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Determinants of Trade in Value-added in Africa: Implications for AfCFTA

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Abstract

Recent literature has stressed that it is not so much how much a country trades that matters, but rather both the degree of value-addition locally and the extent to which an economy is integrated into regional or global value chains. Yet, with a few exceptions (e.g. [de Melo and Twum, 2021](#), [Allard et. al. 2016](#)), Africa is relatively under-researched in this field. While over recent decades the continent has experienced substantial increases in the ratios of exports and imports to GDP and forged new partnerships with emerging markets, its degree of integration in regional and global value chains remains low, even after accounting for the generally lower levels of development (Allard et al., 2016). For instance, according to one study (de Melo and Twum, 2021), between 0.5% and 3% of trade from Africa's regional economic blocks is integrated in regional value chains, far lower than 17.2% and 4.6% observed in the Association of Southeast Asian Nations (ASEAN) and the Southern Common Market (MERCOSUR), respectively. This gap is indicative of the region's unexploited potential to tap into value chains in selected sectors like manufacturing, agriculture and agro-processing, tourism, transport and textiles.

This paper examines the policy and non-policy determinants of domestic value-added embedded in the exports of African countries, applying country fixed-effects regression to UNCTAD-EORA data covering the period 1990-2018. The paper finds that the main determinants of domestic value-addition are economic size (GDP and its per capita counterpart), the average level of tariffs and population size. But the econometric results also highlight differences among countries by resource endowment, with oil-exporting countries leading and land-locked non-resource-intensive countries lagging in domestic value addition. After providing an overview of the extent of value-addition in trade on the continent, the paper then draws conclusions about its implications for the effective implementation of the AfCFTA.

Keywords: Domestic value added, value-added in exports, global value chains, Africa.

JEL Classifications: F13, F14, F15, N17, N77

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1. Introduction

External sector performance – reflected in the share of exports and imports in GDP – is one of the main measures of a country’s growth and structural transformation (Ahmed et al., 2011; Gabriele et al., 2006; Ram, 1985). Recent literature has however stressed that it is not so much how much a country trades that matters, but rather both the degree of value-addition locally and the extent to which an economy is integrated into regional and/or global value chains (Johnson, 2014; Johnson and Noguera, 2012; Njike, 2021). Aggregate figures for exports and imports are further understood to be compromised by ‘double counting’, a problem partly accountable for the declining trend of the value-added to gross exports ratio.²

The concept of trade in value-added – as opposed to gross exports and imports – is increasingly gaining popularity in international trade discourse, as one of the key measures of a country’s engagement in global value chains (GVC). Existing studies have highlighted the salience of value addition in trade and participation in value chains as an option for developing countries – including Africa – to reduce their reliance on the export of primary products (Dollar et al., 2019). Moreover, in principle, greater participation in global production networks could stimulate faster export growth and the domestic generation of export-induced growth (Durongkaveroj, 2021).

Several studies have been undertaken to unpack the extent of GVC involvement at the country and sector/industry level. Two strands in the literature emerge from the existing body of studies on global value chain participation and trade in value-added. The first strand entails the elaboration of methodological approaches to measuring value-added trade and/or GVC engagement (Belotti et al., 2020; Timmer et al., 2015). This literature further examines the patterns and trends of GVC

² ² On the problems of trade data, see [Ortiz-Ospina and Beltekian \(2018\)](#), [OECD/WTO \(2012\)](#). Double-counting is a particularly serious problem and may result in an overvaluing of trade by around 25 percent. The treatment of re-exports is also a challenge. See [Koopman et. al. \(2012\)](#). On the challenges specifically of intra-African trade statistics, see Yeats (1990), [Jerven \(2014\)](#).

involvement and trade in value-added, often with a regional perspective (Biesebroeck and Mensah, 2019; Alard et al., 2016). A number of observations emerge from the literature – some of which are Firstly, according to a study by Van Biesebroeck and Mensah (2019) which compares sourcing patterns in Africa between MNEs and small domestic firms, multinational enterprises (MNEs) rely heavily on domestic sourcing, while the domestic firms import less of their intermediate inputs. . Another stylized fact emerging from the literature is the positive correlation or complementarity between foreign and domestic value added in exports, for example in Latin America (Assamoi et al., 2019) and South-east Asia (Lopez, 2016), implying a common set of factors that drive both domestic and foreign value addition in its exports. Thirdly, the domestic value addition of a country tends to decline over time with increasing levels of development, indicative of a greater engagement of high-skilled foreign firms in value-addition activities in the upper streams of global value chains (Carballo and Jiang, 2016). Finally, after the 1990s, the increasing liberalisation and globalization of the world economy resulted in a reduction not only the trade cost but also the increasing substitution of domestic with foreign suppliers, leading to declining value added at the national level (Johnson and Noguera, 2014).³

The second strand in the literature empirically estimates the determinants of trade in value-added and GVC engagement at the country and/or sector levels. These determinants are broadly categorized into structural factors on the one hand and policy and institutional factors on the other. The structural factors found to augment domestic value addition include GDP per capita (Alard et al., 2016); the degree of capital intensity in the production process (Kee and Tang, 2016; Yu and Luo, 2018); foreign ownership, where a greater presence of MNEs translates into higher domestic value-added embedded in exports (Fernandes et al., 2020); labour intensity, where sectors with higher skills are associated with higher value added (Aggarwal et al., 2021; Barrientos et al., 2011). Whereas FDI

³ Nonetheless, this general trend is subject to variations across space and time: Domestic value-added in Chinese exports, for example, increased from 65% to 70% between 2000-2007 (Kee and Tang, 2016).

inflow has been cited as a potential enabler of domestic value addition, especially by increasing the variety of domestically available inputs (Kee and Tang, 2016), the enabling effect varies by sector/subsector, with the FDI impact on value addition found to be stronger in sectors with higher levels of skills, as is the case with India's manufacturing sector (Aggarwal et al., 2021). The share of manufactured exports in total exports is found to be significantly negatively correlated with value-added in gross exports ratio, partly because of the relatively high foreign content in the manufacturing sector (Johnson, 2014).

Policy and institutional factors that enhance domestic value addition in a country's exports include rule of law (Assamoi et al., 2019), insinuating that 'good' institutions stimulate the domestic production of intermediates (Daniel, 2014). The average level of tariffs, on the other hand, has been documented to be a hinderance to domestic value addition. This is partly attributed to the restrictive effects of tariffs with regards to access to essential productive inputs and technologies (Cadot and Gourdon, 2016; Halpern et al., 2015; Kee and Tang, 2016). This claim is verified in the descriptive analysis section of this paper (Figure 12).

A critical gap in the literature is the disproportionate focus on developed countries and a reduced number of developing countries, with less attention given to Africa, a gap compounded by the limited representation of the continent in GVC databases. While African economies have become more open over time and developed new trading partnerships, especially with the emerging markets, the continent's degree of integration in regional and global value chains remains very low (Alard et al., 2016). The continent's average *centrality*⁴ level is just half that of other emerging and developing countries, even after controlling for , after controlling for size, level of development, cultural ties, and geographical conditions. (Alard et al., 2016). Indeed, according to one study (de Mello and Twun,

⁴ Alard et al. (2016) explain centrality to be a multi-dementional measure of a country's network connectivity in global trade. The measure incorporates the size of exports, number of trade partners and relative weight of trade partners in global trade.

