as documented in greater detail in [Krantz \(2024\)](#). In West Africa, Ghana contributes significantly to the FBE RVC. The PCM RVC is geographically dispersed, just like the agricultural one. PSM RVCs are heavily concentrated in southern Africa, where Botswana takes lead, but also exist in western Africa, particularly Mali. Mining (petroleum) RVCs in Panel (E) are dominated by Nigeria, followed by Angola and Algeria. Services RVCs, shown in Panel (F), are dispersed, with key contributors Egypt, Morocco, and South Africa, Ghana, and Kenya.

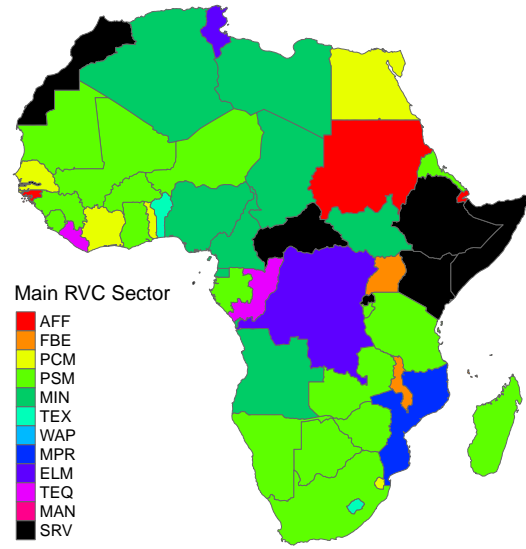
To provide additional bilateral details, panels (E) and (F) of Figure 16 and Figure 18 provide network visualizations of bilateral RVC flows using force-directed network visualizations (Fruchterman-Reingold layout algorithm). Due to the dominant role of South Africa, most countries cluster around it, but sometimes there are interesting dissident clusters. Notably, both overall and in petrochemicals, north African countries form their own RVC cluster. In processed foods and beverages, there seem to be three clusters around South Africa and Zimbabwe, Cote d'Ivoire, and Uganda and Kenya. These clusters reappear to a weaker extent in AFF, where an additional significant cluster emerges around Ethiopia and Djibouti. Overall, the graphics suggest much room for further RVC integration within and across RECs (apart from SADC-COD). We conclude our exploration of GVCs and RVCs in Africa by examining Africa's changing positioning in GVCs.

Figure 16: African RVCs Total Engagement and Main Sector: 2015-19 Average

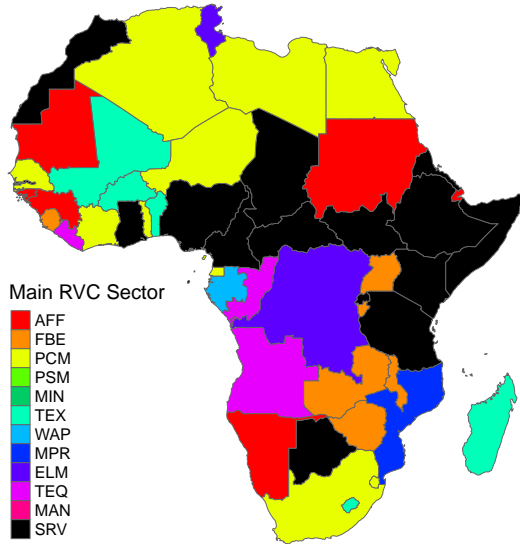
(A) Total RVC Share in Gross Exports



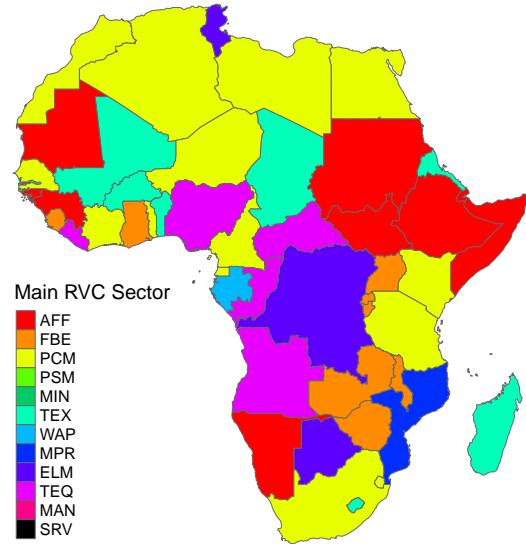
(B) Largest RVC Exporting Sector



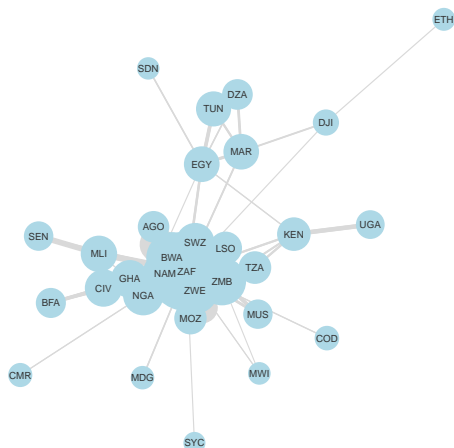
(C) (B) Excluding [MIN, PSM]



