

Surges in Participation in Global Value Chains: Drivers and Macroeconomic Impacts in Sub-Saharan Africa

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Bringing Rigour and Evidence to Economic Policy Making in Africa

Surges in Participation in Global Value Chains: Drivers and Macroeconomic Impacts in Sub-Saharan Africa

By

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List of abbreviations and acronyms

EAC	East African Community
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
ICRG	International Country Risk Guide
IMF	International Monetary Fund
LPM	Local Projection Method
OECD	Organization for Economic Co-operation and Development
PRI	Peace Research Institute Oslo
SACU	Southern African Customs Union
UCDP	Uppsala Conflict Data Program
UNIDO	United Nations Industrial Development Organization
VARs	Vector Autoregressions

Abstract

This paper proposes a cross-country examination of the drivers and impacts of episodes of surges in countries' participation in international value chains based on event-analysis previously used in the empirical literature in studies on export surges or GDP growth accelerations. Using a large sample of developing countries over the period 1990–2018, and relying on the EORA database, the paper offers three main results. First, the “surges” are not common, with only 11 episodes recorded in sub-Saharan Africa over the past three decades. Second, strong FDI inflows and governance quality precede the occurrence of these “surges”, while protracted real exchange rate under-valuations appear to nurture these surges. Third, once they occur, these “surges” are transformative: they are associated with higher real per capita GDP growth, rapid industrialization, stronger diversification and sophistication of exports, and faster poverty reduction.

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1. Introduction

Despite strong growth in trade flows, sub-Saharan Africa's trade has barely kept pace with the expansion of global trade. Over the past decades, the export-to-GDP ratio in sub-Saharan Africa has increased from 18% in 1970 to peak at 35% in 2008, before declining to 25% of GDP in 2019. This occurred to a great extent thanks to a rising demand for raw materials over that period, coupled with a remarkable expansion of the destinations of sub-Saharan African exports reflecting new partnerships with emerging markets.

The region still has ways to go to better integrate in global value chains—a process that has consistently been associated with higher levels of activity and income growth over time— as has happened in South and East Asia or Eastern Europe. International trade has transformed into a complex web of trade in intermediate inputs with decentralized production processes involving many countries. Such rapid and strengthened interconnectedness of countries has expanded employment opportunities for the youth in the developing world and helped boost total factor productivity through know-how and technological transfers. At the same time, a greater participation in international value chains could increase the sensitivity of the participating country to swings in global activity, even though the recent empirical evidence points to supply chains that are becoming more domestic rather than more regional (Miroudot & Nordstrom, 2020).

The so-called trade in value-added can take the form of backward and/or forward integration. The former relates to the use of imports in the production of exports whereas the latter refers to the export of intermediates goods and services that are then used in the production of other countries' exports. Global value chains relate to large value chains in which value is added at each stage of production before crossing borders to be passed on to the next stage.

In general, most countries in sub-Saharan Africa have somewhat increased their integration in global value chains, as measured by the share of foreign value-added in a country's exports (backward integration), though there is a substantial degree of heterogeneity across the region. Africa's participation in global value chains is still dominated by forward integration—with exports concentrated around commodities such as fuel and mineral resources—even though there are substantial economic benefits from increasing backward participation, including productivity enhancements and more sophistication and diversification of exports. The benefits

of forward participation are less clear cut and seem to be conditional on the nature of the linkages (e.g., commodity exports versus skill-intensive exports).

The experience of five countries—Tanzania, Ethiopia, Seychelles, South Africa, and Kenya—is interesting. These countries clearly stand out, having seen their integration rise over two decades by a magnitude similar to the most successful countries in other regions, such as Poland or Vietnam. In those countries that have made the largest strides into global value chains, manufacturing, agriculture, and agro-business—and, to a lesser extent, transport, tourism, and textile—have benefited the most from deeper integration (International Monetary Fund [IMF], 2016). For the majority of African countries, productivity across all sectors of the economy—agriculture, manufacturing, and services—remain too low.

There is, therefore, growing interest in understanding what are the drivers of participation into global value chains, their economic effects, and the implications for the conduct of economic policy. Recent research shows that participation in international supply chains generally brings economic benefits in terms of enhanced productivity as well as greater sophistication and diversification of exports. For African countries faced with acute competitiveness challenges and substantial development needs and demographic pressures, the debate is focusing on the form and desirability of integrating into supply chain linkages.

In this study, we propose a two-way examination of where sub-Saharan Africa stands on progress in integrating the world economy through value chain participations, and what are the key macroeconomic implications of embarking into these value chains at a faster pace. Indeed, the narrative around developing countries moving up the trade value chains seems to be overwhelmingly positive (World Bank, 1990, 2020), prompting this study to examine the issue in greater detail for a large sample of African nations.