2021), only between 0.5% and 3% of all trade from Africa regional economic communities is integrated in regional value chains, far lower than 17.2% and 4.6% observed in ASEAN and MERCOSUR, respectively). With this gap, the region clearly has unexploited potential to tap into value chains in selected sectors like manufacturing, agriculture and agro-processing, tourism, transport and textiles (Alard et al., 2016). Indeed, greater involvement in value chains could increase the potential benefits accruing to Africa countries from trading under the African Continental Free Trade Area (AfCFTA) (de Mello and Twun, 2021).

This paper examines the policy and non-policy determinants of domestic value-added embedded in the exports of African countries, applying country fixed-effects regression to UNCTAD-EORA data covering the period 1990-2018. After providing an overview of the extent of value-addition embedded in exports and empirically estimating its determinants, the paper draws conclusions and highlights implications for the effective implementation of the AfCFTA. The rest of the paper is organized as follows: Section 2 describes the datasets from which the key variables are constructed and provides a basic descriptive analysis of the main variables of interest. The methodology/empirical strategy used in estimating the determinants of value-added in exports is elaborated in Section 3 while econometric results are presented and discussed in Section 4. Finally, Section 5 concludes the paper and highlights implications of the findings for the implementation of the AfCFTA.

2. Data and summary statistics

This study uses a combination of datasets from different sources. The dependent variables on value added are obtained from UNCTAD-EORA database. Covariates include macroeconomic indicators from the World Bank's World Development Indicators (WDI) and IMF databases, labor productivity indicators from ILOSTAT productivity database and governance indicators from the World Governance Indicators (WGI) of the World Bank.

Value added data used in this study are drawn from the UNCTAD-EORA database containing multi-regional input-output (MRIO) tables (Lenzen et al. 2013). Alternative databases that could be used as sources of value-added variables include the World Input-Output Database – WIOD (Timmer et al. 2015) and OECD Trade in Value-added (TiVA) database (OECD, 2018). However, the limited geographical scope covered by these databases, critically excluding developing countries in general and Africa in particular (Casella et al., 2019) make it less ideal for analysis contextualized to this region. With a coverage of 189 countries and “Rest of the world”, the UNCTAD-EORA database provides a good source of value-added data for Africa. An additional advantage relative to other databases is that by nowcasting data for 2016-2018, the database addresses the time lag of two to three years between the latest data and the time of analysis, a weakness in the WIOD, TiVA and previous version of the UNCTAD-EORA databases (Casella et al., 2019).

The database provides actual data for the period 1990-2017 and projected data for 2018. The UNCTAD-EORA database provides three main GVC indicators: foreign value added embedded in a country’s exports (FVA), domestic value added embedded in a country’s exports (DVA), and indirect value-added or domestic value added embedded in other countries’ exports (DVX). As illustrated in Koopman et al. (2014), the overall GVC participation of a country can be easily computed from a combination of the three main GVC indicators, which is also provided alongside the three main value-added indicators in the UNCTAD-EORA database. This thus enables the analysis of not only value-addition by domestic firms and multinational enterprises (MNEs) but also the overall extent of participation of countries in global value chains. Although this paper focuses on domestic value added in a country’s exports, the other indicators are also analysed to enrich the narrative around trade in value-added.

Labor productivity indicators are obtained from the [ILOSTAT labour productivity database](#) updated February 2022. The database provides alternative measures of labour productivity which include output per worker expressed in international 2017 dollars and measured in purchasing power parity

(PPP); output per worker measured in constant 2010 dollars; and growth rate (percent) of output per worker in international PPP dollars.

Macroeconomic and trade indicators are obtained from the WDI database of the World Bank and IMF databases. These are used to control for inter-country differences in economic size, macroeconomic and trade performance as well as policy contexts that could influence domestic value addition. These include: Gross Domestic Product in constant (2015) US Dollars⁵; ratio (percentage) of foreign direct investment net inflow to GDP; the simple average of tariffs (percent) applied to all products; and the relative shares (percent) of both exports and imports in GDP. The share of manufactured exports in total exports is obtained from the TCdata360, an initiative of the World Bank Group's Macroeconomics, Trade & Investment Global Practice.⁶ The ratio of investment to GDP obtained from the IMF database for use as an indicator of the general level of in a country.

Rule of law is obtained from the Worldwide Governance Indicators (WGI).⁷

⁵ In some regressions, this is interchanged with GDP per capita in constant (2015) USD

⁶ <https://tcdata360.worldbank.org/>

⁷ <http://info.worldbank.org/governance/wgi/>

3. Empirical strategy

We estimate (separately) the determinants of value-added and overall value chain participation using simple econometric panel data models:

$$\log VALUE_ADDED_{it} = \alpha + \beta X_{it} + c_i + \varepsilon_{it} \quad (1)$$

Where $\log VALUE_ADDED$ represents log-transformed values of each of the main outcome variables estimated separately: DVA, FVA and GVC. All factors deemed to influence value addition and GVC participation are captured by the variable vector X . These include, among others, Gross Domestic Product (GDP) in constant US Dollars; Foreign Direct Investment (FDI) net inflow expressed as a percentage of GDP; gross fixed capital formation expressed as a percentage of GDP⁸; the share (percentage) of exports and imports in GDP; share of manufactured goods in total exports; simple average of tariffs applied to all products; rule of law (as a proxy for quality of institutions); and labour productivity. Across all estimation specifications, all covariates in the X vector are log-transformed except for rule of law which is an index with a mixed range of negative and positive values.

The subscripts i and t respectively represent the country of origin and time period (year). The time-invariant country fixed effects that could influence value addition in exports and GVC participation are represented by c_i . Random stochastic fluctuations to the outcome variables are captured by the error term, ε . Exploiting the panel nature of the dataset, Equation (1) is estimated using the fixed effects technique, to control for the potential confounding effect of time-invariant country heterogeneity and hence disassociate the partial causal effect of each respective covariate.