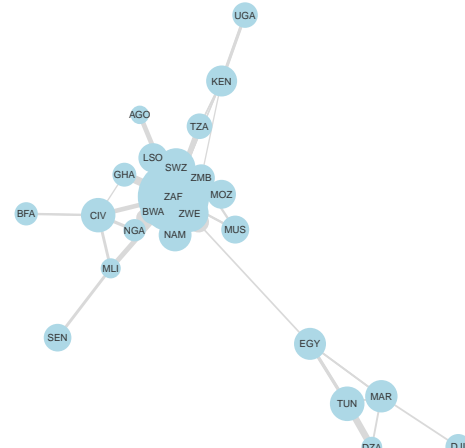
(D) (B) Excluding [MIN, PSM, SRV]



(E) Network of Top 100 Flows



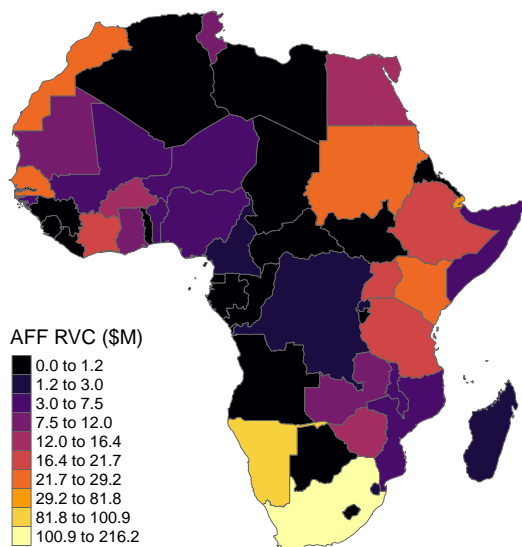
(F) Excluding [MIN, PSM, SRV]



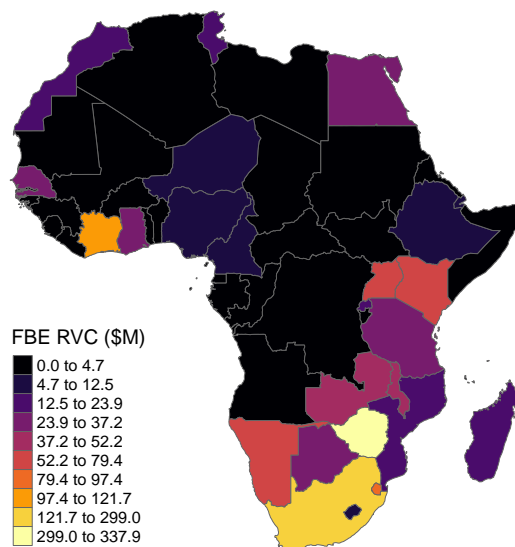
Notes: Figure visualizes countries' RVC share in country gross exports and the sector with the largest RVC exports. Panels (E) and (F) plot force-directed networks of bilateral RVC-related exports, using the top 100 bilateral flows.

