

Greasing the wheels of value chain transformation in Africa: What is the role of access to finance in this regard?

(Draft, not for citation)

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Abstract: Despite the well documented benefits of economic transformation, value chains in Africa have remained untransformed. Lack of access to finance has been identified as the leading factor preventing value chain transformation on the continent. In this regard, this paper endeavoured to investigate the nature and significance of the impact of access to finance on value chain transformation in Africa. The paper makes use of a robust Generalized Method of Moments (GMM) models to investigate the potential of access to finance as an enabler to facilitate value transformation in Africa. The study included 44 African, covering the period 2004 to 2016. Results from the paper show that, even though access to finance on the continent remains low compared to other regions, it is an important factor in the value chain transformation agenda through its impact on manufacturing value added, manufactured exports and the concentration of exports. Specifically, results show that access to finance has a positive influence on manufacturing value addition and manufactured exports. These results show that as access to finance increases, firms are likely to invest in technology which increases productivity, hence manufacturing value added. Secondly, as access to finance increases, firms are likely to export more. Ultimately, results showed that improving financial access increases export diversification, thus reducing concentration of its export basket. These findings are invaluable to policy and programme design pertaining to access to finance programmes for firms at different levels of the value chain, depending on their needs. Different sizes of firms at different levels of the value chain require different interventions concerning access to finance.

2019 Economic Society of South Africa (ESSA) biannual conference

September 2019

Johannesburg, South Africa

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1. Background

Recent studies have repeatedly identified lack of access to finance as the main barrier to value chain transformation and access to the export market (OECD & WTO, 2013 and WTO, 2016). Of greater concern is the fact that small and medium-sized enterprises (SMEs) face the greatest hurdles in accessing affordable finance to move up the value chain. 39% of SMEs in developing countries remain without access to financial services, while an additional 32% is underserved (Saleem & Cavenaghi, 2016). In Africa, unmet demand for trade finance is \$120 billion, which is a third of the continent's trade finance market (WTO, 2016).

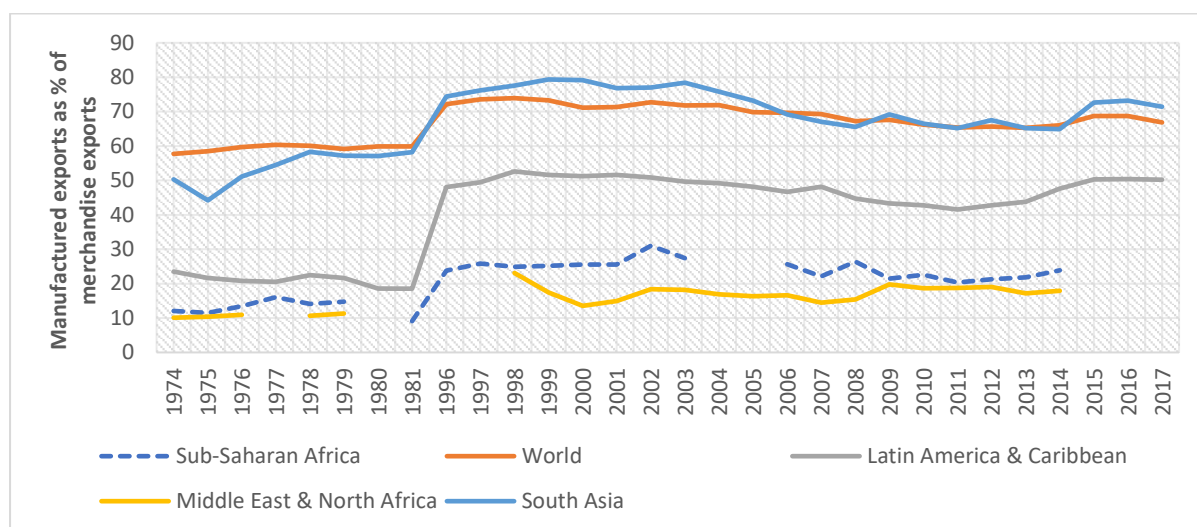
However, limited scholarship has been committed to empirically investigate the influence of access to finance on value-chain transformation. In this regard, this paper employs robust econometric technique to empirically test the influence of access to finance on value chain transformation in Africa. Therefore, findings from this paper are invaluable to supporting evidence-based policy making, as the continent is seized with the economic transformation agenda in line with priority areas of the Sustainable Development Goals (SDGs).

Value chain transformation provides developing countries the opportunity to leap-frog their development process (World bank, 2018) by accelerating industrialization (Taglioni & Winkler, 2014). In addition, it presents an opportunity for countries to develop industrial policies that build the necessary capabilities, which respond to national and regional needs (United Nations Economic Commission for Africa, 2016).

The need for value chain transformation is pertinent to Africa, where the structure of her economies remains untransformed and reliant on exports of commodities. Dependency on export of commodities makes African economies vulnerable to price fluctuations, creating risks for both their internal and external balances. The situation becomes even more precarious given that the continent remains home to the highest proportion of people living in abject poverty (United Nations Economic Commission for Africa, 2016).