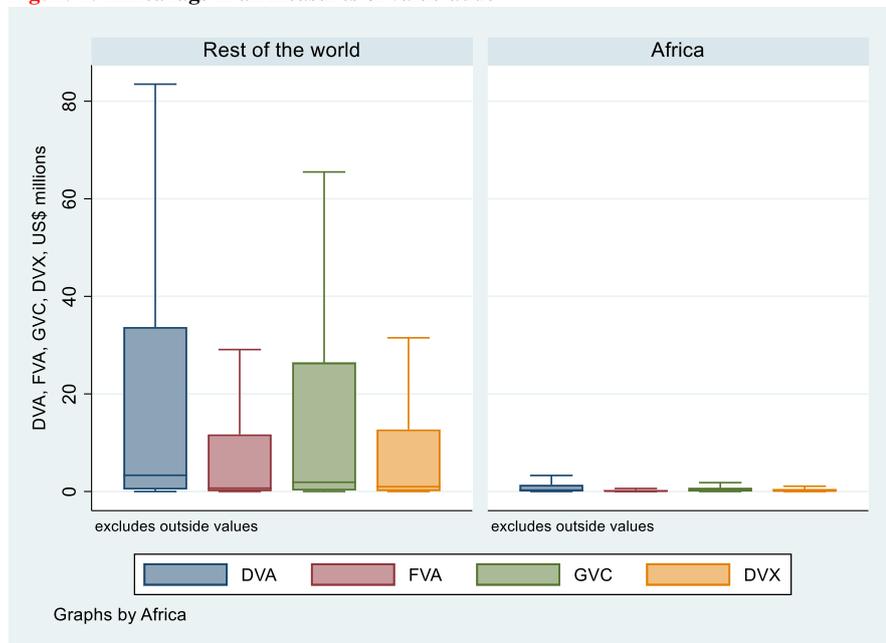
⁸ This is entered in the regression interchangeably with the ratio of total investment to GDP

4. Results

4.1. Descriptive analysis

Average domestic value added remains much smaller in Africa relative to the rest of the world (Figure 1). This is in line with the consensus in previous literature that domestic value addition and overall involvement in global value chains is much lower in Africa relative to other regions (Alard et al., 2016; de Mello and Twun, 2021).

Figure 1: Africa lags in all measures of value-added

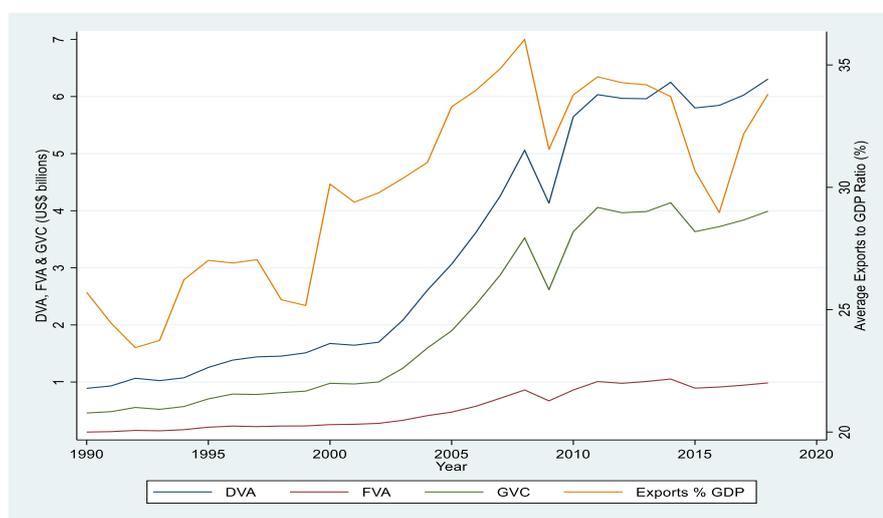


Source: Authors' illustration based on UNCTAD-EORA GVC database

Figure 2 presents the trend of three common indicators of value-added and participation in global value chains averaged for Sub-Saharan African countries for the period 1990-2018. During this period, the ratios of exports and imports increased substantially albeit having volatile trends. For DVA and GVC, the increase over the same period was modest, with the highest growth exhibited during the period prior to the global financial crisis (particularly 2000-2008). Although export to GDP ratios generally

increased faster than the value-added and GVC indicators over most of the years, an interesting pattern is emerging where GVC participation, domestic and foreign value addition in exports are increasing consistently over period 2015-2018. This is perhaps indicative of the increasing importance of value addition and participation of African countries in regional and global value chains in recent years – albeit low initial levels – with potential for greater value chain involvement under the AfCFTA.

Figure 2: Average trend of DVA, FVA, GVC and Exports Share of GDP: 1990-2018



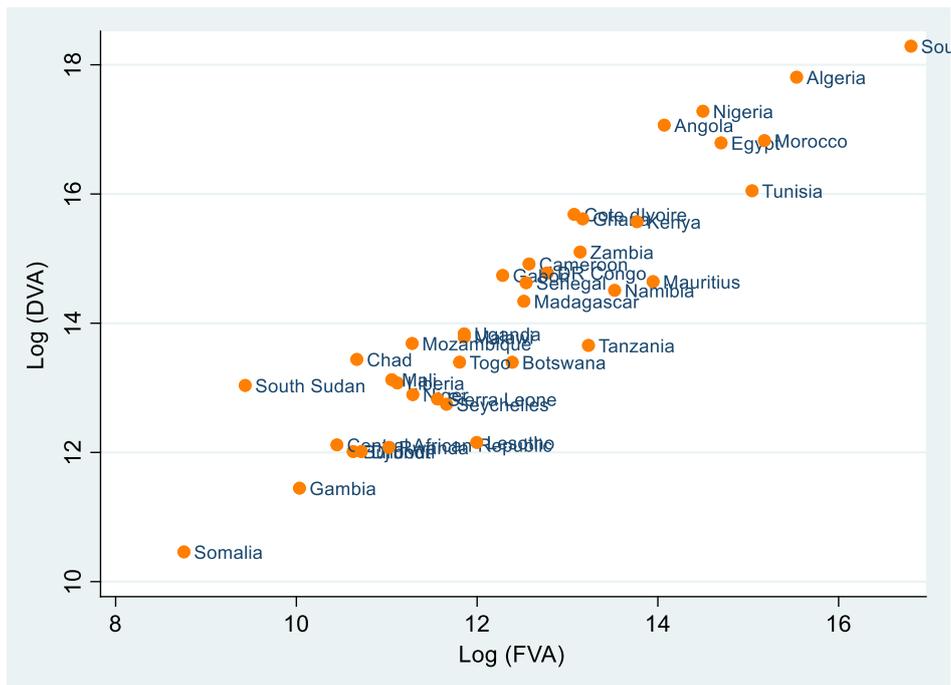
Source: Authors' illustration based on UNCTAD-EORA GVC database

Relationship between DVA and FVA – absolute values

The positive association between DVA and FVA in absolute terms (Figure 3) suggests that countries with higher domestic value addition are also those with higher foreign value addition. In other words, the country-specific conditions that enhance value addition have a relatively similar enabling effect for both domestic and foreign value-added components in a country's exports. Both DVA and FVA are lowest in Somalia and Gambia and highest in South Africa, reflecting how relevant the level of development is in shaping value addition. This pattern corroborates the complementarity between

domestic and foreign value-added as observed in Latin America (Assamoi et al., 2019) and South-east Asia (Lopez, 2016)