Figure 17: African RVCs in Key Sectors: 2015-19 Average

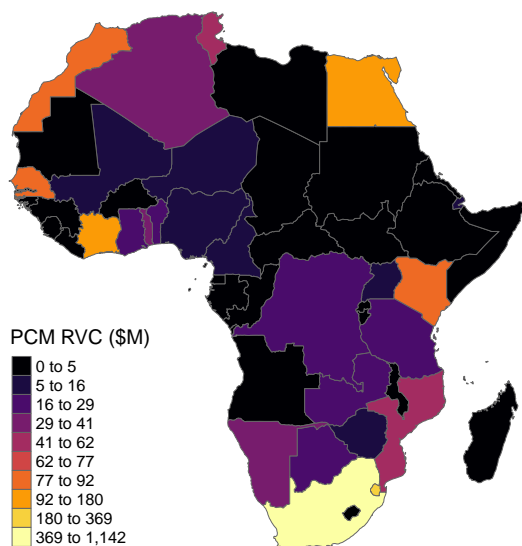
(A) Agriculture, Forestry & Fishing



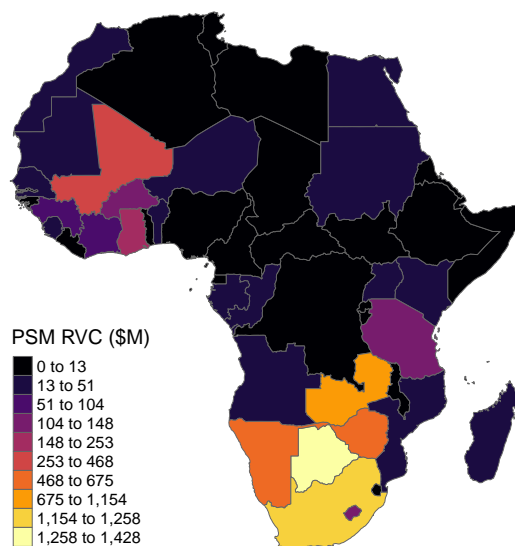
(B) Processed Foods & Beverages



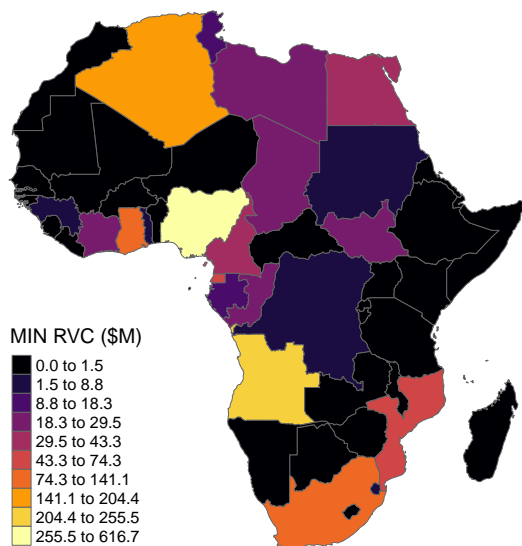
(C) Petrochemicals



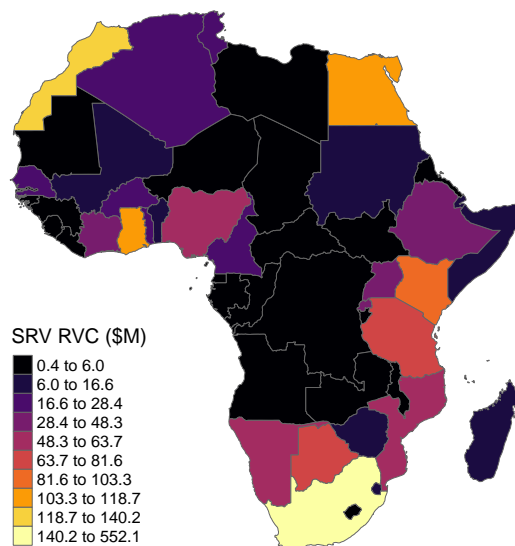
(D) Precious Stones and Metals



(E) Mining (Petroleum)



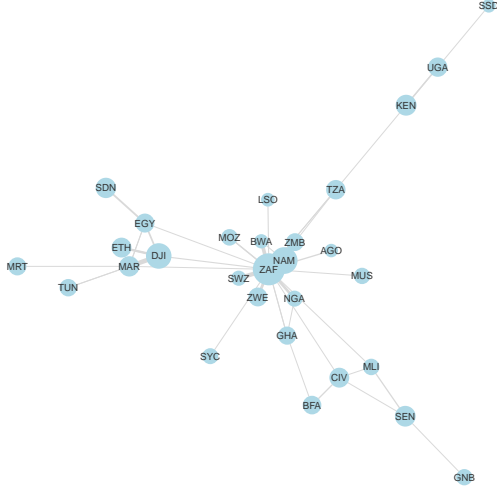
(F) Services (incl. Utilities)



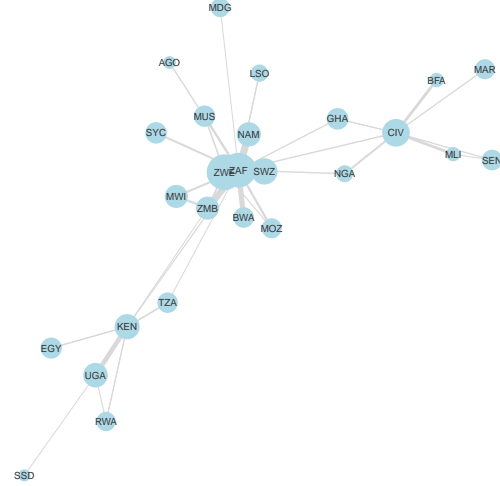
Notes: Figure visualizes countries' RVC exports within key RVC sectors, based on EMERGING 2015-19 MRIO tables.