Figure 1 below shows that in Africa, manufactured exports remain a very small proportion of the merchandise exports compared to the world average and other comparable regions such as Latin America and South Asia. This demonstrates how untransformed African economies remain.

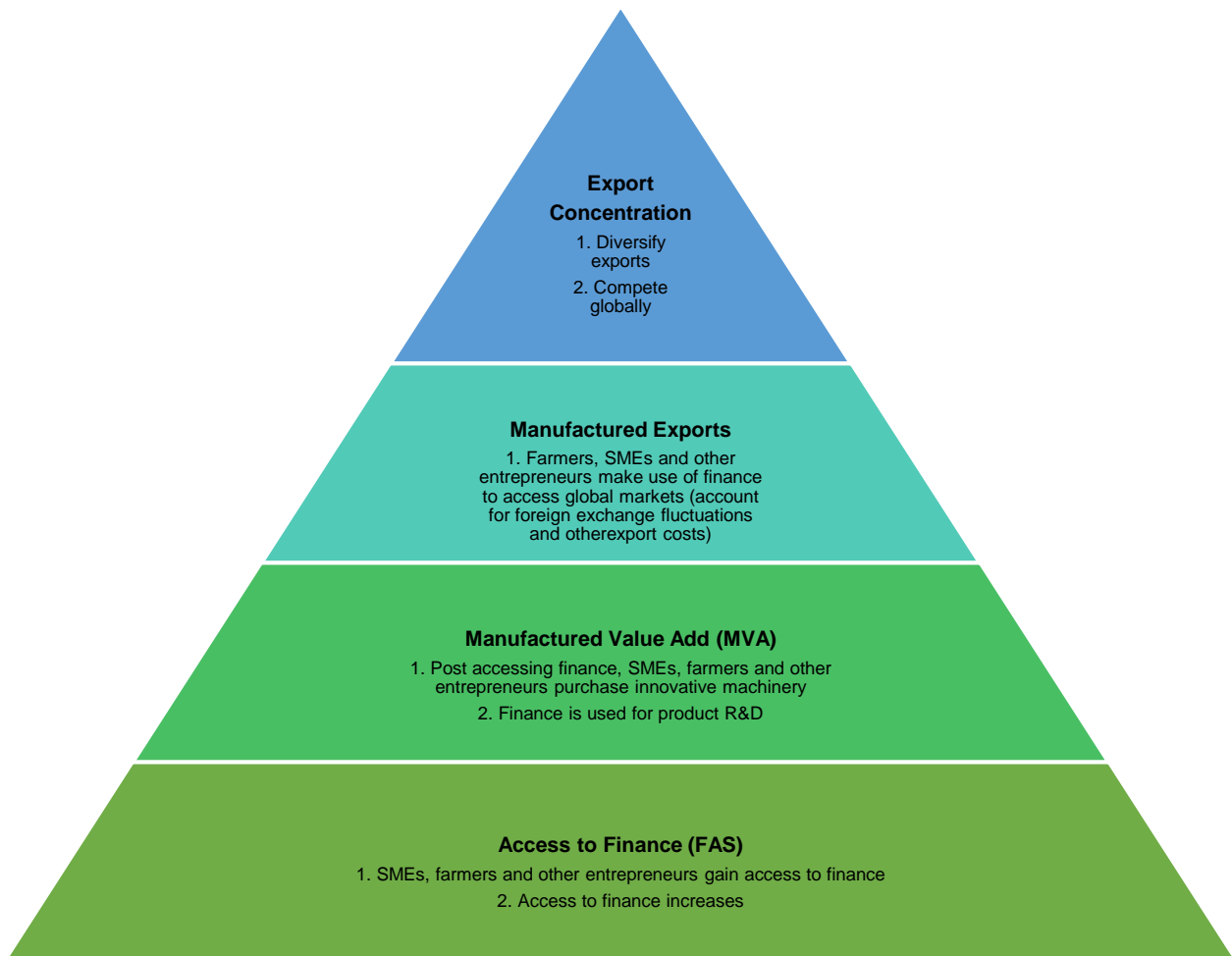
Figure 1: Manufactured exports as a percentage of merchandise exports



Source: Analysis based on World Development Indicators (World Bank, 2018)

According to our review, access to finance enables value chain transformation in three stages: firstly, finance enables firms to invest in new technology leading to increased productivity (Levine, 2004). Increased productivity should be reflected in increasing importance of manufacturing value added. Secondly, access to finance facilitates access to the export market by manufacturers, thus increasing the share of manufactured exports (Beck, 2002). Thirdly, as firms invest in new technologies, they increase their product offerings which are sold onto the export market, thus leading to export diversification (Altowaim, 2016 and Ebireri & Paloni, 2016). Thus, ultimately access to finance would result in diversified exports.

Figure 2: Stages of value chain transformation aided by access to finance.