Figure 3: Positive correlation between DVA and FVA: Africa, 2017



Source: Authors' illustration based on UNCTAD-EORA GVC database

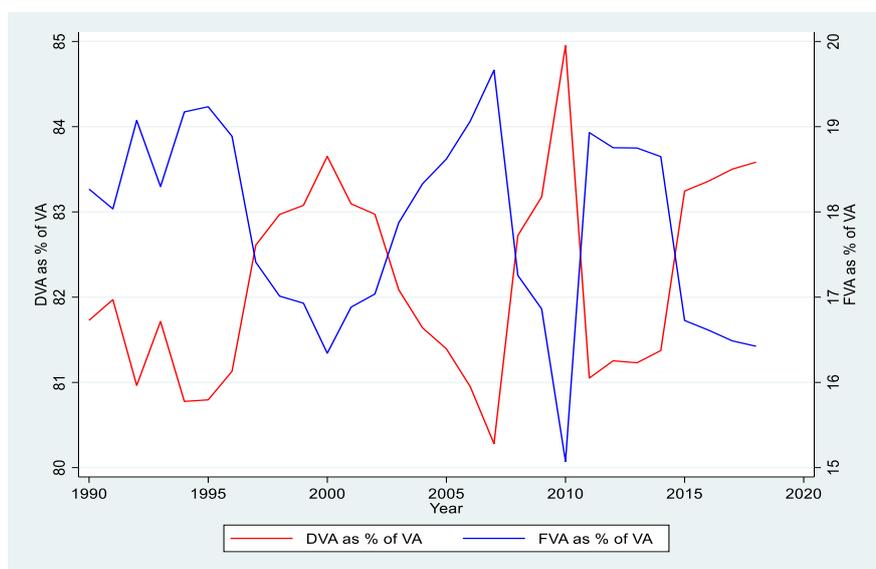
Relative contributions of DVA and FVA to total value-added

The negative correlation between the relative *shares* of domestic and foreign value-added in total value added presented in Assamoi et al. (2019) is exhibited in this study (Figure 4). This pattern reveals a clear substitution effect between the two components of total value-added. The relative shares exhibit no consistent trend and fluctuate considerably across six period. In the latter period (2015-2018), DVA continues to exhibit a positive trend at the expense of FVA, perhaps suggesting increasing domestic

Commented [AM1]: Surely this is a statistical artifact? If DVA+FVA=100%, then the higher one, the lower the other?
 True. Should we drop this entire subsection? Please advise.

content of African exports over this period of latest data availability.⁹ Overall, across the entire 1990-2018 period, DVA shares are relatively high and fluctuated between 80-85% while FVA shares oscillated between the 15-20% range.

Figure 4: Relative shares of DVA and FVA in total value-added: SSA average, 1990-2018



Source: Authors' illustration based on UNCTAD-EORA GVC database

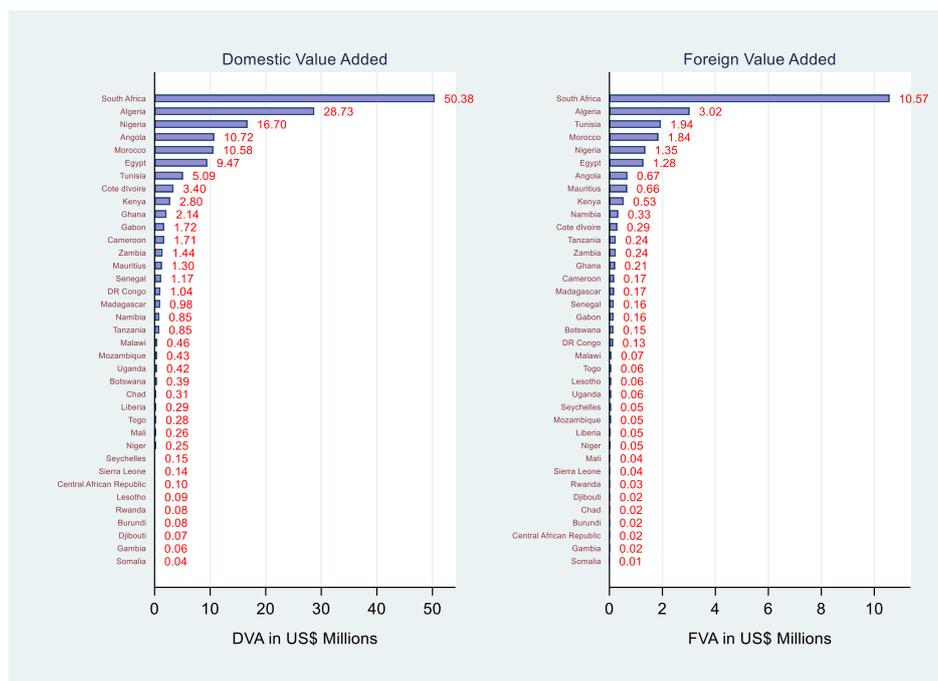
DVA comparisons across African countries

African countries are quite diverse in their absolute values of domestic value-added, with South Africa, Algeria, Nigeria, Angola and Morocco having the highest levels (Figure 4). The countries with the smallest DVA are Somalia, Gambia, Djibouti, Burundi and Rwanda. Diversity is further observed in DVA growth over the 1990-2018 period, with growth ranging from 1.1% in Tanzania to 13.7 in Seychelles and Angola (Figure 5). South Africa, which has the highest DVA in absolute terms, has a

⁹ The high fluctuation and volatility of the DVA and FVA shares however warrant further examination over a longer-term horizon beyond 2018 once data becomes available.

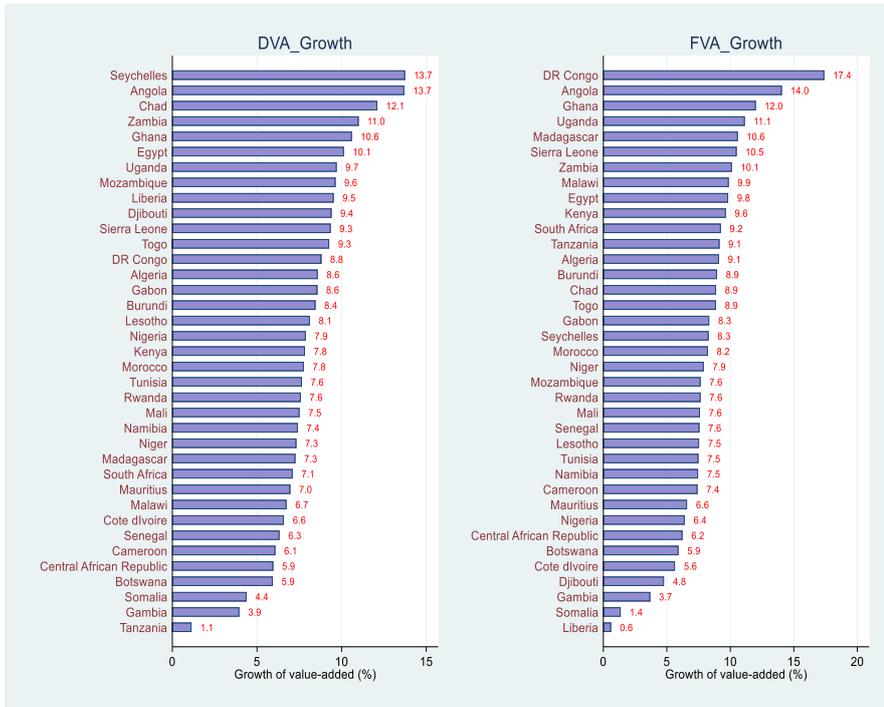
relatively low growth rate, perhaps partly reflecting the country's higher initial position with relatively less room for DVA expansion.