Figure 18: African RVCs in Key Sectors: 2015-19 Average - Network Graphs

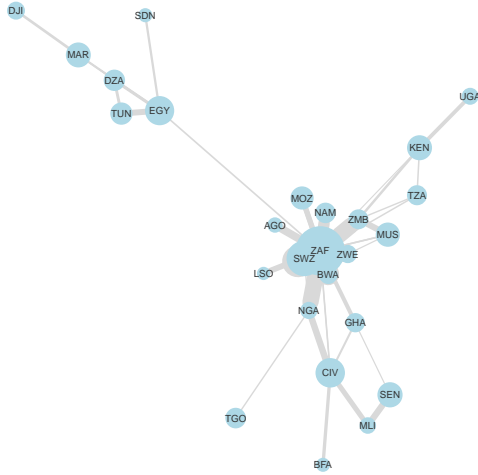
(A) Agriculture, Forestry & Fishing



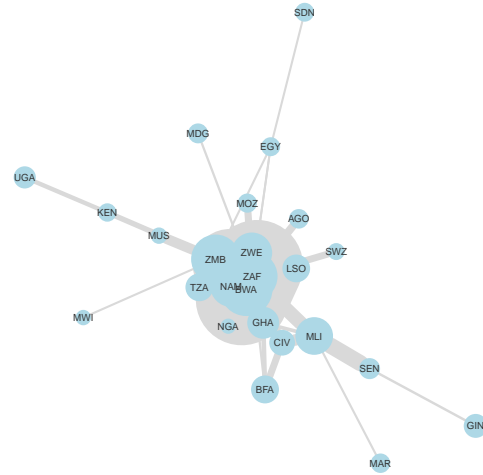
(B) Processed Foods & Beverages



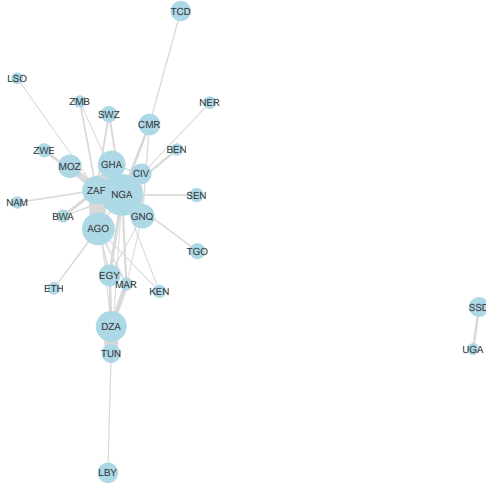
(C) Petrochemicals



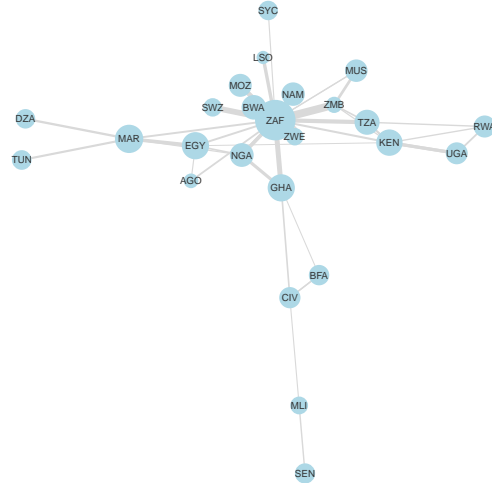
(D) Precious Stones and Metals



(E) Mining (Petroleum)



(F) Services (incl. Utilities)



Notes: Figure visualizes countries' bilateral RVC exports within key RVC sectors, based on EMERGING 2015-19 MRIO tables, using force-directed networks of the top 50 largest bilateral flows (Fruchterman-Reingold layout algorithm).

2.2 GVC Positioning

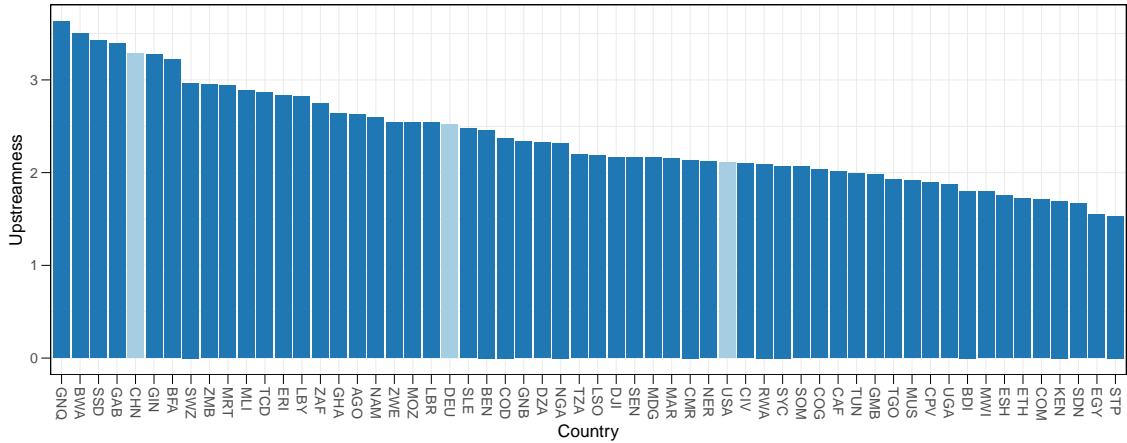
Following [Antràs et al. \(2012\)](#); [Antràs & Chor \(2022\)](#), a common measure of upstreamness $U_{oi} \in \mathbf{u}$ is obtained by iterating forward the IO model in Eq. 1, multiplying terms by the number of production stages needed to obtain them, and normalizing by gross output. In matrix notation:

$$\mathbf{u}\mathbf{x} = \mathbf{d} + 2\mathbf{A}\mathbf{d} + 3\mathbf{A}\mathbf{A}\mathbf{d} + 4\mathbf{A}\mathbf{A}\mathbf{A}\mathbf{d} + \dots = (\mathbf{I} - \mathbf{A})^{-2}\mathbf{d}. \quad (9)$$

The index is, by definition, greater than 1, and [Antràs et al. \(2012\)](#) state that it can be interpreted as the dollar amount by which the output of all country-sectors combined increases following a one-dollar increase in the VA of sector i in country o . Intuitively, it measures the distance of the production stage performed by sector i in country o to the finally demanded product (\mathbf{d}).⁴ [Antràs et al. \(2012\)](#) further find that U is positively correlated with physical capital intensity and negatively correlated with skill intensity across US industries, and negatively correlated with rule of law, private credit to GDP, and education across a sample of OECD countries.

Figure 19 shows aggregate upstreamness by country, where sector-level U_{oi} estimates were averaged using gross export weights. Countries with a highly concentrated export mix in sectors such as mining or PSM that receive a lot of downstream processing, such as Equatorial Guinea, Botswana, South Sudan, and Gabon, are relatively upstream. At the lower end of the spectrum, Kenya, Egypt, and Sao Tome mainly export travel services and FBE, which are close to final demand. GVC positioning does not necessarily imply anything about the state of development or economic diversification, but typically countries with service-led economies are more downstream. China, for example, is relatively upstream because it heavily exports electrical machinery, which is a GVC-intensive sector with long GVCs. The top US exports, on the other hand, are financial and business services, which place it much more downstream.