Source: Authors' own based on literature review.

Therefore, given that manufacturing value added in Africa and share of manufactured exports remains lowest, whilst the export basket is highly concentrated, it is imperative that effort be committed to understand how access to finance can be catalytic to transforming the structure of its economies. This paper adds value in this regard.

The remainder of this paper is organised into three sections: (i) the state of value chain transformation in Africa, (ii) methodology and data analysis, and (iv) policy implications and conclusion.

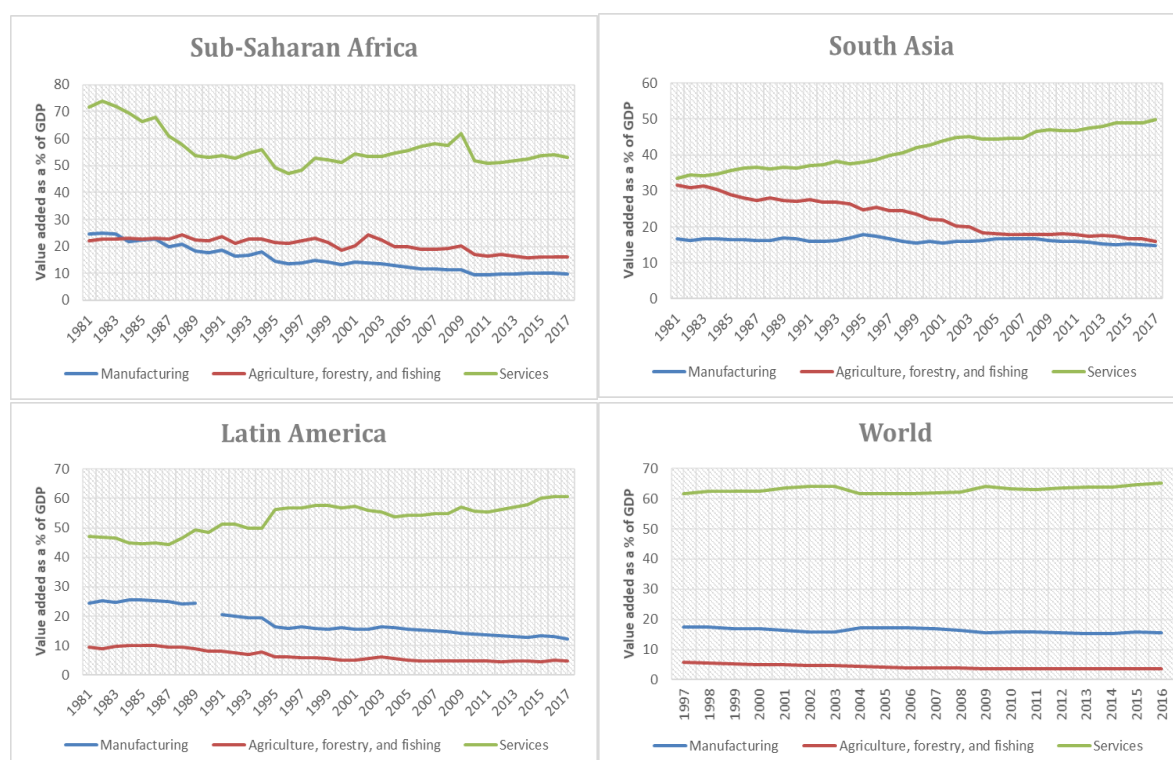
2. Value chain transformation in Africa

Value chain is defined as the “*range of value-adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs, assembly, physical transformation, acquisition of required services such as transport or cooling, and ultimately response to consumer demand*” (World Bank , 2010). On the other hand, transformation is defined as *the transition of an economy from low productivity and labour-intensive economic activities to higher productivity and skill intensive activities*” (UN-Habitat, 2016). When put together, value-chain transformation entails the shift of value-adding activities from low productivity to higher productivity activities across the three main sectors, agriculture, manufacturing and services. Such a shift should:

- help a country to achieve greater diversity of the economic structure, thus building a country’s resilience to vulnerability to poverty and external shocks;
- involve adoption and use of technologies to change what an economy produces and how it does it; and
- should trigger the process of specialization, technological advances and agglomeration (UN-Habitat, 2016).

Figure 3 below shows the evolution of regional economies to provide an overview of whether the economic sectors have transformed or not. Economies that have transformed over time should exhibit an increasing importance of the services and manufacturing sectors over time.

Figure 3: Evolution of the structure of economies



Source: Analysis based on World Development Indicators (World Bank, 2018)

The figure above shows that, in Africa the importance of the services sectors has declined compared to other regions and the world average. At the same time, both the agriculture and manufacturing sectors have also declined over time. Unlike in other regions where the decline in agriculture and manufacturing was because of the growing services sector, the decline in the economic sectors in Africa suggest that not only has value chains in Africa remained untransformed, the economy has contracted over time. This is worrying given the persistently high levels of unemployment and poverty on the continent.