Figure 4: Domestic and foreign value added by country in 2017



Source: Authors' illustration based on UNCTAD-EORA GVC database

Figure 5: Growth of domestic and foreign value added by country: Annual Average, 1990-2018

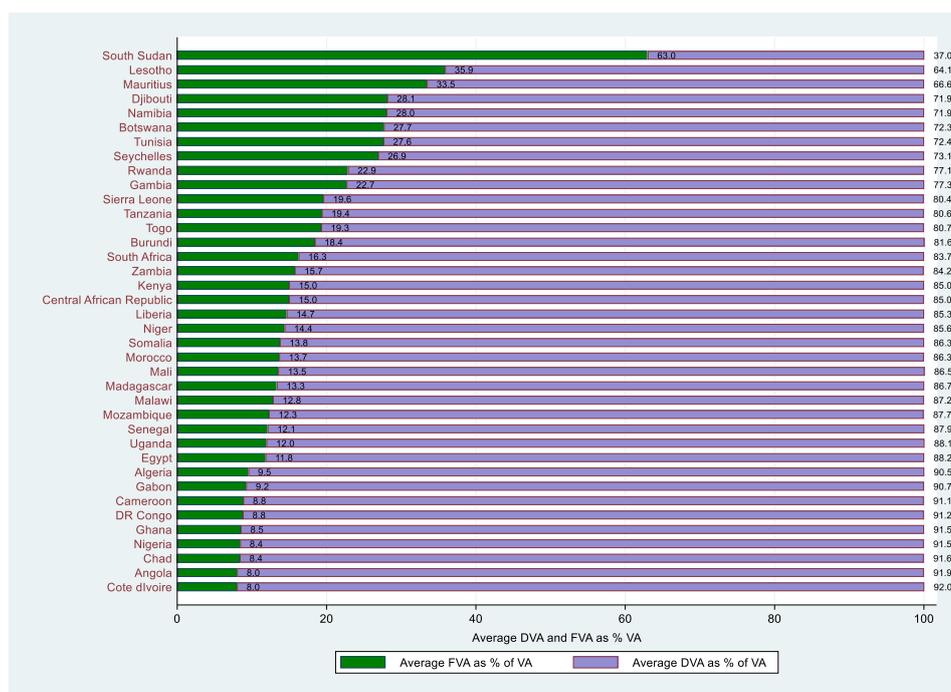


Source: Authors' illustration based on UNCTAD-EORA GVC database

Relative shares of DVA and FVA in total value-added

The relative share of DVA is highest in small countries with lower levels of economic growth, notably South Sudan. In larger and/or oil exporting countries like Nigeria and Angola, the domestic content embedded in exports is relatively higher, with a lower share of foreign value-added, averaging of about 15% in 2017 (Figure 6). This is consistent with Alard et al. (2016) who found that Africa countries with higher levels of domestic sourcing of intermediates by multinational enterprises have lower levels of foreign sourcing by small domestic firms.

Figure 6: DVA and FVA as percent of value-added by country, 2017

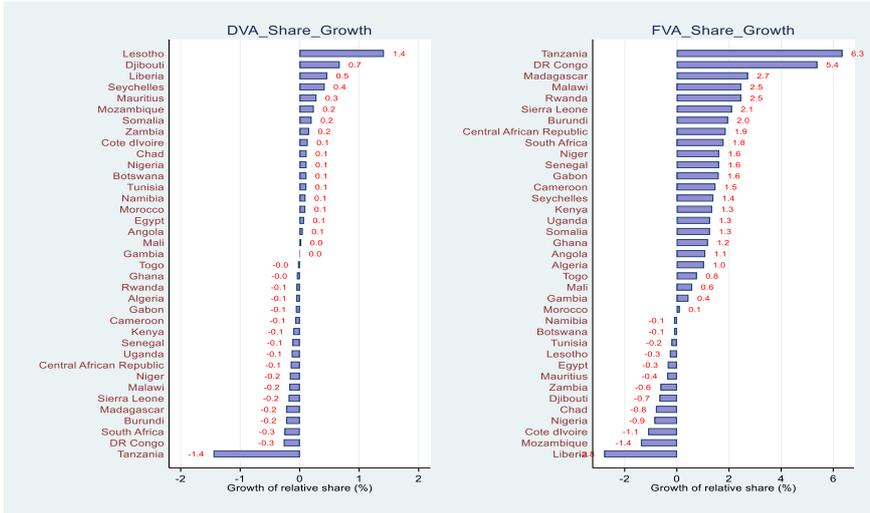


Source: Authors' illustration based on UNCTAD-EORA GVC database

Changes in relative shares of DVA and FVA in total value-added

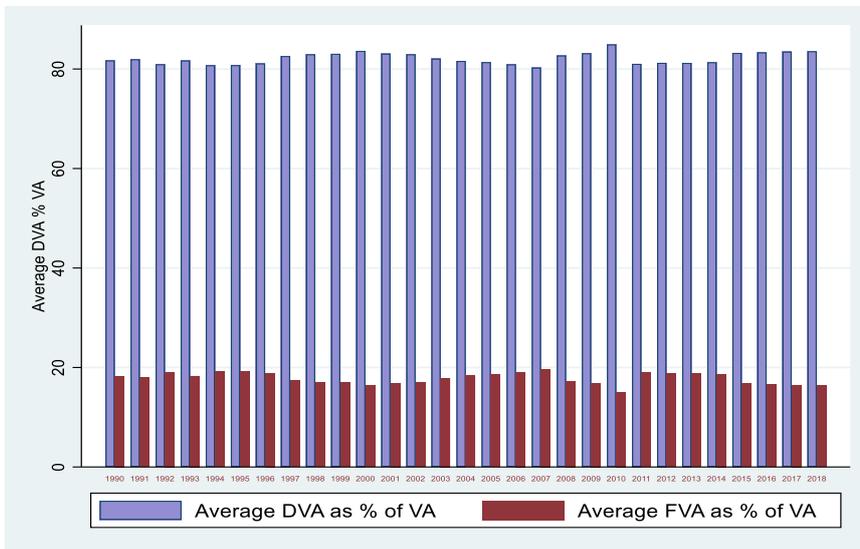
The composition of value-added is changing in some countries, with the share of foreign value-added exhibiting a higher year-to-year growth rate over the 1990-2018 period (Figure 6). Tanzania and DRC had the highest growth rate of the relative share of foreign value-added (6.3% and 5.4%) while domestic value added experienced negative growth (Figure 7). Overall, the relative share of DVA declined in 18 (almost half) of the study countries while 23 out of 36 countries experienced positive annual growth of FVA between the 1990-2018 period. Overall, the relative shares of both DVA and FVA in total value added have not changed substantially over the past three decades (Figure 8).