Figure 19: UPSTREAMNESS INDEX FOR AFRICAN COUNTRIES

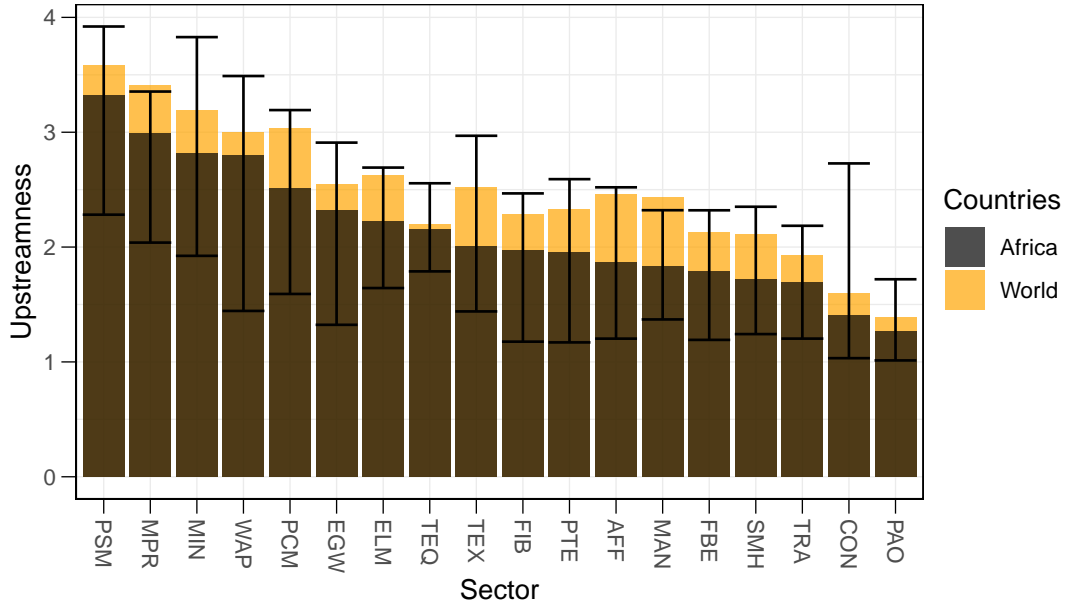


Notes: Figure shows upstreamness index following [Antràs et al. \(2012\)](#), computed at the sector level and averaged across sectors using sectoral gross exports as weights. Based on EMERGING MRIO tables averaged 2015-2019.

Figure 20 provides an export-weighted average (across countries) of sectoral upstreamness, including weighted 5th and 95th percentile bounds. In all sectors, average world upstreamness is greater, indicating that African products are part of shorter GVCs. The PSM sector is most upstream, together with MPR, MIN, WAP, and PCM. At nearly 3.5x the VA generated in downstream production stages, African countries have significant opportunities to increase local value addition by further processing precious stones and other mining products (e.g., petroleum). At the other end of the spectrum, FBE is the most downstream manufacturing sector at an upstreamness of around 1.8. Thus, to increase domestic VA, African countries should produce and export more foods and beverages and deepen local PSM, MIN, and, to a lesser extent, PCM processing.

⁴ An equivalent measure of downstreamness (\mathbf{d}) can be computed measuring the distance to VA instead of FD ([Antràs & Chor, 2022](#); [Miller & Temurshoev, 2017](#); [Mancini et al., 2024](#)), but, for the sake of brevity, this is omitted. The simplest way of computing this index is as $\mathbf{d} = \mathbf{1}'\mathbf{B}$, i.e., it is the column-sum of the Leontief inverse matrix ([Miller & Temurshoev, 2017](#); [Antràs & Chor, 2022](#)). It can be interpreted as the total increase in gross output in the world economy that a unit increase in FD in the respective country-sector would generate. At the world level, \mathbf{u} and \mathbf{d} are identical and measure the length of GVCs ([Mancini et al., 2024](#)).

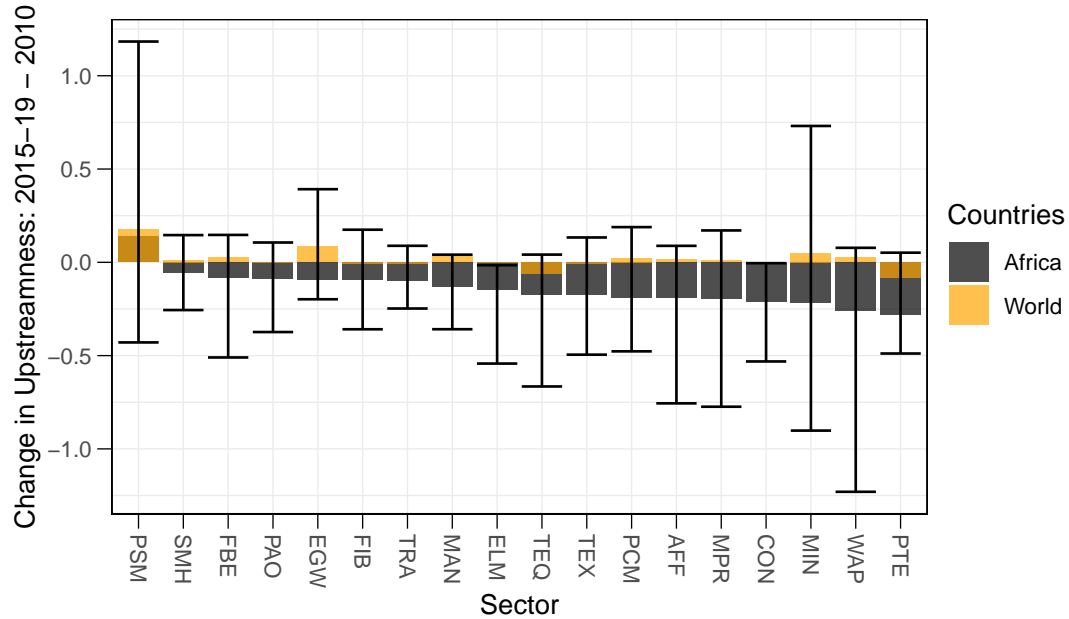
Figure 20: UPSTREAMNESS INDEX BY SECTOR



Notes: Figure shows upstreamness index following [Antràs et al. \(2012\)](#), averaged across countries using sectoral gross exports as weights, including weighted 5th and 95th percentiles. Based on EMERGING MRIO tables averaged 2015-2019.