The study will proceed in three steps—that to the best of our knowledge have never been explored before. First, despite some important data challenges, it will propose for each country, an empirical identification of the main episodes of surges in these countries' backward participation in global value chains, i.e., when a country sources foreign inputs for its export production. The approach borrows from previous studies that focused on identifying and understanding episodes of accelerations in other macroeconomic variables such as GDP per capita or aggregate exports (see next section).

Second, once episodes of surges in participation in global value chains are identified and interpreted, the study will propose an econometric framework to zoom into the main drivers of cross-country occurrences of value chain surges in Africa. We are, therefore, particularly interested in isolating what makes surges in value chain participation sustained. Building on the burgeoning empirical literature, we compare the contribution of structural factors (such as the dependence on natural resources or governance quality) with the effects of more policy-related variables (tariffs, real effective exchange rate, foreign direct investment inflows, financial development, human capital, energy, etc.).

Third, the study concludes by examining the type of macroeconomic transformations that take place through these surges in countries' participation in global value chains and, hence, to better understand the impact of surges in value chains on growth, structural transformation, and poverty reduction.

The study relies on existing data sets that made it possible to use cross-country comparable data on trade in value-added with information available for several African countries over a decent period.

It is hoped that the study will help trigger a fruitful policy discussion and possibly a country case studies that will further shed light on the intricacies of the interaction between trade integration and long-term development in Africa. The examination of the transformative implications of these surges on the economy, inequality, and poverty, in a robust empirical framework will certainly help augment our understanding of what these types of integration (and at this pace) do to the economies in which surges take place. Policy implications will naturally be derived from the results.

The rest of the study is organized as follows. Section 2 presents a brief overview of the key studies that motivated the focus on “surges” in international trade in value-added, and the focus on what makes them sustained and for which macroeconomic impact. Section 3 proposes the framework to identify these surges. Section 4 discusses the strategy to assess the drivers of these surges. Section 5 expands on the impact of surges in participation in global values chains on export diversification and sophistication, growth, structural transformation, and poverty. Section 6 concludes the study.

2. Brief overview of the literature

On trade openness and global value chains

There is a relatively well-accepted finding in the literature that policy-oriented trade openness is associated with long-term economic growth in sub-Saharan Africa, and that policies should aim at maximizing the gains from international trade, including from intra-African trade which has remained low over the years (IMF, 2016; Calderon et al., 2020). Interestingly, the IMF (2016) study finds that sub-Saharan Africa still has a long way to go to better integrate in global value chains as has happened in South and East Asia or Eastern Europe. At the same time, increased gross trade integration also makes countries more vulnerable to external shocks which translate into higher output growth volatility on average (di Giovanni & Levchenko, 2009).

The composition of trade and its macroeconomic consequences on African countries has also been the focus of recent studies. Calderon et al. (2020) showed that it is the increase in primary trade that tends to reduce growth by 1 percentage point in Africa—via lower capital accumulation—while boosting trade exerts a positive impact on long-term growth.

The IMF (2016) study highlights that, while oil-exporting African countries are clearly lagging behind in value chain participation, many other countries—both commodity and non-commodity exporters—are showing progress, even if from low starting points, with the East African Community (EAC) and the Southern African Customs Union (SACU) being particular bright spots. Importantly, they uncover that in countries that have made the largest strides into global value chains—such as Ethiopia, Kenya, Seychelles, South Africa, and Tanzania—manufacturing, agriculture, agro-business and, to a lesser extent, transport, tourism, and textile, have benefited the most from deeper integration. Van Biesebeek and Mensah (2019) used the World Bank Enterprise Surveys and the Eora data set to demonstrate that global value chain engagement of sub-Saharan Africa is rather low, especially for its manufacturing sectors, with a great degree of heterogeneity. Using the EORA database, de Melo and Twum (2021) find that sub-Saharan African Regional Economic Communities have participated mostly in non-regional value chains, and along forward rather than backward activities.

While there are no papers linking economic factors to surges in the integration of sub-Saharan Africa to global value chains, the empirical literature has nevertheless

examined the drivers of this participation. First, industrial labour appears to be more costly for firms that are located in sub-Saharan Africa (Ceglowski et al., 2015; Gelb et al., 2020). Second, several sub-Saharan African countries have small roles in global value chains because they have weak institutions or neighbours with weak institutions (Miranda & Wagner, 2015; Dollar et al., 2016; Dollar & Kidder, 2017). Infrastructure—such as logistical performance—as well as good governance, lower unit labour costs, higher inward FDI openness, and more generally a higher GDP per capita are associated with greater participation of sub-Saharan Africa in global value chains (Organization for Economic Co-operation and Development [OECD], 2015; Fernandes et al., 2020). de Melo and Twum (2021) find that participation is negatively associated with tariffs on imports and exports of intermediates, as well as on trade costs. Backward participation is also positively associated with digital connectivity.