2.1. Access to finance and value chain transformation

While there are several theories and factors have been suggested for value chain transformation or its lack, thereof, the focus of this paper is one how access to finance can grease the wheels of economic transformation on the continent.

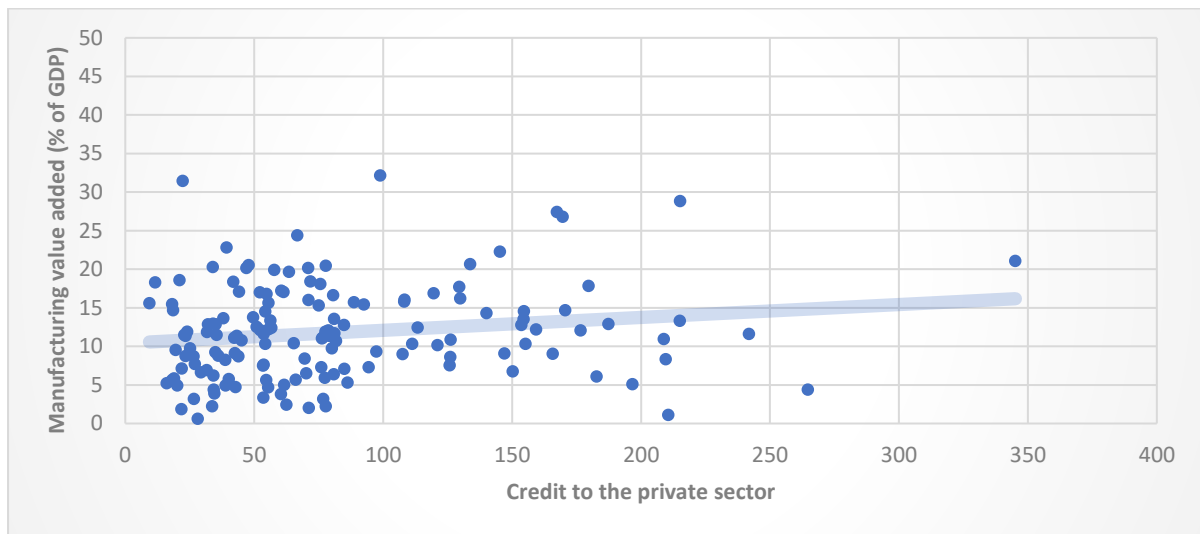
Economic theory predicts that access to finance promotes innovation and adoption of new technology (Bagehot, 1874), and thus be able to transform their production set-up. Some of the channels through which access to finance can influence export diversification include:

- Mobilisation of savings: Financial systems overcome transaction costs associated with collecting savings from disparate savers, exploiting economies of scale and overcoming investment indivisibilities. Many projects require huge capital investments and are risky, which is normally beyond the means of individual investors. However, with financial institutions, 'good projects will not fail for lack of capital' (Levine, 2004:23).
- Source of comparative advantage: Countries with an identical endowment structure might face different production costs because of credit imperfections, which may lead some countries to face higher cost of credit. Consequently, these countries will have different comparative advantages for producing similar goods that require finance (Altowaim, 2016 and Ebireri & Paloni, 2016).
- Innovation and technological improvement: Financial systems can reduce information acquiring and processing costs. This will improve ex-ante assessment of investment opportunities leading to the identification of the best production technologies and more efficient allocation of capital. Identification of profitable projects boosts the rate of technological innovation (Levine, 2004).

Thus, as access to finance increases, firms are expected to shift in comparative advantage towards more profitable export goods, resulting in diversification in the export basket (Altowaim, 2016). This is in line with earlier findings by Beck (2002) in a study aimed at testing whether countries with a higher level of access to finance have higher export shares and trade balances in manufactured goods. Results from the study confirmed that countries with better-developed financial systems are likely to have a higher export share and favourable trade balance in manufactured goods.

Furthermore, a correlation analysis between access to finance and variables of interest, manufacturing value added, share of manufacturing exports and export diversification for 214 countries shows a prima facie case requiring an in-depth investigation of the relationship. Figure 4 below shows a positive correlation between credit to the private sector and manufacturing value added. This shows that countries with higher access to finance have a higher value added from the manufacturing sector.