Has there already been any progress in this direction? Figure 21 shows the difference between the 2010 EMERGING estimate and the 2015-19 median estimate, computed at the country level and then averaged across countries using 2015-19 median exports as weights. It is fascinating to see from Figure 21 that all sectors in Africa apart from PSM have moved downstream on average. This stands in contrast to a global trend towards longer manufacturing GVCs. In the world average, all manufacturing sectors apart from TEQ and PTE (telecommunications) have moved upstream, reflecting this increase in the length of chains. For Africa, the trend thus suggests greater local value addition in many sectors, but may also imply a shift toward processing trade in some sectors.

Figure 21: UPSTREAMNESS INDEX BY SECTOR: DIFFERENCE



Notes: Figure shows an export-weighted average of the country-level differences between the 2015-2019 median upstreamness and 2010 upstreamness, computed using EMERGING. Bars give weighted 5th and 95th percentiles.

3 Conclusion

This short paper examines Africa’s global and regional integration through trade, GVCs, and RVCs, supported by the EMERGING MRIO tables and the DOTS and BACI trade databases. It shows that Africa’s share in global merchandise trade is at 5.5-6.5% and fluctuates with Africa’s macroeconomic performance. However, the share of the region’s trade with itself has increased steadily since 1980. Today, African inner-African trade is ~ 5 times smaller than Africa-ROW trade, up from ~ 20 times smaller in 1980. Regional trade intensity differs significantly by country. Particularly countries in SADC are heavily engaged, with South Africa alone accounting for 30% of intra-African trade. Trade within African RECs is 2x larger than trade between RECs.

The largest sectors for intra-African trade are mining (petroleum), petrochemicals (PCM), precious stones and metals (PSM), and processed foods and beverages (FBE). These sectors also drive RVCs, with significant potential for deeper engagement and more local value addition. In particular, countries with advanced processing facilities could process more PSM, mining, and agricultural outputs from countries lacking these facilities. PCM RVCs could also become longer, with deeper processing and more complex products produced across borders. In FBE, an increase in the share of agricultural output being locally processed and efforts to market these products regionally could expand the size and reach of RVCs, which are very localized at this point.

All RECs could engage much more deeply in regional trading and value addition. Establishing competitive cross-REC RVCs will likely require significant transport infrastructure investments. Countries should thus focus on exploiting comparative advantages within their RECs. The sectoral and graphical analysis in this paper provides some suggestions towards this end, such as enhanced agricultural processing in IGAD and the EAC (alongside PCM), more PSM processing, electrical machinery and transport equipment in SADC and central Africa, deeper textile RVCs in western Africa (alongside mining, PCM, and PSM), longer PCM RVCs in the AMU and Egypt, etc.

Africa’s overall position in GVCs has shifted slightly downstream, countering a global trend towards longer GVCs. In most sectors, this implies that more local value is added, a trend that could be accelerated by harnessing processing capabilities in other countries through RVCs.

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Table 6: EMERGING Sectors (2-Digit HS2002) Mapping to Broad Sectors