Structural factors also play a non-negligible role. A study by the OECD (2015) focusing on the participation of developing countries in global value chains show that, the larger size of the domestic market, the industrial structure (e.g., higher share of manufacturing sector in GDP), and geographical proximity to advanced countries' markets are associated with a stronger integration in global value chains through backward participation.

On trade surges

Few studies, like ours, have focused on higher moments of the distribution of trade flow variables—and in our context, on the subcomponent of trade in value-added. Freund and Pierola (2012) identified, empirically, episodes and the drivers of what they define as export surges—defined for each country as a significant and sustained increase in manufacturing export growth from one seven-year period to the next—and found that these export take-offs are generally preceded by substantial exchange rate depreciations.

Their study generally follows earlier work that examined the economics around sudden shifts in economic variable growth regimes. These include Freund (2005) on current account reversals and Hausmann et al. (2005) on growth accelerations, which all used a filter to identify episodes of accelerations.

3. Identification of surges in value chain participation and data

Defining the “surge”

Following Freund and Pierola (2012), we apply a similar approach to identifying episodes of value chain surges in a sample of developing countries, including sub-Saharan Africa countries. The filter to identify these episodes will satisfy rather strict criteria such as:

- The surge is defined as a significant and sustained increase in the change in participation in global value chains (mainly backward integration measured as the ratio of foreign value-added in exports normalized by the country's total exports) from one five-year period to the next. We use the backward integration (when a country sources foreign inputs for its export production) index to focus on the participation to international value chains that reflect the ability of a country to make use of foreign value-added in the production of its own exports. The other well-known measure—the share of domestic value-added embodied in a county's exports, and which is then re-exported by a third country—runs the risk of capturing, in the African context, mostly raw commodity exports without meaningful impact on domestic structural transformation.
- Real average change in value chain participation over five years is above the developing countries' average change (in percentage points).
- The average five-year change in value chain participation is at 0.5 percentage point above the previous five-year average.
- The change in the value chain index increases every consecutive year during the five-year window for which acceleration is taking place.
- The minimum level of value chain participation observed during each of the five years following a surge is higher than the maximum level of value chain participation during each of the five years before the surge starts.

Trade in value-added data for sub-Saharan Africa

To measure the participation of sub-Saharan African countries in global value chains over a longer period of time, we make use of the UNCTAD-Eora Global Value Chain database, which provides global multi-region Input-Output (IO) tables, to derive value-added trade for a large number of countries, including African countries (Casella et al., 2019). The main advantage of using the Eora database is the depth of its coverage, in terms of countries (189), industries, and years (1990–2018).

Some missing data—at a very high level of disaggregation—in the IO tables are filled through optimization procedures using existing national and global statistics which may lead to serious biases in the estimates. Our results should, therefore, not be taken as exact and precise measures, but merely as providing indications about big shifts in trends, even though we already refrain from going too granular in terms of breakdowns of trade series.

Moreover, instead of focusing on year-on-year changes in trade in value-added, we instead focus on very large and rare events of meaningful take-offs that have the merit of being sustained over a relatively long period of time. We posit that such changes must have, in general, been driven by specific economic developments rather than statistical artefacts.

Following the guidance provided by UNCTAD, de Melo and Solleder (2021) recommend extreme caution with the Eora data related to the following countries due to severe methodological issues: Algeria, Belarus, Benin, Burkina Faso, Congo, Eritrea, Ethiopia, Guinea, Guyana, Iraq, Libya, Moldova, North Korea, Oman, Serbia, South Sudan, Sudan, Yemen, Zimbabwe, and Former USSR. These countries are dropped from the sample.

4. Taxonomy of surges in the participation in value chains and drivers

Heterogeneity of experiences

We begin by taking a long-run perspective of how African countries have travelled across the participation in global value chains by distinguishing between four bins: (a) the so-called recent graduates, i.e., countries which over the period 2007–18 managed to significantly increase their participation in value chains while they saw their participation decline or being modest in the early years (1990–2006); (b) the established graduates which are those who were already relatively plugged into global value chains and have maintained this integration; (c) back-in-school are those countries which regressed in terms of their participation; and (d) the still-in-school group which consists of countries that are struggling to take off in this area.