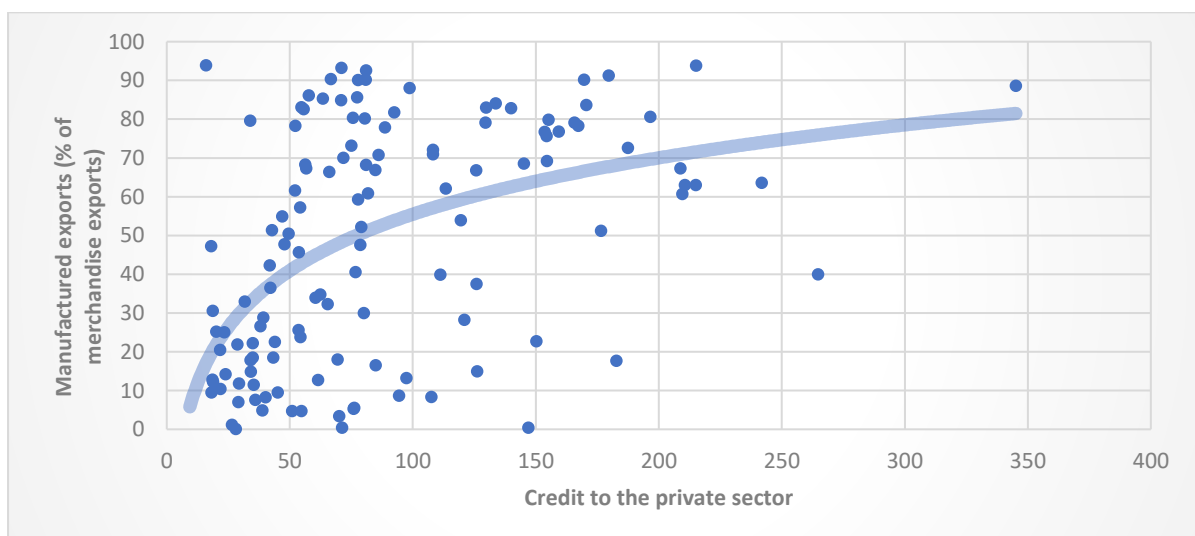
Figure 4: Correlation between access to finance and manufacturing value added



Source: Analysis based on World Development Indicators (World Bank, 2018)

Figure 5 below shows a strong positive and exponential relationship between access to finance and the share of manufactured exports. The figure shows that in countries where access to finance is greater, the share of manufactured exports is higher.

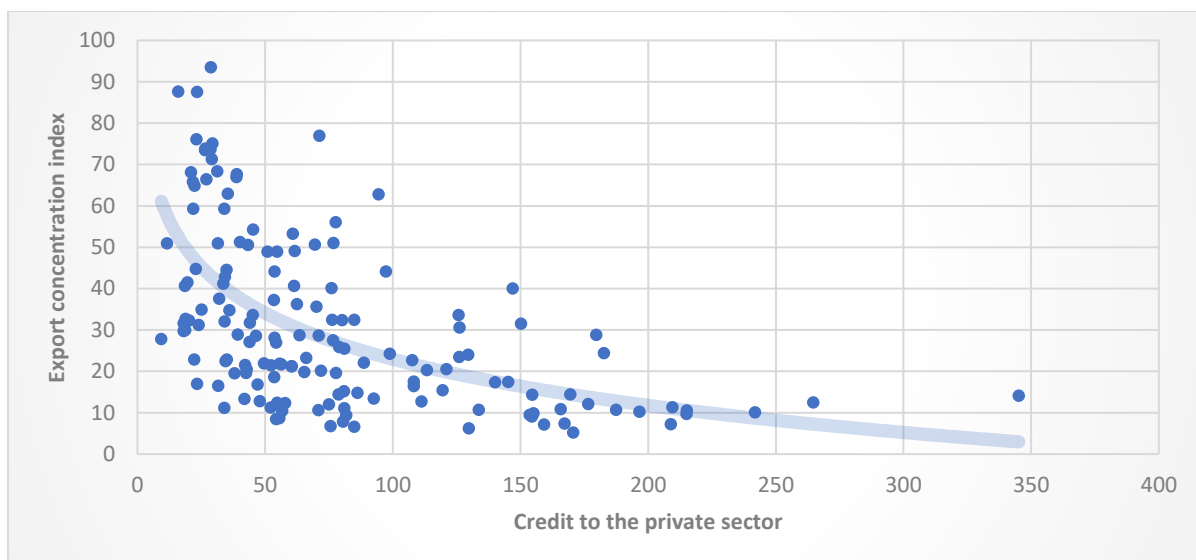
Figure 5: Correlation between access to finance and share of manufactured exports



Source: Analysis based on World Development Indicators (World Bank, 2018)

Furthermore, a correlation analysis between access to finance and export concentration shows a strong negative relationship between the two variables. A negative relationship shows that as access to finance increases, export concentration is expected to decline as firms can invest in new technology to diversify the export basket.

Figure 6: Export concentration and access to finance



Source: Analysis based on World Development Indicators (World Bank, 2018)

Thus, the analysis presented above shows that there is a strong relationship between the level of access to finance and the levels of manufacturing value added, manufactured exports and exports concentration. This demonstrates a case for an in-depth econometric investigation to establish the nature and significance of such a relationship.