HS02	EMERGING Sector Definition	BSC	Broad Sector Definition of Huo et al. (2022)
1	Live Animals	AFB	Agriculture, Hunting, Forestry & Fishing
2	Meat and Edible Meat Offal	PBE	Food Production, Beverages & Tobacco
3	Fish, Crustaceans, Molluscs, Aquatic Invertebrates Ne	AFB	Agriculture, Hunting, Forestry & Fishing
4	Dairy Products, Eggs, Honey, Edible Animal Product Ne	FBE	Food Production, Beverages & Tobacco
5	Products of Animal Origin, Nes	AFB	Agriculture, Hunting, Forestry & Fishing
6	Live Trees, Plants, Bulbs, Roots, Cut Flowers Etc	AFB	Agriculture, Hunting, Forestry & Fishing
7	Edible Vegetables and Certain Roots and Tubers	AFB	Agriculture, Hunting, Forestry & Fishing
8	Edible Fruit, Nuts, Peel of Citrus Fruit, Melons	AFB	Agriculture, Hunting, Forestry & Fishing
9	Coffee, Tea, Mate and Spices	PBE	Food Production, Beverages & Tobacco
10	Cereals	AFB	Agriculture, Hunting, Forestry & Fishing
11	Milling Products, Malt, Starches, Inulin, Wheat Glute	FBE	Food Production, Beverages & Tobacco
12	Oil Seed, Oleagic Fruits, Grain, Seed, Fruit, Etc, Ne	AFB	Agriculture, Hunting, Forestry & Fishing
13	Lac, Gums, Resins, Vegetable Saps and Extracts Nes	AFB	Agriculture, Hunting, Forestry & Fishing
14	Vegetable Plaiting Materials, Vegetable Products Nes	FBE	Food Production, Beverages & Tobacco
15	Animal,vegetable Fats and Oils, Cleavage Products, et	FBE	Food Production, Beverages & Tobacco
16	Meat, Fish and Seafood Food Preparations Nes	FBE	Food Production, Beverages & Tobacco
17	Sugars and Sugar Confectionery	FBE	Food Production, Beverages & Tobacco
18	Cocoa and Cocoa Preparations	FBE	Food Production, Beverages & Tobacco
19	Cereal, Flour, Starch, Milk Preparations and Products	FBE	Food Production, Beverages & Tobacco
20	Vegetable, Fruit, Nut, Etc Food Preparations	FBE	Food Production, Beverages & Tobacco
21	Miscellaneous Edible Preparations	FBE	Food Production, Beverages & Tobacco
22	Beverages, Spirits and Vinegar	FBE	Food Production, Beverages & Tobacco
23	Residues, Wastes of Food Industry, Animal Fodder	FBE	Food Production, Beverages & Tobacco
24	Tobacco and Manufactured Tobacco Substitutes	FBE	Food Production, Beverages & Tobacco
25	Salt, Sulphur, Earth, Stone, Plaster, Lime and Cement	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
26	Ores, Slag and Ash	PSM	Precious Stones & Base Metals Incl. Compounds
27	Mineral Fuels, Oils, Distillation Products, Etc	MIN	Mining & Quarrying
28	Inorganic Chemicals, Precious Metal Compound, Isotope	PSM	Precious Stones & Base Metals Incl. Compounds
29	Organic Chemicals	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
30	Pharmaceutical Products	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
31	Fertilizers	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
32	Tanning, Dyeing Extracts, Tannins, Derivs,pigments et	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
33	Essential Oils, Perfumes, Cosmetics, Toiletries	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
34	Soaps, Lubricants, Waxes, Candles, Modelling Pastes	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
35	Albuminoids, Modified Starches, Glues, Enzymes	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
36	Explosives, Pyrotechnics, Matches, Pyrophorics, Etc	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
37	Photographic or Cinematographic Goods	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
38	Miscellaneous Chemical Products	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
39	Plastics and Articles Thereof	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
40	Rubber and Articles Thereof	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
41	Raw Hides and Skins (Other than Furskins) and Leather	TEX	Textiles, Leather & Wearing Apparel
42	Articles of Leather, Animal Gut, Harness, Travel Good	TEX	Textiles, Leather & Wearing Apparel
43	Furskins and Artificial Fur, Manufactures Thereof	TEX	Textiles, Leather & Wearing Apparel
44	Wood and Articles of Wood, Wood Charcoal	WAP	Wood, Paper & Publishing
45	Cork and Articles of Cork	WAP	Wood, Paper & Publishing
46	Manufactures of Plaiting Material, Basketwork, Etc.	WAP	Wood, Paper & Publishing
47	Pulp of Wood, Fibrous Cellulosic Material, Waste Etc	WAP	Wood, Paper & Publishing
48	Paper & Paperboard, Articles of Pulp, Paper and Board	WAP	Wood, Paper & Publishing
49	Printed Books, Newspapers, Pictures Etc	WAP	Wood, Paper & Publishing
50	Silk	TEX	Textiles, Leather & Wearing Apparel
51	Wool, Animal Hair, Horsehair Yarn and Fabric Thereof	TEX	Textiles, Leather & Wearing Apparel
52	Cotton	TEX	Textiles, Leather & Wearing Apparel
53	Vegetable Textile Fibres Nes, Paper Yarn, Woven Fabri	TEX	Textiles, Leather & Wearing Apparel
54	Manmade Filaments	TEX	Textiles, Leather & Wearing Apparel
55	Manmade Staple Fibres	TEX	Textiles, Leather & Wearing Apparel
56	Wadding, Felt, Nonwovens, Yarns, Twine, Cordage, Etc	TEX	Textiles, Leather & Wearing Apparel
57	Carpets and Other Textile Floor Coverings	TEX	Textiles, Leather & Wearing Apparel
58	Special Woven or Tufted Fabric, Lace, Tapestry Etc	TEX	Textiles, Leather & Wearing Apparel
59	Impregnated, Coated or Laminated Textile Fabric	TEX	Textiles, Leather & Wearing Apparel
60	Knitted or Crocheted Fabric	TEX	Textiles, Leather & Wearing Apparel
61	Articles of Apparel, Accessories, Knit or Crochet	TEX	Textiles, Leather & Wearing Apparel
62	Articles of Apparel, Accessories, not Knit or Crochet	TEX	Textiles, Leather & Wearing Apparel