Figure 1 shows the country groupings obtained from splitting the data according to the proposed taxonomy discussed above. Most countries are in the “back-in-school” bin, suggesting that they have not managed to increase their participation in global value chains as defined by the backward integration index. Furthermore, these countries reversed the positive momentum which saw their integration increase during the first period 1990–2006.

In contrast, only a few countries have seen their integration increase during the recent period 2007–18. Tanzania, for example, leads the group labelled “established graduates” as it has steadily increased its participation into global supply chains in the two periods discussed here. The other group is labelled “recent graduates” and only includes Rwanda.

Table 1: Dates of surges in participation into global value chains

Countries	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-saharan Africa
ARG			2001			
BOL			2002			
BRA			1998			
BWA						2005
CAF						2003
COD						2002
COL			1999			
CUB			2003			
DOM			2010			
EGY				2002		
GEO		2002				
GMB						2001
HTI			2001			
DN	1997					
ND					2001	
RN				1999		
JAM			2002			
JOR				2002		
KGZ		2004				
KHM	2003					
LEB				2002		
LBR						2003
MAR				2010		
MDG						2003
MEX			2001			
MWI						2002
NER						2008
NFL					2002	
RNG	2000					
PRY			2001			
RUS		1997				
RWA						2008
SLE						2010
SLV			2004			
SYR				2009		
TJK		2009				
TKM		2008				
TUR		2004				
TZA						2005
UKR		2002				
VNM	2005					
VUT	2004					
Total accelerations	5	7	11	6	2	11

Source: Eora database and author's calculations.

Most of these surges in sub-Saharan Africa took place around the mid 2000s, and we see again countries such as Tanzania or Rwanda being picked up by the filter, which is comforting. The mix of countries in which surges are recorded is relatively heterogeneous. Some are natural resource-rich (Democratic Republic of Congo), others are post-conflict nations (Liberia, Sierra Leone), some are small (Madagascar, the Gambia), etc.

As shown by Foster-McGregor et al. (2015), on average, low-tech manufacturing makes up the greatest share of foreign value-added involvement in Africa, at 41%.¹ It is particularly relevant in Botswana*, Ghana, Madagascar*, Mauritius, Namibia*, Senegal, Tanzania*, and Zambia, with shares above 50%. High-tech manufacturing is the exception in countries such as Niger* or Rwanda* in the case of foreign value-added in the export of chemicals or transport equipment.²

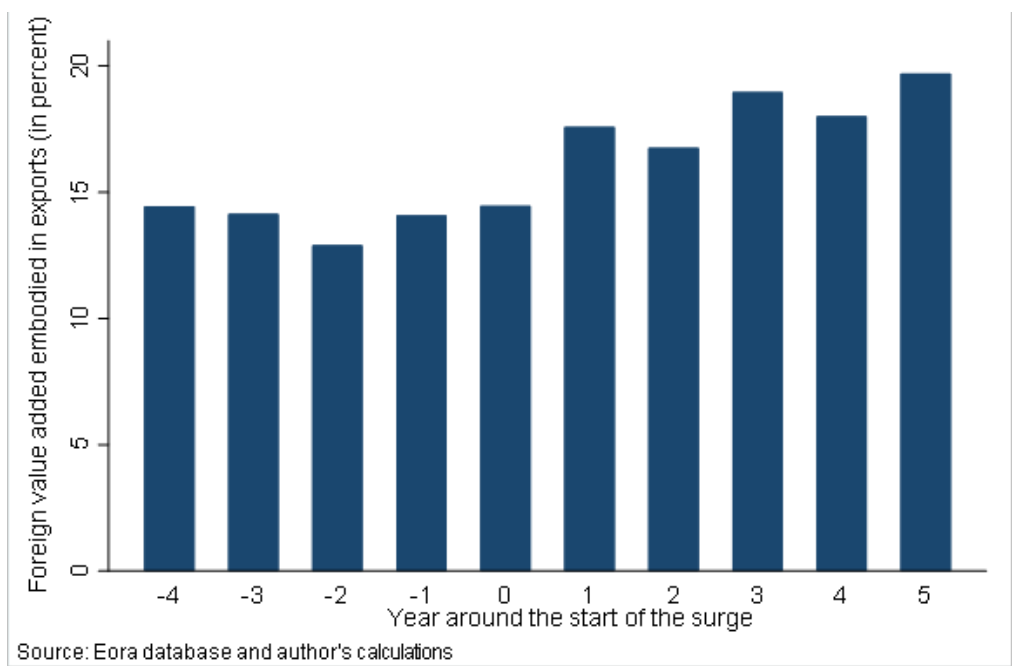
Several countries also have shares of primary sectors in foreign value-added (backward participation) of around 50% or more, and these primarily include the resource-rich countries such as Algeria, Angola, Gabon, Libya, and Nigeria.³

There is, therefore, not a single pattern at first glance to pin down the main attributes of these accelerations. This will explain the recourse to some econometric investigations that would account for the rare occurrences of these events with enough statistical power to extract the main correlates of the surges in participation into global value chains.