3. Methodology and data analysis

3.1. Methodology

In this study, the empirical analysis of the key determinants promoting export concentration was performed using System Generalized Method of Moments (GMM) estimator. The GMM was employed for this paper to address the endogeneity problem usually associated with macroeconomic variables. Secondly, country data obtained consisted of unobserved time invariant country effects which then implied that the use of Ordinary Least Squares (OLS) levels and Within Groups estimators would have produced biased and inconsistent results. The third reason for using GMM estimators is that the independent variables themselves are influenced/correlated to the current and past error term, moreover there is heteroskedasticity and autocorrelation among the independent variables. Thus, the GMM estimator overcomes the issues of endogeneity of independent variables and fixed effects.

The analysis was carried out in three stages, sequentially, starting with the impact of access to finance on manufacturing value added. The second stage was investigating the impact of access to finance on manufacturing exports. Lastly, the relationship between access to finance

and the level of export diversification was investigated. Export diversification was measured by the export concentration index. Access to finance was measured by the amount of outstanding claims (borrowing) by firms expressed as a percentage of GDP. Manufacturing value added was expressed as percentage of GDP. Manufactured exports is a share of manufactured exports in merchandise exports. Trade is a measure of openness which expresses total trade as a percentage of GDP.

The model employed in the empirical analysis was specified as follows:

$$MVA = \beta_1 FAS + \beta_2 GDP + \beta_2 Trade + \beta_3 ExpConc + \beta_4 CPI + \beta_5 Tariff + \beta_6 Logs + Dyear + \varepsilon \quad (1)$$

$$ManExp = \beta_1 FAS + \beta_2 Trade + \beta_3 MVA + \beta_3 ExpConc + \beta_4 CPI + \beta_5 Tariff + \beta_6 Logs + Dyear + \varepsilon \quad (2)$$

$$ExpConc = \beta_1 FAS + \beta_2 LogGDP + \beta_2 Trade + \beta_3 Vadd + \beta_4 LogCPI + \beta_5 Tariff + \beta_6 Logs + Dyear + \varepsilon \quad (3)$$

Where; *ManExp* is manufacturing exports, *FAS* is financial access, *Trade* is a country's trade, *Vadd* is product value addition, *MVA* is manufacturing value add, *Dyear* is dummy variable for years, *LogCPI* is the logarithmic of CPI, *LogGDP* is the logarithmic of GDP, *ExpConc* is exports concentration, *Tariff* is the measure of the level of tariffs, and *Logs* measures the level of logistics and transport infrastructure in each country.

3.2. Data

For this paper, the crucial determinants promoting export concentration are tested for 44 African countries, limited to the period 2004 to 2016 due to the recent popularity of value chain development and the availability of annual data. Financial access data used in this study was obtained from the World Bank and trade data was obtained from World Trade Organisation (WTO).

The table below reports the average, the minimum, the maximum, and the descriptive statistics of the series.

Table 1: Descriptive statistics

	Obs	Mean	SD	Min	Max
ExConc	611	44.2870	22.6880	11.9234	96.0724
FAS	558	22.5424	18.5416	0.73664	85.1554
Loggdp	598	7.1468	1.1027	5.36618	9.9200
Trade	591	79.1126	33.9260	20.7225	311.3553
MVA	548	10.1980	5.8040	0.2326	35.2154
Logcpi	568	1.6102	1.1196	-3.2068	10.1027
ManExp	455	27.4917	24.4333	0.0004	94.4611
LogGdp	598	7.1468	1.1027	5.3661	9.9200
LogCPI	568	1.6102	1.1196	-3.2068	10.1027

Tarif	479	12.6189	4.2859	1.7600	28.4500
Logs	198	2.2548	0.39159	1.2700	3.7900

Notes: Logs is logistics, Tarif is tariffs.

3.3. Empirical analyses

The table below reports GMM results for manufactured value added, manufacturing exports, and export concentration as dependent variables. The variable of interest in the GMM models is financial access' (FAS). Another important indicators are the Sargan, Hansen and Arellano-Bond (AR(2)) test's p-values which should be at least be 0.10 or above.

Table 2: GMM estimates (estimates results showing the coefficient and standard error in parenthesis)

	MVA (1)	Manufactured Exports (2)	Export Concentration (3)
Lagged dependent variable	0.4671113 (0.0350203)***	-0.0244359 (0.0967037)	0.2079527 (0.0483232)***
FAS	0.0635516 (0.019511)***	0.4852697 (0.1766267)***	-0.2340714 (0.1093627)**
ExConc	-0.0175863 (0.0147877)		
Loggdp			-1.751146 (6.819386)
Trade	0.0264594 (0.002714)***	-0.0650696 (0.0362446)*	0.0141704 (0.0187935)
MVA		0.6460681 (0.5143625)	
Logcpi	-0.0106384 (0.111884)		-0.9336393 (0.7894238)
Loggdp	-2.350148 (1.145858)*		
Vadd			0.0468982 (0.1665679)
AR(2)	0.663	0.632	0.603
Sargan test	0.375	0.873	0.138
Hansen test	1.000	0.981	1.000
Number of Groups	44	37	44

Notes: The superscripts ***, ** and * denote the significance at 1%, 5% and 10% level, respectively. The values reported for AR(2) are the p-values for the null hypothesis of no second-order serial correlation the first-differenced residuals. The p-values are reported for Sargan and Hansen tests.