63	Other Made Textile Articles, Sets, Worn Clothing Etc	TEX	Textiles, Leather & Wearing Apparel
64	Footwear, Gaiters and the Like, Parts Thereof	TEX	Textiles, Leather & Wearing Apparel
65	Headgear and Parts Thereof	TEX	Textiles, Leather & Wearing Apparel
66	Umbrellas, Walking-Sticks, Seat-Sticks, Whips, Etc	TEX	Textiles, Leather & Wearing Apparel
67	Bird Skin, Feathers, Artificial Flowers, Human Hair	TEX	Textiles, Leather & Wearing Apparel
68	Stone, Plaster, Cement, Asbestos, Mica, Etc Articles	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
69	Ceramic Products Undata	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
70	Glass and Glassware	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
71	Pearls, Precious Stones, Metals, Coins, Etc	PSM	Precious Stones & Base Metals Incl. Compounds
72	Iron and Steel	MPR	Metal & Metal Products
73	Articles of Iron or Steel	MPR	Metal & Metal Products
74	Copper and Articles Thereof	PSM	Precious Stones & Base Metals Incl. Compounds
75	Nickel and Articles Thereof	PSM	Precious Stones & Base Metals Incl. Compounds
76	Aluminium and Articles Thereof	MPR	Metal & Metal Products
77	Lead and Articles Thereof	PSM	Precious Stones & Base Metals Incl. Compounds
78	Zinc and Articles Thereof	PSM	Precious Stones & Base Metals Incl. Compounds
79	Tin and Articles Thereof	MPR	Metal & Metal Products
80	Other Base Metals, Cermets, Articles Thereof	PSM	Precious Stones & Base Metals Incl. Compounds
81	Tools, Implements, Cutlery, Etc of Base Metal	MPR	Metal & Metal Products
82	Miscellaneous Articles of Base Metal	MPR	Metal & Metal Products
83	Nuclear Reactors, Boilers, Machinery, Etc	ELM	Electrical & Machinery
84	Electrical, Electronic Equipment	ELM	Electrical & Machinery
85	Railway, Tramway Locomotives, Rolling Stock, Equipmen	TEQ	Transport Equipment
86	Vehicles Other than Railway, Tramway	TEQ	Transport Equipment
87	Aircraft, Spacecraft, and Parts Thereof	TEQ	Transport Equipment
88	Ships, Boats and Other Floating Structures	TEQ	Transport Equipment
89	Optical, Photo, Technical, Medical, Etc Apparatus	ELM	Electrical & Machinery
90	Clocks and Watches and Parts Thereof	ELM	Electrical & Machinery
91	Musical Instruments, Parts and Accessories	ELM	Electrical & Machinery
92	Arms and Ammunition, Parts and Accessories Thereof	ELM	Electrical & Machinery
93	Furniture, Lighting, Signs, Prefabricated Buildings	MAN	Manufacturing & Recycling
94	Toys, Games, Sports Requisites	MAN	Manufacturing & Recycling
95	Miscellaneous Manufactured Articles	MAN	Manufacturing & Recycling
96	Works of Art, Collectors Pieces and Antiques	MAN	Manufacturing & Recycling
97	Commodities not Specified According to Kind	MAN	Manufacturing & Recycling
98	Electricity	EGW	Electricity, Gas & Water
99	Gas Manufacture, Distribution	EGW	Electricity, Gas & Water
100	Water Collection, Purification, and Distribution	EGW	Electricity, Gas & Water
101	Coal	MIN	Mining & Quarrying
102	Oil	MIN	Mining & Quarrying
103	Gas	MIN	Mining & Quarrying
104	Petroleum, Coal Products	PCM	Petroleum, Chemicals & Non-Metallic Mineral Products
105	Manufacturing Services on Physical Inputs Owned by Others	SMH	Sale, Maintenance & Repair of Vehicles; Fuel; Trade; Hotels & Restaurants
106	Maintenance and Repair Services N.i.e.	SMH	Sale, Maintenance & Repair of Vehicles; Fuel; Trade; Hotels & Restaurants
107	Sea Transport	TRA	Transport
108	Air Transport	TRA	Transport
109	Other Modes of Transport	TRA	Transport
110	Postal and Courier Services	PTE	Post & Telecommunications
111	Goods (Travel)	TRA	Transport
112	Local Transport Services	TRA	Transport
113	Accommodation Services	SMH	Sale, Maintenance & Repair of Vehicles; Fuel; Trade; Hotels & Restaurants
114	Food-Serving Services	SMH	Sale, Maintenance & Repair of Vehicles; Fuel; Trade; Hotels & Restaurants
115	Construction	CON	Construction
116	Direct Insurance	FIB	Financial Intermediation & Business Activity
117	Pension and Standardized Guaranteed Services	FIB	Financial Intermediation & Business Activity
118	Financial Services	FIB	Financial Intermediation & Business Activity
119	Real Estate	FIB	Financial Intermediation & Business Activity
120	Charges for the Use of Intellectual Property N.i.e.	FIB	Financial Intermediation & Business Activity
121	Telecommunications Services	PTE	Post & Telecommunications
122	Computer Services	PTE	Post & Telecommunications
123	Information Services	PTE	Post & Telecommunications
124	Research and Development Services	FIB	Financial Intermediation & Business Activity
125	Professional and Management Consulting Services	FIB	Financial Intermediation & Business Activity
126	Engineering	FIB	Financial Intermediation & Business Activity
127	Waste Treatment and De-Pollution Agricultural and Mining Services	PAO	Public Administration; Education; Health; Recreation; Other Services
128	Operating Leasing Services	FIB	Financial Intermediation & Business Activity
129	Other Business Services N.i.e.	FIB	Financial Intermediation & Business Activity
130	Audiovisual and Related Services	PAO	Public Administration; Education; Health; Recreation; Other Services
131	Health Services	PAO	Public Administration; Education; Health; Recreation; Other Services
132	Education Services	PAO	Public Administration; Education; Health; Recreation; Other Services
133	Recreation & Other Services	PAO	Public Administration; Education; Health; Recreation; Other Services
134	Government Goods and Services N.i.e.	PAO	Public Administration; Education; Health; Recreation; Other Services