Figure 7: Growth of relative shares of DVA and FVA by country: Average, 1990-2018



Source: Authors' illustration based on UNCTAD-EORA GVC database

Figure 8: Average DVA and FVA as percent of value-added: 1990-2018

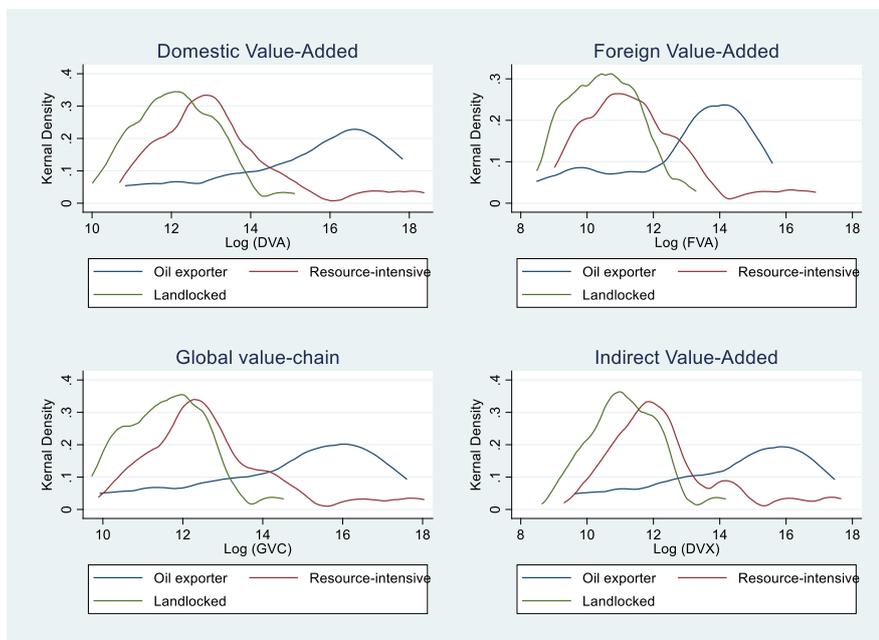


Source: Authors' illustration based on UNCTAD-EORA GVC database

Inter-country heterogeneities in DVA, FVA, DVX and GVC by resource endowment

In order to explore potential heterogeneities in value added and GVC participation among African countries, Figure 9 presents the distribution of log-transformed values of domestic value-added (DVA), foreign value-added (FVA), indirect value-added (DVX) and overall GVC disaggregated by countries' resource-endowment categories (IMF 2019).

Figure 9: Distribution of DVA and FVA by resource endowment category

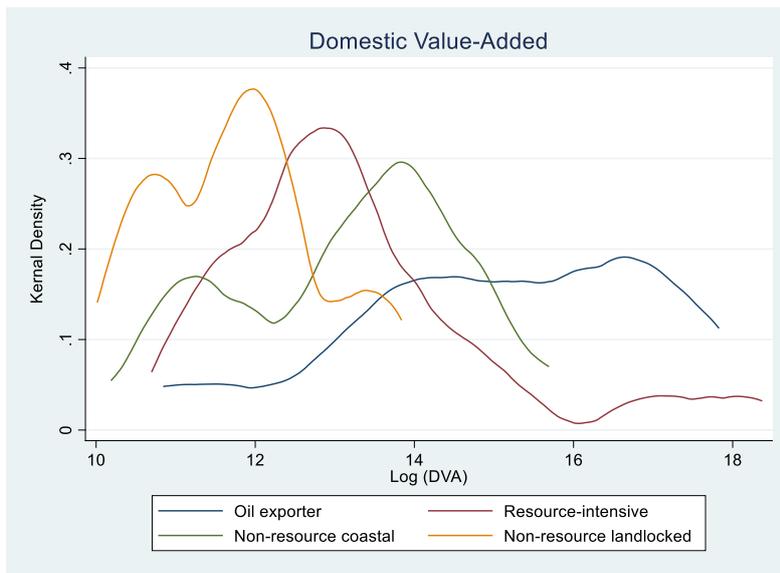


Source: Authors' illustration based on UNCTAD-EORA GVC database

Clearly, all four indicators are generally higher among oil-exporting countries and non-oil resource-intensive countries and lowest among landlocked countries. While this could be capturing differences in levels of development, Alard et al. (2016) claim that oil exports have been a major driver of increasing GVC participation for countries like Angola and Nigeria. In relative terms, however, oil-

exporting countries have substantially higher shares of domestic value-added and, conversely, lower shares of foreign value-added embedded in their exports (Figure 10).

Figure 10: Distribution of DVA and FVA as shares of VA by resource endowment category



Source: Authors' illustration based on UNCTAD-EORA GVC database

Commented [AM2]: The interesting question here is how this is compatible with the literature which discusses the 'resource curse', and the literature which shows that FDI in the oil and mineral sector is not embedded in the domestic economy, and rather ends up 'hollowing out' domestic industry.

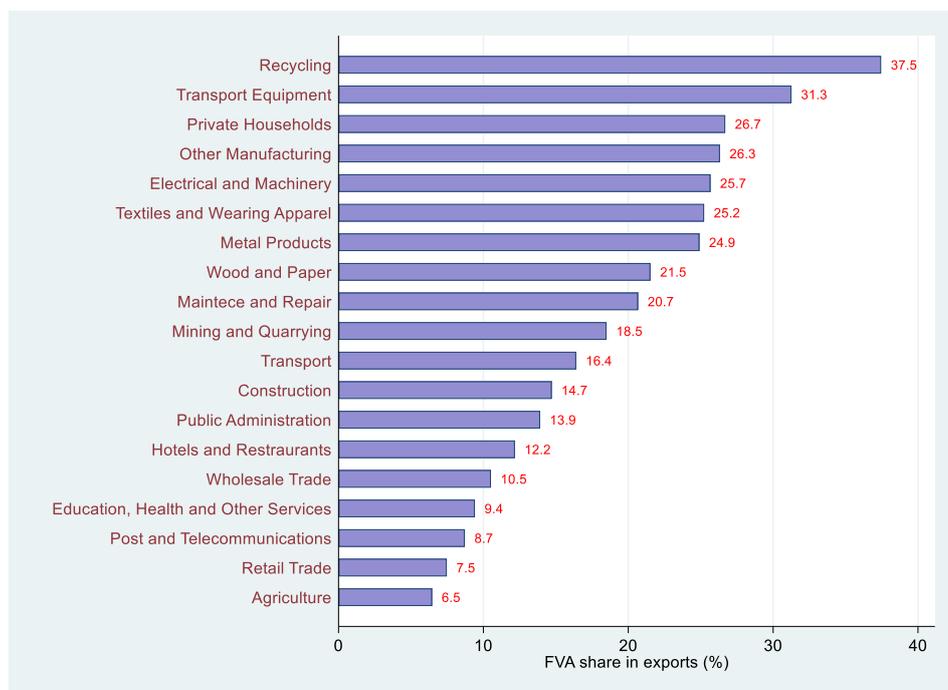
Interesting. We could explore this during further revisions.