Results presented in Table 2 show that there is a positive and significant relationship between FAS and the relevant indicators at the three levels of the value chain. Model one indicates that FAS has a positive impact on MVA, this suggests that an increase in FAS is likely to result in an increase in MVA. As indicated above when firms' access to finance is improved, firms are will invest in advanced manufacturing technology which improves firms' productivity.

Also, the second model shows that there is a positive relationship between FAS and manufactured exports. The second model results indicate that an increase in FAS will result in an increase in manufactured exports. When firms gain access to finance, manufacturing firms interested in entering global markets will do so.

The third model shows that there is a negative relationship between FAS and export concentration. This implies that an increase in FSA is likely to result in a decrease in export concentration. When firms' access to finance is improved, firms will diversify products they export and this will lead to a decrease in the export concentration ratio.

In order to enhance the results the paper also included three tests in analysis/estimations. These are the AR(2), Sargan, and Hansen tests. The AR(2) test for serial correlations analysed the first and the second order auto correlated disturbances in the three equations mentioned above; this measure ensures that there is no serial correlation in the error term. While the Sargan and Hansen tests ensure that there is no correlation between the error term and variables. In this study, the Sargan and Hansen test detected the correct specification, and reports the p-values for the null hypothesis of instrument validity (p-values were above 0.10); while the AR(2) results also indicate that there is no serial correlation in the error terms.

According to our review and empirical analyses, access to finance would enable value chain transformation. Initially, firms with access to finance would be able to invest in new technology leading to increased productivity (Levine, 2004). These firms' productivity would increase as firms would improve manufacturing value added. Secondly, access to finance would facilitate firms' access to the export market by manufacturers, thus increasing the share of manufactured exports (Beck, 2002). Thirdly, as firms invest in new technologies, they are expected to increase their product offerings which would be sold onto the export market, thus leading to export diversification or reduction in export concentration (Altowaim, 2016 and Ebireri & Paloni, 2016).

4. Policy implications and conclusion

This paper employed a robust econometric technique to empirically test the influence of access to finance on value chain transformation in Africa. Analysis was based on country-level data across 44 African countries. The analysis was carried out based on three models, based on manufacturing value added, manufactured exports and export diversification.

Based on the results, the paper finds that access to finance across different players along the value chain is vital. Our results are relevant and timely in light of the current transformation agenda and the SDGs. Thus, this paper provides policy makers with evidence to support the

need for programmes to increase access to finance, not only to one level of the value chain, but across all levels. However, this would require policymakers to assess financial needs of different players across the value chain. The type of finance that manufacturing firms would require to invest in new technology is different from that which is required by exporters. Even among the different manufacturers and exporters, the type of finance required may vary according to the size of the firm.

We propose that, whatever interventions, policy makers consider improving access to finance, they should be in line with value chain finance principles suggested by the World Bank and FAO listed in the box below.

Box 1: FAO’s Committee on World Food Security (CFS) Principles for Responsible Investment in Agriculture and Food Systems

Responsible investment: 1. Contributes to food security and nutrition; 2. Contributes to sustainable and inclusive economic development and poverty eradication; 3. Fosters gender equality and women’s empowerment; 4. Engages and empowers youth; 5. Respects tenure of land, fisheries, and forests, and access to water; 6. Conserves and sustainably manages natural resources, increases resilience, and reduces disaster risks; 7. Respects cultural heritage and traditional knowledge, and supports diversity and innovation; 8. Promotes safe and healthy agriculture and food systems; 9. Incorporates inclusive and transparent governance structures, processes, and grievance mechanisms; and 10. Assesses and addresses impacts, and promotes accountability.

Source: (FAO, 2014) and (Bank, World, 2018)

Appendix 1 below presents existing access to finance intervention in several African countries that adhere to some of the above-mentioned principles. The appendix also mentions alternative access to finance interventions to be sought after by agricultural players along the value chain. These are some of the case studies that may be considered when designing new programmes.

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Appendix 1

1. Case studies: Agricultural value chains in Africa

Multiple countries across the Continent have established innovative financial methods to nudge smallholder farmers, subsistence farmers and farmers' co-operatives to meaningfully participate in the agricultural value chain and plausibly participate in the global or regional agricultural value chain. We have identified a number of African countries case studies for agricultural value chain finance.