The anatomy of “surges”

Before turning to econometric investigations, let's first examine what our filter is picking up from the data. Figure 2 shows the evolution of the median participation index around the start date of the identified surge for the group of sub-Saharan African countries. Five years after the beginning of the surge, the ratio of foreign value-added embodied in exports is around five percentage points higher than for the years before the surge took place. This is a substantial increase as it is expressed in percentage point of a country's gross total exports in a year.

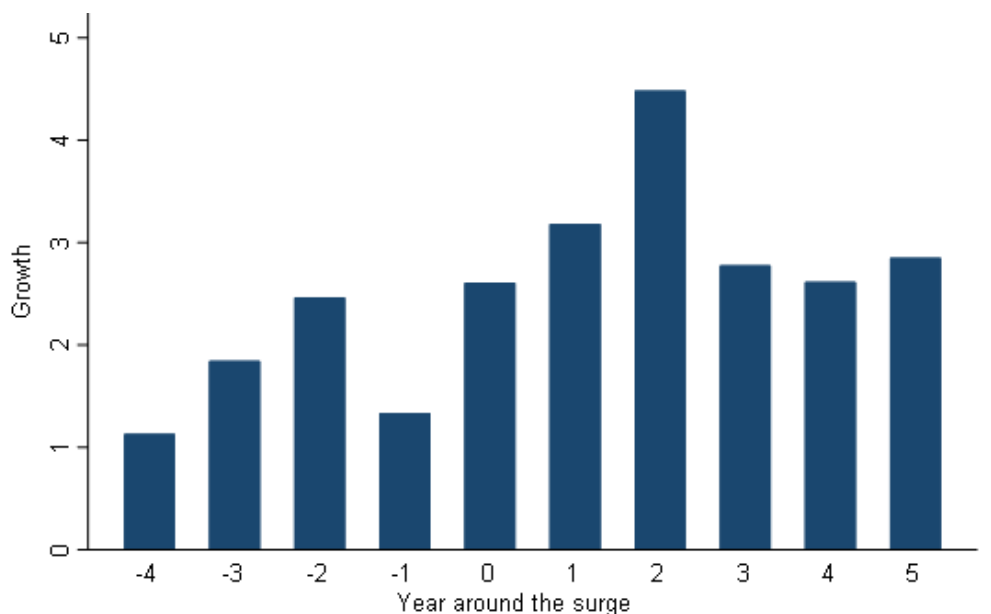
Figure 2: Surge in participation in global supply chains (median)



If the surges are indeed substantial with levels going way beyond what was imposed by our filter, and if they are not simply picking up statistical blips, one should at least expect them to be associated with higher real GDP growth overall. We test this conjecture—purely taken here as a validation tool rather than attempting to infer any causal relationship—by plotting the dynamic of real GDP growth around the surge timeline. In Figure 3, the data show a significant increase in GDP growth following

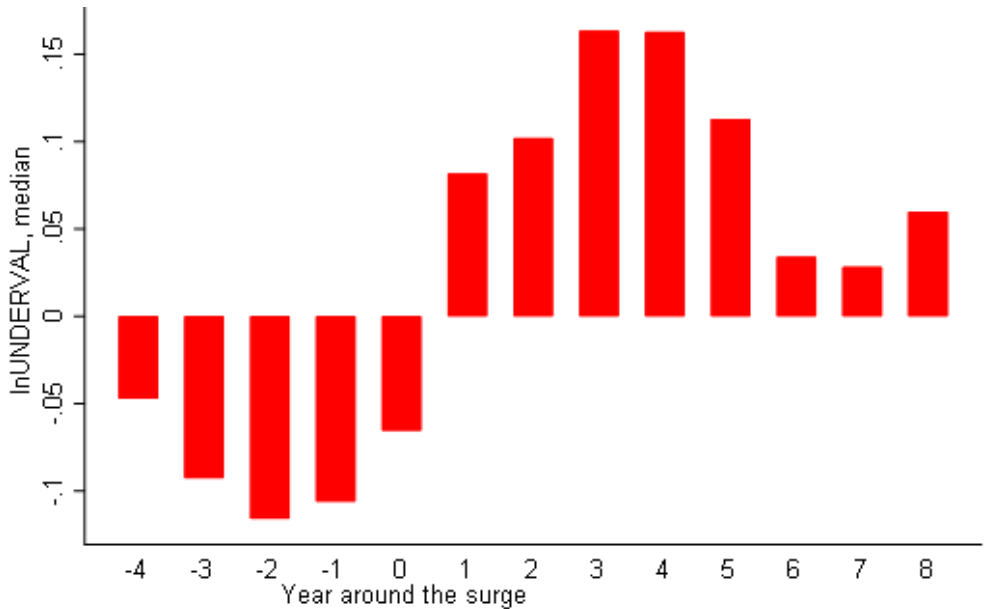
the surge. The median growth accelerates to 4% during the first three years following the surge, from 1% prior to it.