Relative shares of foreign value-added in exports by sector

Figure 11 presents the relative shares of foreign value-added in total value added embedded in exports for 2017 for Africa. Diversity among sectors is quite high, with *recycling* having the highest foreign content while, not surprisingly, the foreign content of value added in *agriculture* is low.¹⁰

¹⁰ We exclude re-exports and re-imports which are almost entirely accounted for by foreign content

Figure 11: Relative contribution of FVA in total value added by sector, 2017

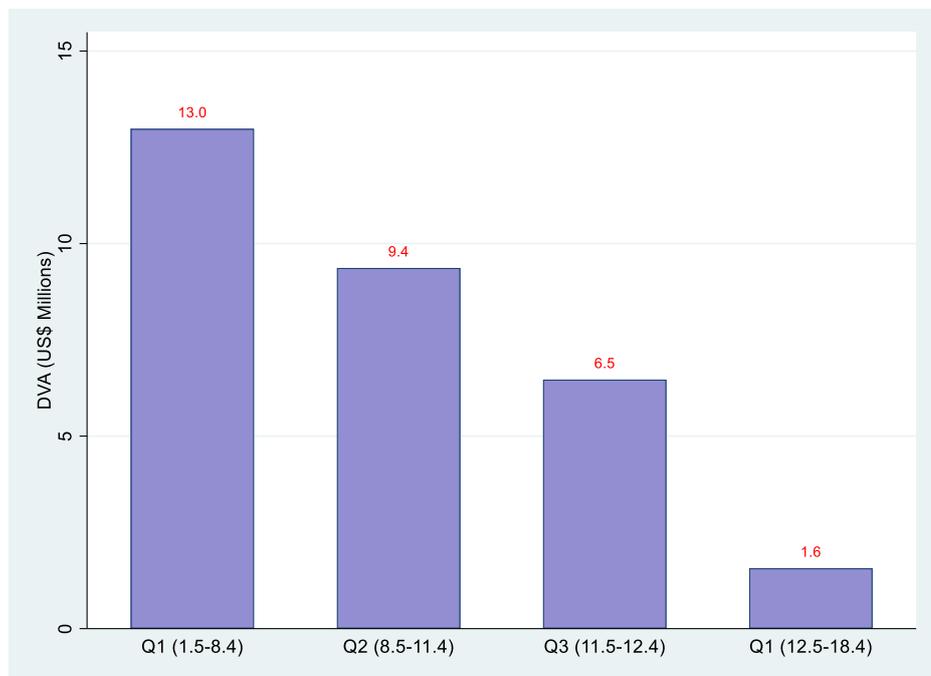


Source: Authors' illustration based on UNCTAD-EORA GVC database

Relationship between tariff rate and domestic value-added

Existing studies have commonly shared the view that the higher the level of tariffs, the lower the domestic value-added embedded in a country's exports, citing the restrictive effects tariffs have to access to modern technologies and value-adding intermediates (Cadot and Gourdon, 2016; Halpern et al., 2015). In order to verify the claim in this study, we present averages of domestic value-added for the three latest years of actual DVA data (2015-2017), disaggregated by quartiles of average tariff rates for the same period. Figure 12 corroborates the claim, as average DVA is highest in countries with the lowest tariff average and vice versa.

Figure 12: DVA disaggregated by quartiles of tariff rates: Average, 2015-2017



Source: Authors' illustration based on UNCTAD-EORA GVC database

4.2. Econometric results

In this section, we presented the econometric results of the determinants of DVA and other measures of value-added embedded in the exports of African countries. Fixed effects estimates are presented in Table 1, starting with domestic value-added in Column 1. Column 3 presents estimates for FVA as a proxy for depth of participation in global value chains. In Column 2, GVC estimates are presented, while indirect and total value-added embedded in exports are presented in Columns 4 and 5, respectively.

Table 1: Determinants of domestic and foreign value added in exports: FE regression

VARIABLES	(1) Log (DVA)	(2) Log (FVA)	(3) Log (GVC)	(4) Log (DVX)	(5) Log (VA_EXP)
Log (GDP)	2.438*** (0.124)	2.379*** (0.137)	2.553*** (0.127)	2.571*** (0.144)	2.432*** (0.117)
FDI % GDP	0.00817* (0.00441)	-0.00260 (0.00491)	0.00410 (0.00455)	0.00968* (0.00513)	0.00595 (0.00418)
Log (Total investment % GDP)	-0.0930 (0.0630)	0.171** (0.0700)	0.00929 (0.0649)	-0.0682 (0.0732)	-0.0531 (0.0596)
Log (Average Tariff Rate)	-0.207*** (0.0411)	-0.196*** (0.0457)	-0.215*** (0.0424)	-0.249*** (0.0478)	-0.203*** (0.0389)
Log (Manufactured share of exports)	-0.00815 (0.0339)	0.0146 (0.0377)	0.00564 (0.0350)	-0.0108 (0.0395)	-0.00280 (0.0321)
Log (Private sector credit % GDP)	-0.00332 (0.00209)	-0.00205 (0.00232)	-0.00254 (0.00215)	-0.00279 (0.00243)	-0.00289 (0.00198)
Rule of law	-0.0142 (0.0736)	-0.0782 (0.0818)	-0.0906 (0.0758)	-0.0788 (0.0856)	-0.0265 (0.0697)
Log (Output per worker)	-2.262*** (0.226)	-1.828*** (0.251)	-2.180*** (0.233)	-2.419*** (0.263)	-2.149*** (0.214)
Constant	-21.83*** (1.559)	-27.03*** (1.733)	-26.19*** (1.606)	-24.51*** (1.813)	-22.71*** (1.476)
Observations	364	364	364	364	364
R-squared	0.751	0.758	0.782	0.722	0.782
Number of countryid	27	27	27	27	27

*Standard errors in parentheses. Asterisks ***, ** and * indicate significance at 1%, 5% and 10%, respectively. All variables are log-transformed except rule of law.*

Domestic value-added in Sub-Saharan Africa is strongly positively associated with a country's GDP, suggesting DVA to be higher in relatively larger economies. Similarly, countries with higher GDP levels tend to have higher FVA (Column 2). This is contrary to Allard et al. (2016) who found a positive link between GDP lagged one year to contemporaneous FVA. They however find a positive and significant effect of GDP per capita, suggesting the level of economic development as a determining factor in a country's downward integration in global value chains.¹¹

Labor productivity has significantly negative effect on DVA (Column 1). Although the finding is surprising and counterintuitive, it is consistent with Assamoi et al. (2019) for the case of Latin American countries. They attribute the negative association to measurement issues in the labor productivity indicator which is not disaggregated by skill level, concluding that the variable is not an appropriate measure of human capital. Indeed, by disaggregating labor productivity, Aggarwal et al. (2021) find a significantly positive impact of skilled on DVA unskilled labor had a negative effect. Similarly, Olczyk and Kordalska (2017) disaggregate labor into high-skilled, medium-skilled and low-skilled categories and find differing effects, with high-skilled labor having the greatest (positive) impact on DVA.¹²

The positive contribution of rule of law that was found in Assamoi et al. (2019) is not confirmed in our study. This finding is surprising, given that 'good' institutions are anticipated to stimulate the domestic production of intermediates and in turn increase DVA (Nunn and Trefler, 2014). While we do not have a plausible explanation for the insignificant contribution of the institutional variable towards DVA in Africa, we presume the institutional effect is crowded out by economic (both structural and policy) covariates in the regression.

¹¹ We produce alternative estimates in which GDP is replaced with GDP per capita. The positive effect on DVA holds.