Table 3: Agricultural value chain finance (AVCF) in Africa

Country	Programme	Description	Benefits	Challenges	Results (if any)
Kenya	Githunguri Dairy and Community SACCO	The SACCO provides basic savings, credit, transactional and cash management services to dairy farmers and other rural and town dwellers including coffee and tea growers.		Still find financing small-scale farming a challenge.	
Ghana	Blue Skies	Blue Skies is a processor and exporter of fresh cut fruit which it exports to Europe. Blue Skies enables individual farmers to obtain pre-finance production and also provides technical assistance. Individual farmers supply their produce to Blue Skies for grading in exchange of a pre-produce finance.		Not an outgrower scheme (although the business offers pre-production finance to farmers) and the arrangements made with farmers are not formal.	
Tanzania	TechnoServe	TechnoServe has been working in Tanzania with farmers, cooperatives, suppliers and processors to strategically develop competitive industries around key crops, including cash crops such as cocoa and coffee and staples such as maize and rice. TechnoServe is helping farmers make the transition from subsistence to commercial production, assisting processors to improve operations and identifying opportunities for investment in agriculture.	Assisted in establishing KILICAFE, an organization owned by 9 000 smallholder coffee farmers		Markets over USD3 million of smallholder coffee per year
Zambia	Anonymous Zambian agribusiness	The agribusiness acted as a lead chain actor by providing a guaranteed sales agreement for farmers. The agribusiness as a lead chain actor approached a	Agribusiness benefits: Meeting set objectives of promoting the business' brand of input	Smallholders side selling, i.e. not honouring the contract to supply	

		third party to fund tractors and rippers (i.e. mechanization) on behalf of smallholder farmers. The agribusiness facilitated the relationship between the banks and the smallholder farmers. The lead actor evaluated farmers' creditworthiness and submitted a recommendation letter to banks on behalf of farmers at no commission.	supplies and obtaining produce from smallholder farmers. Smallholder farmers' benefits: Increased higher yields per hectare and higher-quality products. Reduced wastage as harvest was given to the agribusiness	harvest to agribusiness	
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Source: (African Rural and Agricultural Credit Association (AFRACA), 2008); (GIZ, 2011); (Middelberg, S.L., 2017)

The (Bank, World, 2018) emphasise that a significant amount of capital could be assigned to agricultural projects, however, there is hesitance that there are no partnerships to absorb risk, facilitation, or partnerships. The Zambian programme mentioned above presents how partnerships can be formed to unlock capital towards agriculture and agro-processing.

Identified challenges mentioned in the table above indicate that although alternative access to finance have been implemented to benefit smallholder farmers, there is still a need to improve and also formalise (in the case of Ghana Blue Skies) financial programmes offered to farmers. In this regard, the following section presents an alternative agricultural value chain finance system; some of the recommendations have been implemented elsewhere but at a smaller scale.

2. Recommendation on innovative instruments to transform value chains and support global trade

Table 4: Alternative agricultural value chain finance

Programme	Description	Benefits	Results (if any, if already established)
Commodity-backed finance	Agricultural inventories are used as an important component to make agricultural credit and professional storage more accessible.	1. Increasing local food processing capacity; 2. Reducing post-harvest losses; 3. Improving the quality of the goods stored under better conditions; 4. Potentially improving incomes for farmers through a combination of lower post-harvest losses and better prices from delayed marketing.	
Warehouse receipts systems (WRS)	Farmers store their harvest at the warehouse, and then farmers can use a warehouse receipt to obtain a loan. The receipt states the quality and		Efforts in Kenya and Malawi have already resulted in approximately US\$49 million of loans against receipts and have reached hundreds of thousands of farmers.

	quantity have been deposited at a particular location by named depositors. The warehouse operator holds the stored commodity in safe custody, and the depositor can use the receipt as collateral to borrow from banks.		There is additionally evidence of sharp decreases in post-harvest losses in Kenya.
Blended finance	A package comprised of concessional funding provided by development partners and commercial funding provided by a financier. This can help mitigate real or perceived risks which often lead to higher costs or delay or prevent a transaction from happening.		Since inception, the Global Agriculture and Food Security Program (GAFSP) Private Sector Window has supported 51 agribusiness and agrifinance projects in 25 countries, deploying approximately USD\$260 million of donor funds, leveraging an additional 1.7 times this funding on average from IFC and 3.5 times this funding from other development finance institutions and/or private investment. In parallel, the GAFSP Private Sector Window has supported 47 IFC Advisory Services projects across 27 countries for an amount of over US\$13 million.
Distributed ledger technologies (DLT) (also referred to as blockchain)	DLT is built around the concept of a ledger, or shared record of transactions. However, unlike traditional ledgers that are maintained by a trusted third party (e.g., government land registries, credit bureaus), DLT theoretically provides a mechanism for creating a shared record of transactions among several institutions or individuals in the absence of a trusted arbiter.	The need to share information across several parties including between the public and private sector, among competitors, and across industries—means that both transparency and shared control are important benefits of DLT.	

Source: (Bank, World, 2018); (CGAP, 2018)

Establishing these alternative financial instruments would require substantial government intervention, particularly regulation. For instance, in Côte d'Ivoire, farmers and financial institutions gained confidence in warehouse receipts once the government developed and adopted a legal (first warehouse receipts in West Africa) and regulatory framework (see (Bank, World, 2018)). Therefore, the suggestion is that market gaps and barriers identified in access to finance by farmers would be mitigated with intervention from government.