Figure 3: Real per capita GDP growth around the surge (in percent, median)



Source: Eora database, World Bank, and author's calculations.

Another interesting question is, to what extent these surges are taking place amid large changes in the real exchange rate. Figure 4 shows movements in the median of the real exchange rate misalignment. The latter is calculated based on data from the Penn World Tables and essentially a real exchange rate adjusted for the Balassa-Samuelson effect (see Rodrik, 2008).⁴ In our sample, a move from overvaluation toward undervaluation—using the methodology proposed by Rodrik (2008) to estimate real exchange rate misalignment based on Balassa-Samuelson regressions—precedes surges on average. Five years before the surge, the exchange rate tends to be nearly 10% overvalued, and by the end of the surge, it is about 13% undervalued.

Figure 4: Regression based: $\ln\text{UNDERVAL} = \ln\text{RER} - b \cdot \ln\text{GDPpc} - c \cdot \text{Yearly dummies}$ 

Source: Penn World Table, and author's calculations.

What triggers take-offs?

This section focuses on dissecting the identified episodes of surges. We are interested in what can possibly trigger sustained periods of increased participation in global value chains. The literature so far has mainly focused on the drivers of the participation in global value chains.

We assess the contribution of:

- **Structural factors:** Natural resource dependency measured by the share of oil rents in GDP drawn from the World Bank, economic structure approximated by the share of the industry in GDP (from World Bank databases), governance and institutional quality proxied by the average of ICRG sub-indices. We also control for the occurrence of internal conflicts in each country from the UCDP/PRIO armed conflict data set.
- **Policy variables:** Trade and corporate taxation (ratio of trade or corporate income taxes over GDP), infrastructure approximated by access to electricity (percentage of the population with access to electricity), human capital (school enrolment at the tertiary level), and foreign direct investment (FDI-to-GDP ratio). All series are taken from the World Development Indicators database.

We model a linear probability model of the likelihood of observing a surge, conditional on a battery of observables drawing on the list above. The specification will take the following form:

$$P[S_{it} = 1 | X_{it-1}] = X'_{it-1}\beta + \epsilon_{it}, \quad (1)$$

Where, S is a dummy variable taking 1 around the start of the “surge” and 0 otherwise, whereas X denotes the bloc of initial (pre “surge”) values of the explanatory variables entering the model as expressed in averages over the past five years. These variables include a mix of structural and policy variables as discussed above.

Equation 1 is estimated for the overall sample of developing countries, including African countries, as to maximize the number of positive occurrences of surges in the sample, which is too skewed towards zeroes. We rely on the modified logit framework suggested by King and Zeng (2001) that is designed to better handle rare-occurrence bias. This method is particularly useful to the modelling of relatively rare event data such as the supply chain acceleration episodes. In presence of rare binary events, standard statistical procedures, such as logit or probit regressions can underestimate the probability of occurrence of the event due to the high concentration of non-events in the data.

The results are shown in Table 2. We start with parsimonious regressions where we enter each correlate at the time (column 1 to column 7) which does not yield to any meaningful results. In contrast, when we estimate the full model with all the correlates entering simultaneously, the results are stark (column 8). Surges in the participation in value chains appear to be associated with higher FDI inflows and stronger governance quality prior to the surge. The important role played by FDI and governance quality, holds well with the previous finding that the bulk of these surges occurred in countries that embarked on backward participation in global value chains in the manufacturing sector. Foreign value-added entered through FDI, which is attracted by good governance quality on the ground.

This result is also in line with the recent findings by Qiang et al. (2021) who focused on the level of participation in global value chains as opposed to the surges, as defined here. The authors found empirical evidence—a mutually reinforcing relationship between FDI and global value chain participation—and argued that, multi-national corporations have driven the phenomenal rise of global value chains in the past three decades as they have unbundled production processes and spread their networks on a global scale.