¹² In alternative specifications, this study replaces labor productivity with GDP per capita as a rough proxy given lack of skilled-disaggregated labor productivity.

The negative and significant coefficient on the variable for average tariff rate is suggestive of a generally reducing effect of tariffs on domestic value-added in Africa, a similar observation found in the case of Latin America Assamoi et al. (2019), Hungary (Halpern et al., 2015) and China (Kee and Tang, 2016). Indeed, it is claimed that high tariffs restrict access to sophisticated intermediate inputs (Cadot and Gourdon, 2016; Halpern et al., 2015) and constrain the variety of available inputs and technology (Kee and Tang, 2016). This could in turn reduce domestic value addition. The observation further corroborates Allard et al. (2016) who found tariffs to significantly reduce backward GVC integration – measured by the share of FVA in exports – in Sub-Saharan Africa. They estimate a 14% potential increase in regional and international trade in Africa if the continent could reduce tariffs to the global average.¹³ Similarly, tariffs have a negative effect on FVA (Column 2) and all other estimates in subsequent columns.

The effect of manufactured exports as a share of total exports is negative but insignificant.¹⁴ Some studies have found a negative and significant effect (Kowalski et al., 2015), attributing it to the high foreign content in manufacturing, which crowds out domestic intermediates and leads to lower domestic value addition in the sector (Johnson, 2014).

Domestic credit as a percentage of GDP has no significant effect on any of the measures of value-added. The finding is surprising given that access to credit has a potential role to play in stimulating investments and production of intermediates. In Allard et al. (2016), access to credit is found to positively, though marginally, increase DVA in Sub-Saharan Africa, predicting that achieving world-level financial deepening on the continent would increase trade by 29%. The insignificant effect found in this study could perhaps reflect challenges in aggregating this indicator, yet both DVA and private sector credit highly differ by sector.

¹³ Tariff rates averaged 7.1% in Sub-Saharan Africa during the period 1990-2013, compared to global average of 1.6%.

¹⁴ A similar observation is found in unreported results when using the ratio of manufacturing value added to GDP

FDI has a positive but marginally significant effect on domestic value-added, contrary to Assamoi et al. (2019) who found a significantly negative effect in Latin America. They attribute this to potential reduction in demand for domestic inputs resulting from higher inward FDI, as stressed in Vrh (2018). Additionally, FDI inflow possibly increases the importation of foreign intermediate inputs, symmetrically reducing DVA in the recipient country (Kowalski et al., 2015). The total investment to GDP ratio does not affect domestic value addition but rather seems to influence foreign value-added, suggesting that countries with higher investment levels attract foreign content in their exports. The finding differs from Aggarwal et al. (2021) who found the level of capital owned by both domestic and foreign firms to increase DVA in India's manufacturing sector, attributing it to attraction of foreign players in sectors with growing capital-intensity.

Estimation results with alternative sets of covariates

The estimation of Equation (1) is repeated in this section, with an alternative set of covariates. Firstly, GDP as a measure of economy size is replaced with GDP per capita and population size, which respectively measure the level of development and potential market size. Secondly, existing studies report concerns of using measures of output per worker that do not disaggregated by skill level (Assmoy et al., 2019) and that the labor productivity effect on DVA depends on skill level (Agarwal et al., 2021). Given the lack of skill-disaggregated data, this study drops output per worker and resort to GDP per capita as a rough proxy. The results presented in Table 2 are quite similar to those earlier presented, with minimal changes in the coefficients of some covariates. Similar to the effect of GDP presented in earlier estimates, the coefficient on GDP per capita is positive and statistically significant, further confirming the level of economic development as major determinant of a country's value-added embedded in its exports. In other words, countries with higher levels of development have a higher capacity to domestically add value to their exports. Finally, the coefficient on population size is positive and significant, indicating that a larger market size enhances domestic value addition.

Table 2: Determinants of value added in exports: FE regression with alternative covariates

VARIABLES	(1) Log (DVA)	(2) Log (FVA)	(3) Log (GVC)	(4) Log (DVX)	(5) Log (VA_EXP)
Log (GDP per capita)	0.467*** (0.161)	1.020*** (0.176)	0.721*** (0.166)	0.469** (0.185)	0.597*** (0.153)
FDI % GDP	0.00447 (0.00474)	-0.00689 (0.00518)	0.000167 (0.00488)	0.00569 (0.00546)	0.00224 (0.00451)
Log (Total investment % GDP)	-0.0349 (0.0680)	0.249*** (0.0743)	0.0742 (0.0700)	-0.00524 (0.0783)	0.00692 (0.0648)
Log (Average Tariff Rate)	-0.225*** (0.0466)	-0.183*** (0.0509)	-0.224*** (0.0480)	-0.267*** (0.0536)	-0.216*** (0.0444)
Log (Manufactured share of exports)	-0.0524 (0.0363)	-0.0218 (0.0397)	-0.0372 (0.0373)	-0.0582 (0.0418)	-0.0450 (0.0346)
Log (Private sector credit % GDP)	-0.00241 (0.00226)	-0.00154 (0.00247)	-0.00173 (0.00232)	-0.00183 (0.00260)	-0.00207 (0.00215)
Rule of law	-0.115 (0.0798)	-0.217** (0.0872)	-0.204** (0.0821)	-0.188** (0.0918)	-0.131* (0.0760)
Log (Population)	2.197*** (0.148)	1.975*** (0.162)	2.261*** (0.152)	2.308*** (0.170)	2.171*** (0.141)
Constant	-24.67*** (1.918)	-27.74*** (2.095)	-28.47*** (1.973)	-27.50*** (2.207)	-25.16*** (1.826)
Observations	364	364	364	364	364
R-squared	0.710	0.727	0.747	0.683	0.743
Number of countryid	27	27	27	27	27

Standard errors in parentheses. Asterisks ***, ** and * indicate significance at 1%, 5% and 10%, respectively. All variables are log-transformed except rule of law.

Note: Variables with high correlation (corr>0.6) excluded

Conclusions and policy implications

Export and import shares of GDP have increased in Africa over the past two decades. However, the corresponding increase in value-added embedded in the exports as well as participation rates of African countries in regional and global value chains remain quite low. A number of institutional and structural challenges keep many countries on the continent away from realizing full benefits from involvement in value chains and adding value to their exports. In this study, the determinants of domestic value-added embedded in exports is estimated using country-fixed regression models applied to value-added

indicators from the UNCTAD-EORA multi-regional input-output tables for the 1990-2018 period. The analysis focuses on Africa, a region that is largely underrepresented in existing literature partly due to data limitations as several trade in value-added databases tend to overly concentrate on developed countries.

We find high diversity among African countries regarding value addition: countries with higher levels of development are more able to add value to their exports domestically. We confirm the shared view in the literature that both domestic and foreign value addition and the extent of global value chain engagement are generally lower in Africa relative to the rest of the world. Our econometric results further reveal that among the factors that hinder value addition and GVC participation on the continent are high rates of tariffs. This perhaps suggests tariff reduction as potentially one of the pathways through which African countries could increase their value addition to their exports and maximize benefits from trading under the AfCFTA.

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