Table 2: Correlates of value chain surges - ReLogit estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real GDP per capita	-0.0561							0.491
	(-0.350)							(0.807)
FDI-to-GDP		0.0137						0.0904***
		(0.763)						(3.211)
Access to electricity			-0.00228					0.00111
			(-0.448)					(0.0548)
Enrolment in tertiary				-0.00578				-0.0591
				(-0.695)				(-1.557)
Corporate taxes-to-GDP					-0.0154			-0.00432
					(-0.279)			(-0.0415)
Trade taxes-to-GDP					-0.175			-0.251
					(-1.490)			(-1.386)
Governance quality (ICRG)						2.344*		7.045***
						(1.651)		(2.733)
Internal conflicts							-0.469**	-0.371
							(-2.030)	(-0.713)
Constant	-3.527***	-3.980***	-3.726***	-3.802***	-3.403***	-5.013***	-3.818***	-9.473**
	(-2.923)	(-24.60)	(-10.80)	(-16.97)	(-9.058)	(-7.311)	(-25.21)	(-2.565)
Observations	2,427	2,397	2,046	1,832	1,983	1,968	2,532	1,027

Notes: Robust z-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1

5. Macroeconomics effects of surges in global value chain participation

This section provides an empirical assessment of the impact of sudden shifts in global value chain integration on sub-Saharan African economies. As these “surges” will be defined as unique events, one could expect them to be rather transformative in the way trade will affect these economies.

We are interested in several outcome variables which include per capita GDP growth, structural transformation—through the change in sectoral shares in GDP—and poverty rates. These variables are chosen to capture both the cyclical effects (GDP growth), the implications for structural transformation (shifts in sectoral shares in GDP, exports diversification and sophistication), and the distributional consequences of supply chain surges (impact on poverty rates).

The modelling framework is the local projection method (LPM), which allows tracing the cumulative effect of the shock variable (the “surge”) throughout the outer years, conditional on the strong assumption of exogeneity of the shock itself (Jordà, 2005). We, therefore, estimate the following model, and will be interested in the coefficients at each horizon associated with the shock variable S observed in country i at the year t .

$$y_{i,t+h} = \theta_h S_{it} + \Psi(L)y_{i,t+h-1} + Z'_{it}\gamma_h + u_i + \eta_t + \epsilon_{i,t+h} \quad (2)$$

Where, $y_{i,t+h} = Y_{i,t+h} - Y_{i,t-1}$, and Y denotes either the index of export concentration, the log of the export sophistication measure, the logarithm of real per capita GDP, the share of the industry in GDP, or the poverty rate. GDP per capita, industry share, and the poverty rate are taken from World Bank's World Development Indicators database. The sample includes all developing countries, including African countries.

The main hypothesis is that, surges in value chain participation are associated with long-term structural transformations that nurture long-term growth through either higher labour productivity or higher accumulation of physical capital. The impact gains strength over time. To our best knowledge, this is the first study to provide such an examination of the macroeconomic transitions around significant shifts in value chain participations.

One key advantage of the local projection technique over more traditional methods such as VARs is the flexibility in dealing with nonlinear forms. We expect the “surges”

to be associated with higher export diversification and sophistication over time, and with aggregate growth, industrialization, and poverty reduction.

Impact on export diversification and sophistication

We start with regressions focusing on the impact of value chain accelerations on export diversification and sophistication. These two phenomena have been found in the literature to be strongly associated with growth and macroeconomic stability (Hausmann et al., 2007; da Costa Neto & Romeu, 2011). We use the CEPII's BACI database, a detailed international trade database which provides disaggregated data on bilateral trade flows for more than 5,000 products and 200 countries over the period 1996–2019.⁵ We then define export concentration as the Herfindahl-Hirschman index of each country's export basket over time—the higher the index, the stronger the degree of export concentration in a few products. To measure the sophistication of a country's export basket, we rely on the measure proposed by Hausmann et al. (2007), which examines to what extent a country is exporting products that require greater levels of development to be produced and exported.⁶

We then assess the effect of the supply chain accelerations on export diversification and sophistication using a panel dataset of developing countries and the local projection method. We restrict the horizon of the local projection to up to five years, to pick up effects that can be statistically estimated with a decent degree of confidence.

We find that an acceleration in the participation in international value chains—as defined earlier in the paper—is associated with higher diversification with an increase amounting to about 16 percent of the typical five-year cumulative change in export diversification observed in the sample. Regarding sophistication of exports, the regression results also show a positive impact of supply chain surges only from the fifth year from the start of the acceleration. In terms of magnitude, the effect amounts to 17% of the typical five-year cumulative change in export sophistication observed in the regression sample. These results point to non-negligible impacts of surges on fundamental shifts in exports, but also that these effects do take time to materialize, which is not surprising.

Table 3: Dynamic effects of surges in participation in global value chains on export diversification and sophistication

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Cumulative change in export product concentration (Herfindahl–Hirschman index [0 , 1])					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Global value chains [1: Surge]	-0.000736	-0.000145	0.00391	-0.0127	-0.00962	-0.0164**
	(-0.314)	(-0.0313)	(0.437)	(-1.029)	(-1.658)	(-2.162)
Observations	1,691	1,589	1,487	1,385	1,288	1,195
Number of countries	102	102	102	102	102	102
	Dependent variable: Cumulative log change in export sophistication (Hausmann, Hwang and Rodrik (2007) index)					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Global value chains [1: Surge]	-0.00170	0.00361	0.0196	0.00565	0.00609	0.0382**
	(-0.0844)	(0.165)	(0.820)	(0.238)	(0.408)	(2.141)
Observations	1,691	1,589	1,487	1,385	1,288	1,195
Number of countries	102	102	102	102	102	102

Notes: All models include lagged values of the dependent variables and country-specific effects; t-statistics in parentheses based on Discroll-Kraay standard errors; *** p<0.01, ** p<0.05, * p<0.1

Impact on growth, industrialization, and poverty

We now turn to other macroeconomic implications of surges. Table 4 shows the results of the local projection regressions for growth, industrialization, and poverty reduction. We find that acceleration in the participation in international value chains—defined here as the share of foreign inputs embodied in exports—is associated with very strong growth in the order of five percentage points cumulatively after five years. This growth is associated with rapid industrialization as the share of industry in GDP increases by an average two percentage points in the projection period. Ultimately, this positively leads to reduced poverty, even though the small sample associated with the poverty regressions calls for caution.

Table 4: Dynamic effects of surges in participation in global value chains on growth, industrialization, and poverty-Local projections

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Cumulative log change in real GDP per capita					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Global value chains [1: Surge]	-0.00374 (-0.606)	-0.0120 (-1.095)	0.00822 (0.649)	0.0301*** (3.001)	0.0465*** (5.093)	0.0574*** (5.418)
Observations	2,085	1,983	1,891	1,794	1,702	1,615
Number of countries	101	100	101	101	100	101
	Dependent variable: Cumulative percentage points change in the share of industry in GDP					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Global value chains [1: Surge]	0.703*** (6.021)	1.306*** (5.179)	1.910*** (3.017)	1.737** (2.244)	1.866*** (2.869)	2.070*** (4.913)
Observations	1,976	1,872	1,778	1,679	1,589	1,503
Number of countries	102	101	102	100	99	100
	Dependent variable: Cumulative percentage points change in the poverty gap rate					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Global value chains [1: Surge]	-0.836* (-1.725)	0.776 (0.650)	-0.985* (-1.725)	-1.109* (-2.048)	-1.464** (-2.570)	-1.285*** (-3.012)
Observations	340	316	304	277	246	240
Number of countries	32	33	33	35	28	34

Notes: All models include lagged values of the dependent variables and a full battery of fixed effects; t-statistics in parentheses based on Discroll-Kraay standard errors; *** p<0.01, ** p<0.05, * p<0.1

6. Concluding remarks

This study has examined episodes of surges in participation in global value chains in the developing world and in Africa. It has demonstrated that such episodes are not common and that it is particularly difficult for developing countries to systematically integrate those networks. In Africa, only 11 such episodes are recorded, with countries like Tanzania or Rwanda leading the way.

The paper has shown that, strong FDI inflows and governance quality tend to precede these surges. Once they occur, the surges are associated over time with higher export diversification and sophistication, stronger per capita growth, lower poverty rates, and importantly, seem to move in tandem with faster industrialization.

Notes

1. Low-tech manufacturing includes food & beverages, textiles & apparels, wood & paper, metal products, recycling, and other manufacturing.
2. High-tech manufacturing includes petroleum & chemicals, electrical & machinery, and transport equipment.
3. Primary sector includes agriculture, fishing, mining, and quarrying.
4. Specifically, we regress the real exchange rate at PPP on real per capita GDP and calendar-year fixed effects, and the extent of misalignment is measured as the difference between the log of the real exchange rate at PPP and the log of the fitted value from the regression.
5. The database is built from data directly reported by each country to the United Nations Statistical Division (Comtrade). The CEPII developed a procedure that reconciles the declarations of the exporter and the importer, that may be different in the original data. Products are defined as items from the Harmonized System nomenclature, at the 6-digit level. At a much finer disaggregation level, the nomenclature would not be similar across countries anymore.
6. As discussed by Jarreau and Poncet (2012), the measure aims to avoid the direct determination of the intrinsic product features (the technology embedded in it, the specialized skills required to produce it, R&D investments, and so on).

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